

**AN IN HOME COMPARISON OF DI FLASHCARDS AND A READING RACETRACK
PROCEDURE ON MASTERY OF SELECTED SIGHT WORDS WITH A TYPICALLY
DEVELOPING SIX-YEAR-OLD CHILD**

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Abstract: The purpose of this study was to evaluate the effects of the Direct Instruction (DI) flashcard system in comparison to the reading racetrack on the mastery of selected site words from the Dolch site word list of a 6-year old typically developing girl who was struggling with reading. The study was conducted in the participant's home at the kitchen table. The home is located in a rural community in the Pacific Northwest. Targeted sight words were chosen bases on the participants site word pretest score. The effects of both DI flashcard system and reading racetrack were evaluated using a single-subject multiple baseline design across five sets of targeted sight words. A clear functional relationship was shown between sight word mastery and both the implementation of the DI flashcard system and reading racetrack. The DI flashcard procedure was more effective with correct words read per minute and the number of words taught.

Key words: DI flashcards, reading racetracks, sight words, in home treatment, six-year old, reading, home research, mother as teacher,

Introduction

Reading is the vital skill upon which all formal education depends (Moats, 1999). Not only does formal education depend on reading skills but reading is needed to enter into the career world and also be functional in society (Adams, 1990). Learning to read is vastly important and learning to read at an early age is instrumental in the attainment of knowledge in greater measure. Research now shows that a child who doesn't learn to read the basics early is unlikely to learn them at all. Any child who doesn't learn to read early and well will not easily master other skills of knowledge (Moats, 1999). It is important to have a child start learning to read early so that they can build up their reading skills for more challenging tasks and assignments in

the future (Cunningham & Stanovich, 1997a). Students whose reading skills fall behind their peers rarely close the gap on their own (Fletcher, Lyon, Fuchs, L., & Barnes, 2007; Francis, Shaywitz, Stueging, Shaywitz & Fletcher, 1996; Juel, 1988; Lyon & Fletcher 2001). In today's schools, too many children struggle with learning to read and unfortunately there are many who disagree on the best way to teach those children.

An early skill struggling readers lack is the ability to quickly recognize sight words, the lack of rapid word recognition limits comprehension for at-risk readers. It is therefore important to teach sight words (Fletcher et al., 2007). Reading sight words has shown to improve vocabulary and comprehension (Meadan et al, 2008). Some common approaches used to teach sight words include, writing sight words down over and over on a piece of paper, verbal spelling of sight words, using sight words in sentences, and independent practice of sight words. While this may be effective for some students, struggling readers continue to struggle.

Review of Literature

A drill and practice procedure from direct instruction called Direct Instruction (DI) flashcards had been very successful in teaching students basic skills (Brasch, Williams, & McLaughlin, 2007; Crowley, McLaughlin, & Kahn, 2013; Green, McLaughlin, Derby, & Lee, 2010; Skarr, Ruwe, Zielinski, Sharp, Williams, & McLaughlin, 2014). The DI flashcards system is a method of presenting and teaching sight words to a student on an individual basis (Hyde, McLaughlin, & Everson, 2009). Each set of DI flashcards consists of several sight words. If the child vocalizes a word correctly when presented the flash card, this card is placed at the back of the deck and the next word is presented. If an error occurs, the teacher states the correct answer and the student repeats the answer. The error card is placed only a couple of cards back and the teacher continues to place this card in that manner until the error is said correctly three consecutive times (Green et al., 2010; Silbert, Carnine, & Stein, 1981).

Research has also shown that reading racetrack can also be effective in teaching students sight words (Alexander, McLaughlin, Derby, & Cartmell, 2008). Reading racetrack looks like a racecar track (McLaughlin et al., 2011). The racetrack is divided into 28 spaces. In those spaces, words can be placed. Students read those words as they race around the track (Rinaldi, Sells, & McLaughlin, 1997). If the student is unable to read a word, a correction is made by the teacher and repeated by the student and then student races on. Error correction follows the model, lead, and test format. Student performance is graphed after each session. There are four sessions on a particular track. After the fourth session the child moves on to the next list of words on a new racetrack. After four racetracks have been completed, a review track which contains all of the words that the student had difficulty are covered. The reading racetrack helps build fluency in a game-like format (Rinaldi & McLaughlin, 1996; Romjue, McLaughlin, & Derby, 2010).

Academic interventions have been employed in various home settings. Owens, Violette, McLaughlin, and Derby (2009) implemented Direct Instruction materials and were able to improve the comprehension skills of a 12-year-child who was the daughter of the first author. Mann,

McLaughlin, Derby, and Everson (2012) were successful in employing DI flashcards in both the home as well as the classroom. DI flashcards were able to increase the math performance in both settings with two different children. The in home aspect of this research again involved the child of the first author.

The purpose of this study was to compare the effects of the DI flashcard system in comparison with that of a the racetrack on the mastery of selected sight words from the Dolch site word list with a 6-year old girl that is struggling with reading skills. A second purpose was to replicate the previous work (Mann et al., 2012; Owens et al., 2009) where an academic intervention was implemented in the home. As in our prior research, the participant's mother was the lead author in this research

Methodology

Participant and Setting

The participant was a six-year-old first grade girl at the time the study began. Her mother noticed that she has difficulty reading simple text and wanted her to become familiar with site words in order to build her confidence, comprehension, and fluency for reading. The participant was given a phonics assessment that showed that she had knowledge of her letters and letter sounds but did not have skills in reading and decoding. The participant showed an interest in books and enjoyed having her parents and siblings read to her. He was also the daughter of the first author.

This study took place in the Pacific Northwest in participant's home at the kitchen table. There were several of the participant's family members present during the study. The environment was busy with intermittent background noise and activity. The study took place in the evening several days a week. The sessions were conducted by the author who was completing a course in classroom management as part of an undergraduate degree in Special Education at Gonzaga University.

Materials

The materials uses for this study were two sets of 25 flashcards with unknown words for data collection, five sets of five flashcards with unknown word for Direct Instruction, 25 flashcards with known words used for Direct Instruction. The flashcards were around 3x3 inch and made with blue card stock. A word was printed on each flashcard in black font, 48 size Century Gothic. The reading racetrack was printed on a 17 by 11 inch laminated white poster board. Five penny-racer type cars, dry erase maker, timer, data collection forms to record data, and candy reinforces were also used in this study.

Dependent Variables and Measurement

The target response in the present study was the number of sight words, retrieved from a list found at <http://www.mrs.perkins.com/341olch.htm>, read correctly. The dependent variables were the participant's correct responses and incorrect responses during maintenance probes at the beginning of each session. A correct response was defined as the participant verbally saying the word correctly within three seconds of being shown the word. Incorrect responses were defined

as the participant verbally saying the wrong word, saying the word after the three seconds were past, or not responding at all.

Data Collection and Inter-Observer Agreement

Event recording was used in recording the number of words correct and incorrect. If a correct response was made by the participant the flashcard was put in the pile rotated in a counter clockwise direction. If an incorrect response was made the flashcard was put in the same pile with no rotation. After probe test was complete researcher recorded correct responses with a (+) on the data collection form next to the corresponding word. Incorrect responses were recorded with a (-) on the data collection form next to the corresponding word after probe test was complete.

For the inter-observer agreement (IOA) another observer recorded correct responses with a (+) on the data collection form next to the corresponding word. Incorrect responses were recorded independently by the observer with a (-) on the data collection form next to the corresponding word. Inter-observer agreement was taken live and independently of the first author. IOA for DI flashcards was collected two of the five sessions during baseline and six of the 12 sessions during intervention with a total IOA collected eight of the 17 sessions, which constituted 47% of all sessions. IOA for Reading racetrack was collected two of the four sessions during baseline and six of the 13 sessions during intervention with a total IOA collected eight of the 17 sessions which constituted 47% of all sessions. Recorded data from the first author and another observer were compared on a point-by point agreement ratio. An agreement was defined as a word that was scored in the same manner by both the first author and the observer. A disagreement was defined as a word being scored in a different manner by either scorer. The IOA agreement was calculated by the number of agreements divided by the number of agreements and disagreements and the answer multiplied by 100. The IOA agreement for DI flashcards was 98% and the IOA agreement for the reading racetrack intervention was 99% with a range of 98%-99%.

Experimental Design and Conditions

For each treatment a multiple baseline design (Kazdin, 2011) across five sets of sight word was used in this single subject study. Baseline for DI flashcards was conducted five days with set 1 showing a stable trend, seven days with set 2 showing a stable trend, ten days with set 3 showing a stable trend, 12 days with set 4 showing a stable trend, 18 days with set 4 showing a stable trend. Baseline for reading racetrack was conducted four days with set 1 showing a stable trend, ten days with set 2 showing a stable trend, 17 days with set 3 showing a stable trend, 17+ days with set 4 showing a stable trend, and 17+ days with set 5 showing a steady trend. Probe tests were given at the beginning of each session followed by ten minutes of intervention. This was the procedure for each session using DI flashcards, or reading racetrack as an intervention.

Pretest. Before baseline, a pretest was given to the participant. The pretest consisted of all 220 words under the Dolch pre-primer, primer, first, second, and third graded word lists. The participant was given a sheet of paper with pre-primer words printed on it and a window card that framed each word then asked to read the words. The first author circled unknown words and

underlined mastered words. The same procedure occurred with the primer word list, first grade word list, second grade word list, and third grade word list. The first author selected ten unknown words from the pre-primer list to make Sets 1 list of words, five words for DI flashcards intervention and five different words for reading racetrack intervention. The first author went through the same process for Sets 2, 3, 4, and 5 using primer, first, second, and third grade lists respectively.

Baseline. Baseline was conducted the same for both DI flashcards and Reading racetrack. Each set of 25 cards was presented in the same manner. The participant was told that it would be okay not to know all the words and to do their best to read them, but was not given feedback for correct or incorrect responses. For DI flashcards the set of 25 cards that contained correlated words from sets 1 through 5 were used. The first author presented one card and asked what word, and then counted three seconds silently while waiting. After the participant responded or three seconds was counted, the card was placed on the table. This procedure was repeated until all the cards were presented. For Reading racetrack the set of 25 cards that contained correlated words from sets 1 through 5 was used. The first author used the same procedure with reading racetrack as they did for DI flashcards.

DI flashcards. During the DI flash card procedure the participant and researcher sat at the participant's kitchen table to work. A set of flashcards containing all five words from set 1 and 20 previously mastered words taken from the pretest words were shuffled and randomly presented to the participant one at a time. The participant was instructed to read each word within 3 seconds, if the participant made a correct response, the card would be placed in the back of the stack. If the participant made an incorrect response, the first author told the participant the word and then asked "what word". The participant then repeated the word and the card was placed 2 to 5 places behind the next card in the rotation. This provided an additional opportunity for the participant to respond correctly after 2 to 5 other flashcards were presented. The card would continue to be placed 2 to 5 places back, after it was presented, until the participant correctly verbalized the word three consecutive times then the card was placed in the back of the deck. Instruction in this manner continued for 10 minutes. This procedure continued until participant had mastered each unknown word for Set 1, two sessions in a row. Set 2 was then implemented and 5 previously mastered words were randomly taken out of the deck and replace with the unknown words from set 2. The process was repeated through set 4. Set 5 mastery was not met at the time of this study.

Reading racetracks. The reading racetrack, a 28 space game board in shape of a racetrack, was presented to the participant. One word from the set 1 Reading racetrack words was written on the laminated racetrack in the first space. The same word was also written onto the third, sixth, tenth and 15th spaces on the board. This provided slightly longer periods of time between seeing the unknown word, which allowed greater chance of word mastery. This word was then randomly places three more times within the remainder of the spaces past the 15th space on the board. The rest of the open spaces were then filled with previously mastered words the first author had taken from the pre-tests. Words chosen did not resemble the unknown word. The

first author gave the choice of five different penny racer type cars. The participant chose one to use as a game piece and put the racecar next to the starting space. The first author said what word and pointed to the word in space one. The participant would have three seconds to respond. If a correct response was made the participant drove her game piece onto the space. If participant responded incorrectly or not at all the first author told the participant the word and asked "what word". The participant then repeated the word and moved the car onto the space. This would continue through all 28 spaces. The first time around the racetrack was not timed. For the next racetrack reading a timer was used to time how quickly the participant took to read each word on the racetrack. The first author used the timings to motivate participant to decrease the previous time it took to read around the racetrack. Reading racetrack instruction continued for 8-10 minutes. In next session if participant respond correctly to the previous unknown word another word in set one was written on the racetrack and the same procedure as first unknown word was implemented. The most recent mastered word(s) were randomly placed on the racetrack in six spaces.

Findings

The number of sight words read correctly during baseline and during DI flashcards across five sets of sight words for the participant is shown in Figure 1. The mean of correct responses during baseline for Set 1 was 0.5 (range 0 to 1), which increased during DI flashcards to a mean of 4.67 (range: 2 to 5). The mean of correct responses during baseline for Set 2 was 0.0, which increased during DI flashcards to a mean of 4.4 (range: 2 to 4). The mean of correct responses during baseline for Set 3 was 0.0, which increased during DI flashcards to a mean of 3.43 (range: 1 to 5). The mean of correct responses during baseline for Set 4 was 1.0, which increases during DI flashcards to a mean of 3.0 (range: 2 to 5). The number of sight words correctly read during baseline for Set 5 was 0.1 No intervention was implemented with Set 5 sight words.

The number of sight words read correctly during baseline and during Reading racetrack across five sets of sight words for the participant are shown in Figure 2. The mean of correct responses during baseline for Set 1 was 1.0, which increased during Reading racetrack to a mean of 3.7 (range: 1 to 5) The mean of correct responses during baseline for Sets 2 through 5 was 0.0. The mean of correct responses during Reading racetrack for Set 2 increased to mean of 2.1 (range 1 to 5). No intervention was implemented with Sets 3 through 5 sight words.

The participants total number of sight words correct on the pre-test and post-test are shown in Figure 3. The participant's percentage of words correct on the pre-test was 25%, which increased to 40% on the post-test.

The participant's percentage of total words correct per Set is shown in Figure 4. The participant's pre-test percentage of words correct in Set 1 was 52%, which increased to 80% in the participants post-test. The participant's pre-test percentage of words correct in Set 2 was 19%, which increased to 44% in the participant's post-test. The participant's pre-test percentage of words correct in Set 3 was 22%, which increased to 24% in the participants post-test. The participant's pre-test percentage of words correct in Set 4 was 15%, which increased to 28% in

the participants post-test. The participant's pre-test percentage of words correct in Set 5 was 19%, which stayed at 19% in the participant's post-test.

A comparison of mastered words between DI flashcards and reading racetrack is shown in Figure 5. The participant mastered 80% of the words used in DI flashcards and 44% of the words used in the reading racetrack part of the research.

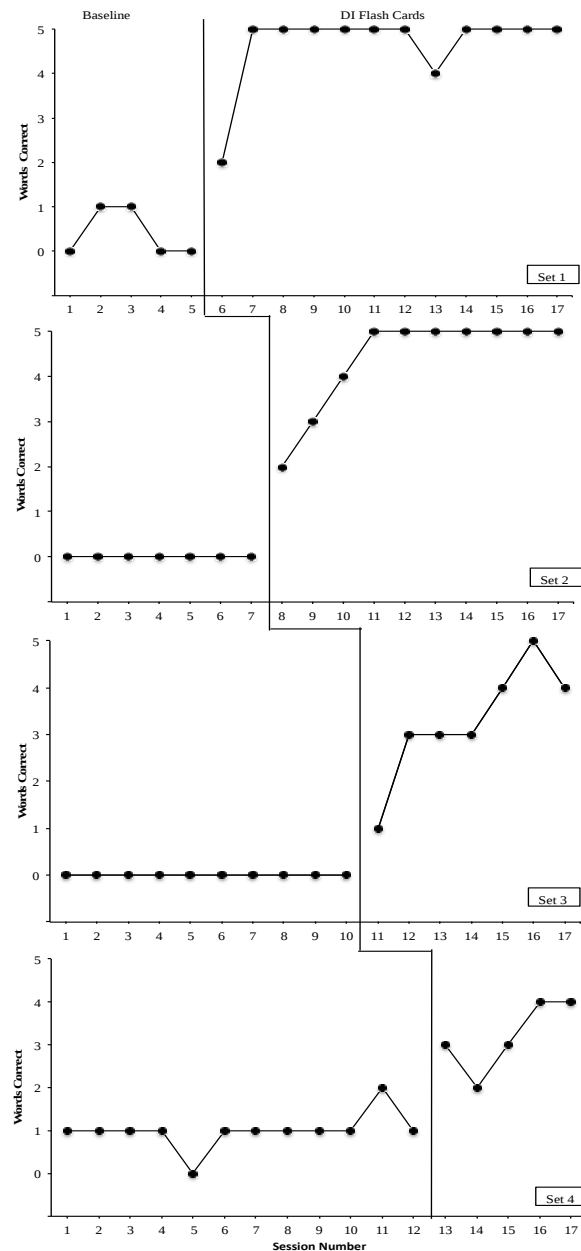


Figure 1. The number of sight word read for DI flashcards

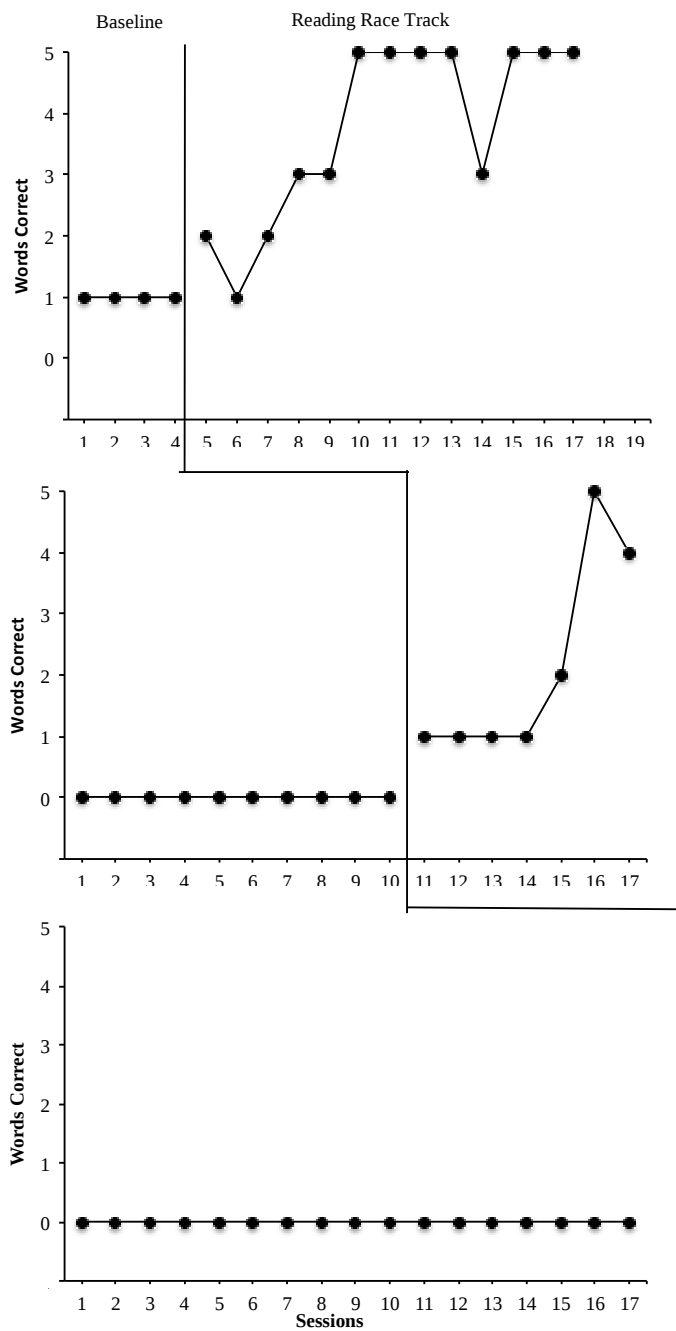


Figure 2. The number of sight words read for baseline and during reading racetracks.

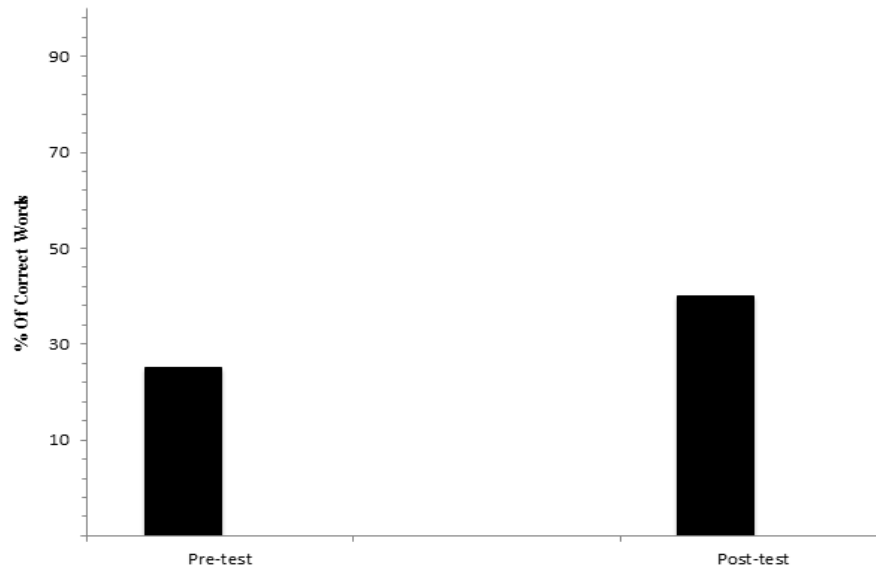


Figure 3. The percentage of sight words read in pretest and posttest.

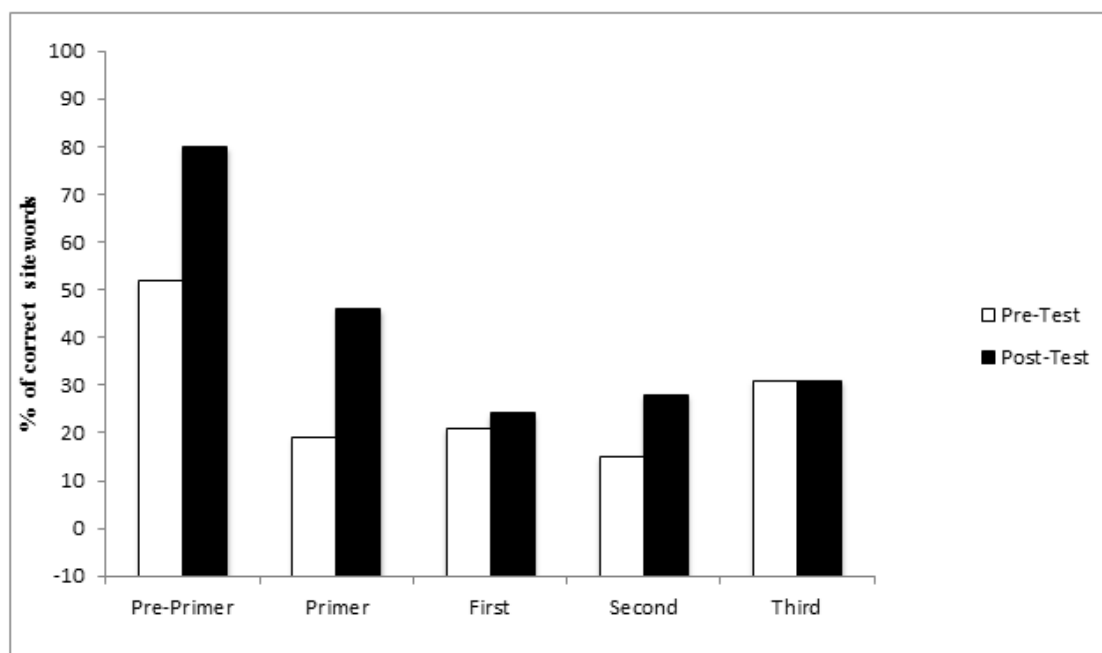


Figure 4. The percentage of sight words read for each Set in DI flashcards and reading racetracks.

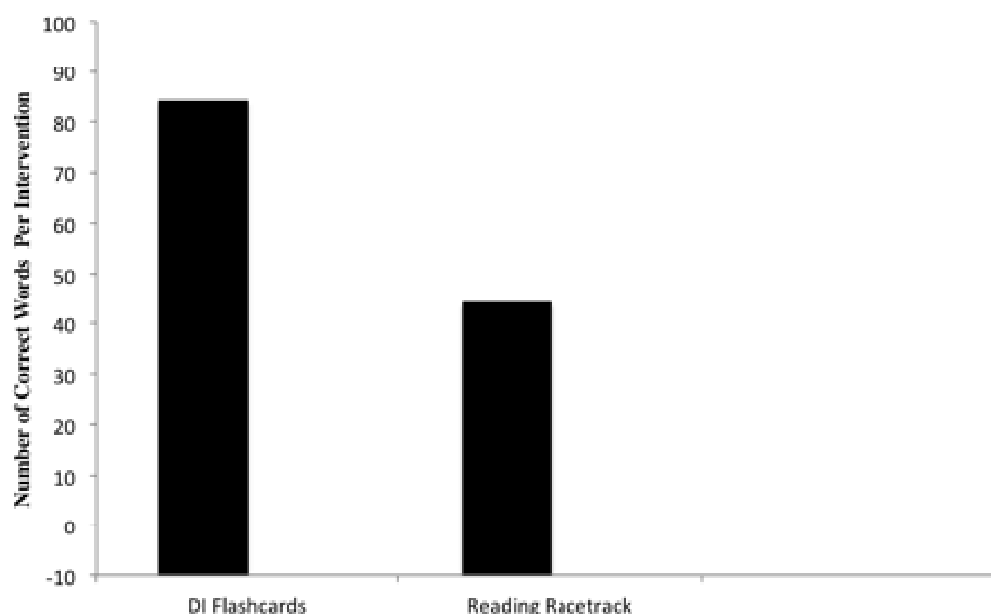


Figure 5. The percentage of sight words read per intervention.

Conclusion

The results from this study indicate that the intervention of DI flashcards and the intervention of Reading racetrack were both effective for the participant. However, the largest gains were made during DI flashcards and indicate that the intervention of DI flashcards to be more effective than the intervention of Reading racetrack for the participant.

This study had positive effects for the student. The participant showed a significant increase in the amount of sight words correctly read from the pre-test to the post-test. This increase in sight words mastered had an impact on fluency the participant demonstrated when participant would read. The participant also exhibited generalization from the word made to make. Made was a word taught in DI flashcards Set 1 and make was a word to be taught in Reading racetrack Set 3, which was not implemented during this study.

The DI flashcard procedure is very easy and practical to implement. It only took 30 minutes a day, three times a week to execute. Index cards could be substituted in the place of card stock, which reduces the already low cost of the procedure further. The hardest part of this procedure is deciding to start.

The first author, also the participant's mother, noticed that the participant would bring books to read more often than was done before implementation. The first author also noticed that the participant's fluency increased as well as the participant's comprehension. The mother of the participant is very happy with the procedure and will continue to use it in the future.

There were limitations in the present case report. First, an issue seen with this study is that it was done in the evenings when the participant's energy was on the decline. As a result, edibles were occasionally used to motivate the participant to work hard throughout the entire session. Breaks were also given to help the participant focus on the activity at hand. During one particular difficult in home session where the participant indicated that she did not want to participate any longer. However, when the first author showed the data collection sheet to the participant and celebrated how many words the participant had already mastered. This seemed to motivate the participant to continue to work through the session.

The relative difficulty of the words was not systematically controlled. In a replication of this research, some type of scale needs to be developed to make sure the words covered in the DI flashcard conditions are comparable to those employed with reading racetracks. In addition, since the reading racetrack phase took place after the DI flashcard procedure has been employed, some type of order effect could have affected our outcomes. These issues will have to be addressed in future research. Finally, both procedures had only one overlapping data point. However, more words were learned when DI flashcards were employed than when the reading racetrack was in effect. This is also evident when one examines Figure 5.

Finally, the overall outcomes replicate our work using DI flashcards (Alexander et al., 2008; Crowley et al., 2013; Erbey et al., 2012; Kaufman et al., 2012; Ruwe et al., 2012; Skarr et al., 2014), reading racetracks (Hyde et al., 2009; Romjue et al., 2011), or a combining both interventions (Green et al., 2010; Printz, McLaughlin, & Band, 2006). In addition, these procedures could be successfully employed in a home with the mother acting as teacher. This should add some strength to the idea that both these procedures can be employed in the home or at school. Overall, our participant's mother felt the study was successful to evaluate the effects of the Direct Instruction flashcard system in comparison to the reading racetrack procedures on the mastery of selected site words of a 6-year-old girl who was struggling with reading skills. Others who provide education in the home could possibly improve the educational performance of their children employing the procedures outlined in the case report.

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