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The effects of direct instruction flashcards to increase sight-word reading ability and cover, copy, and compare for spelling for a fifth grade student with specified learning disabilities

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Abstract
The purpose of this study was to evaluate the effects of Di flashcard s to increase the sight word reading ability and copy, cover, and compare (CCC) to increase the spelling accuracy of an 11- year-old fifth grade student with a specific learning disability. Her academic issues revolved around her ability to read text fluently and spelling difficulties grade spelling words that impacted her ability to write text. The study was conducted in a large urban school district in the Pacific Northwest. Data were gathered in a small classroom next to her resource classroom. Targeted site words were selected based on the participant's site word pretest results. A Direct Instruction (DI) flashcard system was implemented after baseline for sight words. The effectiveness of this intervention was evaluated using a single-subject multiple baseline design across four sets of targeted site words. A clear functional relationship was shown between increase of site word reading and the implementation of the DI flashcard procedure. Increases in spelling accuracy was also found when CCC was employed.

Keywords: copy, cover, and compare, Direct Instruction Flashcards, learning disabilities, sight words, spelling

1. Introduction

Reading is the vital skill upon which all formal education depends [1, 2]. It is such a vital skill because reading is essential for learning across multiple subject areas to take place. Without a solid foundation in reading learning is less likely to occur in social studies, math, or spelling [3]. 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 [4, 5]. Unfortunately, those who struggle with reading and fall behind their peers in school, rarely close the gap on their own [6, 7, 8]. Spelling is another important skill to develop to increase reading fluency. Research has shown that reading and spelling are synonymous. Students who have trouble recognizing words in reading usually have poor spelling skills [9]. Knowing the spelling of a word makes the representation of it sturdy and accessible for fluent reading because spelling and reading rely on the same mental representation of a word [2].

Reading and spelling are a struggle for those with learning disabilities. A learning disability is a neurological difference in brain structure and function and affects the brain's ability to store, process or communicate information [10]. Students with learning disabilities need more time and practice to master a specific skill [11]. A drill and practice procedure from direct instruction called Direct Instruction (DI) flashcards has been very successful in teaching students basic skills [12]. DI flashcards system is a method of presenting and teaching sight words to a student on an individual basis. 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 in the deck and the teacher continues to place this card in that manner until the error is said correctly three consecutive times [13]. A procedure that is shown to be effective in teaching students to improve spelling is copy, cover, and compare or cover, copy, and compare (CCC) [14-18]. CCC is self-management strategy where a student practices the desired skill repeatedly, monitors their own progress and receives immediate feedback of their work [18, 19]. CCC consists of the following: the student is required to copy and academic stimulus such as the correct spelling of the word found on the CCC sheet. Next, the student is required to cover his or her work and that of the correct sample provided. The student then writes the word from memory. Next, the student evaluates the accuracy of his spelling. If he is correct the student moves down the spelling list and repeats this procedure. If the student makes an error, he or she are required to write the correct spelling of the work three times [17, 18]. CCC has also been found to be successful at assisting in the synthesis of information for students though the use of self-correction [20]. CCC also assists with students' retention and discrimination. By presenting previously mastered materials with new materials, students using this method are able to retain past knowledge and improve current skills [21, 22]. This procedure has been used extensively in spelling, math, and sight word instruction.

The purpose of this study was to evaluate the use of DI flashcards to increase the sight word reading ability and copy, cover, and compare (CCC) to increase the spelling accuracy of an 11 year old fifth grade student. An additional purpose was to replicate and extend the use of CCC in spelling as well as the use of DI flashcards to improve sight word vocabulary.

2. Method

2.1 Participant and Setting

The participant in this study was an eleven-year-old female who attended the 5th grade in a public elementary school in the Pacific Northwest. She was attending a regular education classroom for 80% of her day with pull-out for special

education serves in the resource room for 20% of the day. The participant was a student diagnosed with a specific learning disability and was preforming on a 1st grade level in both reading and written language and a 2nd grade level in math. The special education teacher recommended this student for the study due to her low performance levels in reading.

The study took place in a staff lounge near the resource room at a suburban elementary public school in the Pacific Northwest three to five times a week. The author took the participant to this room so the participant could focus on the tasks without distraction or discomfort. The participant and the author were the only people in the room with an occupational teacher or instructional assistant entering and then exiting the room.

2.2 Materials

The materials used for this study were 3x3 inch cardstock flashcards with one word printed on each card, data collection forms to record data on, pencils, and copy, cover, and compare worksheets. The flashcards were organized into four sets of ten. Each flashcard had a different sight word taken from the 1st or 2nd grade sight word lists printed in black font, 48 size century Gothic font. The copy, cover, and compare (CCC) worksheet was created and words found on the CCC worksheet came from the school list categorized by grade. This can be seen in Appendix A.

2.3 Dependent Variable and Measurement Procedures

The target responses in the present day study were the number of sight words, taken from the school districts 1st and 2nd grade sight word lists, read correctly (primary target) and the number of spellings words, taken from the school's first grade spelling list, spelled correctly (secondary target) (See Appendix). The dependent variables were the participant's correct responses and incorrect responses. A correct response for the primary target of sight words was defined as the participant verbally saying the word correctly within five seconds of the word being revealed. Incorrect responses were defined as the participant verbally saying the wrong word, saying the word after five seconds had expired, or not responding at all. A correct response for the secondary target of spelling words was defined as a word that matched the letter sequence found on the school's first grade spelling list. An incorrect response was defined as a word that did not match the letter sequence found on the school's 1st grade spelling list. Letter reversals, or a blank space were also defined at incorrect responses.

2.4 Data Collection and Inter-Observer Agreement

Event recording was used in recording the number of words correct and incorrect. If during the primary target intervention, an incorrect response was made by the participant the flashcard was put in the pile rotated in a counter clockwise direction. If a correct 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 words after probe test was complete. After each session of the secondary target, an oral spelling test of 10 words was administered to participant. After assessment was completed by the participant, author would mark a (+) on the permanent product for a correct response and a (-) on the permanent product next to an incorrect response.

For inter-observer agreement (IOA) of the primary target, a recording of six sessions was taken and was observed and scored independently of the author. Correct responses were recorded on a separate data collection sheet with a (+) next to the corresponding word and an incorrect response was recorded with a (-) next to the corresponding word. IOA was collected six of the 22 sessions, which constituted 27% of all sessions. Recorded data 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 researcher and the observer. A disagreement was defined as a word being scored in a different manner by either scorer. The number of agreements divided by the number of disagreements calculated the IOA agreement and the answered multiplied by 100. The primary target IOA agreement was 97%.

For IOA of the secondary target, a copy of the participant's permanent product was made and scored independently of the author. Correct responses were recorded by placing a (+) next to the correctly spelled word and incorrect responses were recorded by placing a (-) next to the incorrectly spelled word. IOA was collected 10 of the 22 sessions, which constituted 45% of all the sessions. Permanent product data 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 researcher and the observer. A disagreement was defined as a word being scored in a different manner by either scorer. The number of agreements divided by the number of disagreements calculated the IOA agreement and the answered multiplied by 100. The secondary target IOA agreement was 99%.

2.5 Experimental Design and Conditions

A single subject multiple base line design (23, 24) across four sets of words was used for primary target. In order to go onto the next set of words, the previous set must be mastered with 90% accuracy three sessions in a row. For the secondary target an AB design (24) with changing spelling words with a set criterion with a periodic check for maintenance was performed. Once a word was mastered by being correctly spelled three sessions in a row, a new word would be added and the mastered word would be periodically checked for maintenance.

2.5.1 Pre-assessment

Before beginning baseline and intervention a pretest was administered to the participant. The pre-test was created by using the list of 1st and 2nd grade sight word lists provided by the school district. Each list was presented to the participant and the author noted errors on each list by marking a (-) next to the corresponding words. From the information collected from the pre-tests, four groups of 10 words were created for DI Flashcards.

2.5.2 Baseline

In baseline for the primary target each set of words were presented to the participant thru flashcards. The author told the participant that it would be okay not to know all the words and to do their best to orally read the words. Feedback was not given for correct or incorrect responses. The researcher presented one flashcard and asked what word, and then counted five seconds silently while waiting. After the participant responded or five seconds was counted, the card was placed on the table in front of examiner. This procedure was repeated

until all 40 words had been presented. In baseline for the secondary target each of the thirty words were orally dictated by the author to the participant. Each word was said aloud, used in a sentence, and repeated aloud. Feedback was not given for correct or incorrect spelling of the words. Baseline was taken for four days for primary target and three days for secondary target.

2.5.3 Direct instruction flashcards

During the Di flashcard procedure the participant and researcher sat at a table to work. A set of flashcards containing all ten words from set 1, and 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 five 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 researcher told the participant the word and then asked "what word". The participant then repeated the word and the card was placed two to five places behind the next card in the rotation. This provided an additional opportunity for the participant to respond correctly after two to five other flashcards were presented. The card would continue to be placed two to five 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. After drill, the instructor would test drill set with two other sets and record data to show maintenance if it was a set previously mastered or show that student had not learned words from sets not used during intervention yet. This procedure continued until participant had mastered each unknown word for Set 1 with 90% accuracy, three sessions in a row. The next set was then implemented by taking previously mastered words randomly out of the deck and replace with the unknown words from the new set. The process was repeated through Set 4.

2.5.4 Copy cover, and compare

In this spelling intervention the author created a worksheet with columns. In the first column the correctly spelled words to be practiced were listed. The second column was a check-spelling column where participant could make a checkmark when they had viewed the word being practiced. In the next column the participant was instructed to copy the word being practiced. The following column was a place where the participant could spell the word from memory after folding the left side of the paper to cover the words to practice and copy word columns. The column next was another check spelling column where the student could compare the spelling of the word from memory to the correct spelling of the word. If participant correctly spelled the word from memory, they could put a check in the column and move to the next word. If the participant spelled the word incorrectly the incorrect word would be crossed out and participant would correctly spell the word under the crossed out word and in the last column labeled Correction for more practice before moving to the next word. After the participant completed the CCC worksheet, the author would give the participant a clean paper and orally dictate the spelling words by say the word, using the word in a sentence, and repeating the word. When the participant spelled a word correctly in three consecutive spelling tests, a new word was added to the CCC practice list and the mastered word removed with a periodic check for maintenance. Words used for CCC were taken from the school's first grade spelling list.

3. Results

The number of sight words read correctly during baseline and during DI flashcards across four sets of sight words for the participant is shown in Figure 1. The mean of correct responses during baseline for Set 1 was 4.25 (range 3 to 5), which increased during Di flashcard s to a mean of 9.4 (range: 9 to 10). During maintenance after instruction the mean was 8.5 (range: 7 to 10) The mean of correct responses during baseline for Set 2 was 3.75, which increased during DI flashcards to a mean of 8.7 (range: 7 to 10), and maintained at a mean of 8.7 (range: 8 to 9) The mean of correct responses during baseline for Set 3 was 4, which increased during DI flashcards to a mean of 8.0 (range: 6 to 10) and maintained at a mean of 10 (range: 10-10) The mean of correct responses during baseline for Set 4 was 3.8, which increases during Di flashcard s intervention to a mean of 8.75 (range: 8 to 9) maintenance was not taken for set 4 words. The participants total number of sight words correct on the 1st and 2nd grade sight word pre-test and post-test is shown in Figure 2. The participant's percentage of words correct on the 1st grade sight word pre-test was 82%, which increased to 96% on the post-test. The participant's percentage of words correct on the 2nd grade sight word pre-test was 22%, which increased to 80% on the post-test.

The number of correctly spelled words during baseline before the intervention of CCC for the participant is shown in Figure 3. The mean of correct responses during baseline for Set 1 spelling words was 4.6 (range: 4 to 6). Maintenance during intervention had a mean of 7 (range 4-10) and participant scored 8 out of 10 on post-test. The mean of correct spellings during baseline for Set 2 words was 2.0 (range: 1 to 3). Maintenance during intervention had a mean of 4 (range: 4) and participant scored 4 out of 10 on posttest. The mean of correct responses during baseline for Set 3 spelling words was 2 (range: 0 to 3). Maintenance was taken only once during intervention with a score of 6 out of 10, and the participant scored 8 out of 10 on post-test which we defined as maintenance.

The participant's total number of correct spelled words during baseline and post-test is shown in Figure 4. The average percentage of correctly spelled words during baseline was 53%, which increased to 68% correct rate in the post-test results. Note; a pre-test was not given for the secondary target but the average baseline percentage of correct spelled word by the participant was a 53% correct rate.

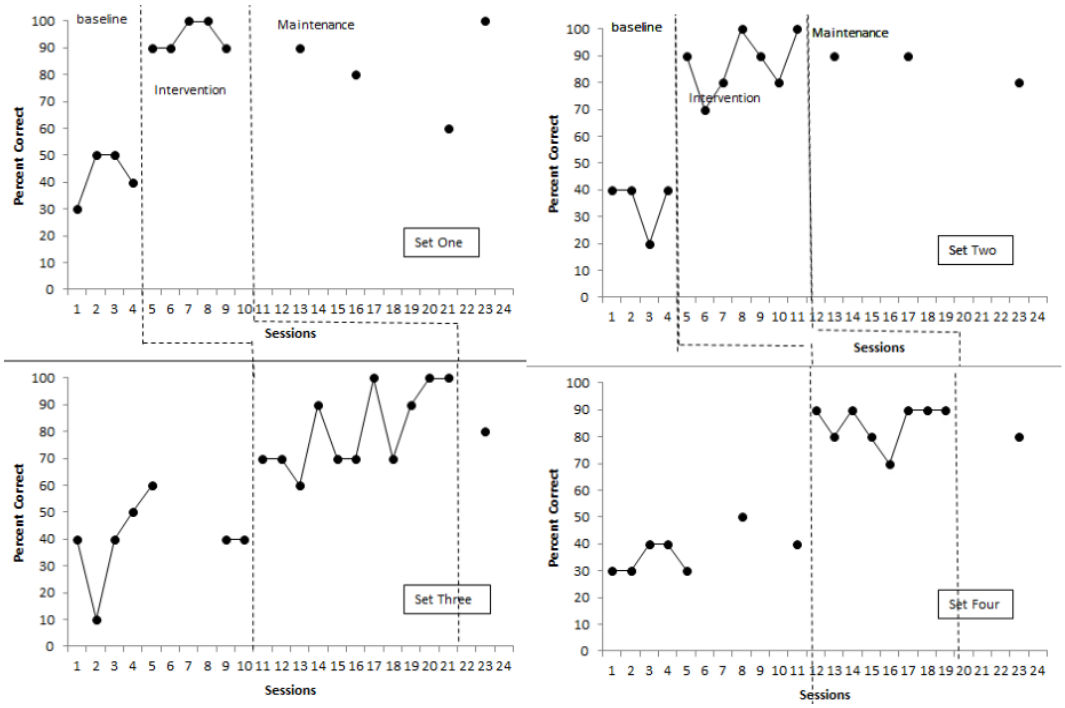

Fig 1: Percent correct for sight words during baseline, DI flashcards and maintenance.

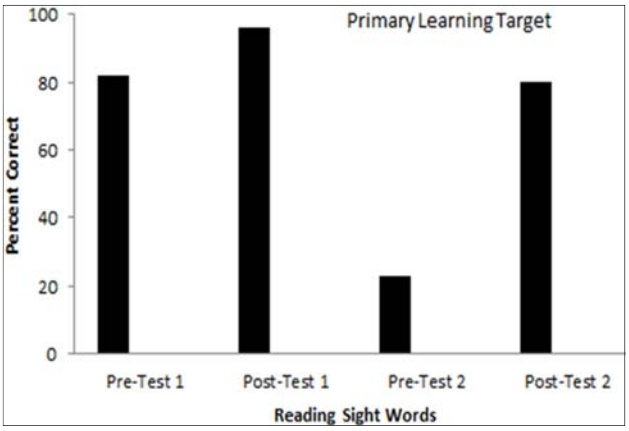

Fig 2: Overall mean percent correct for pre- and posttest for sight words.

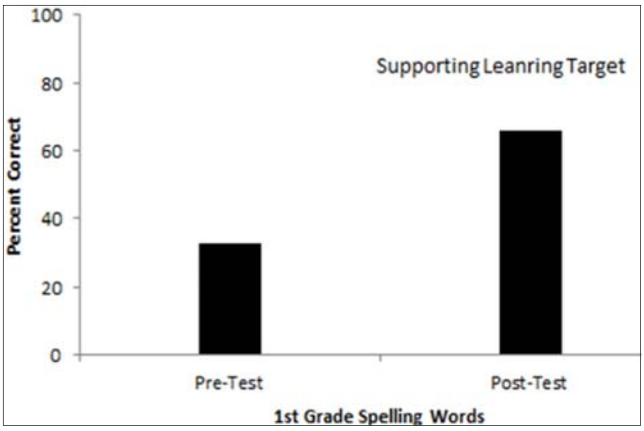

Fig 4: Pre and posttest scores for our participant in spelling.

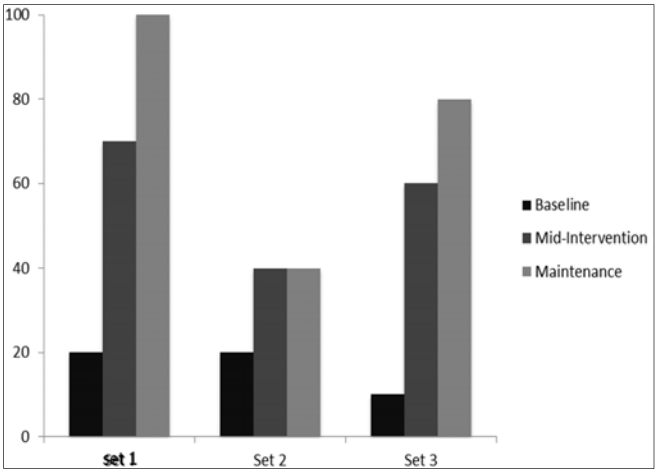

Fig 3: Mean percent correct by set and baseline, mid-intervention and maintenance for sight words by set.

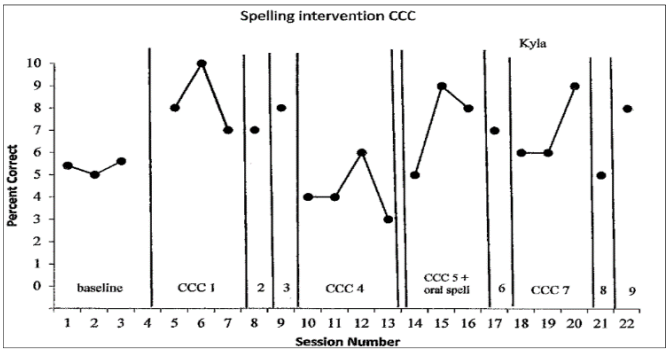

Fig 5: The number of spelling words correct for baseline and CCC over seven lists.

4. Discussion

The use of the DI flashcards system to increase sight-word reading ability of the 1st and 2nd grade sight word lists and CCC to increase spelling accuracy of 1st grade spelling words of a

fifth grade student with Specified Learning Disabilities proved effective. There was an increase in word mastery from the pre-test to the post-test of both 1st and 2nd grade sight word lists. In the duration of time the study took place the participant was able to improve the number of accurately read words on the 1st grade sight word list by 14% and the participant showed a 58% increase of the numbers of words read accurately on the 2nd grade word list. An increase of correctly spelled words from baseline to post-test for the duration of the study was 14%. Participant was very pleasant to work with and did not show any inappropriate behaviors even when author increase writing work.

During CCC intervention with Set 1 spelling words, the author noticed that the participant had mastered some words rather quickly and others took a little longer to master. Because of this, the author decided to remove Set 1 mastered words from the Words to Practice list and start adding spelling words from Set 2 to the Words to Practice list. This gave learner more practice with words that were not as quickly mastered while working toward mastering words from Set 2. While working on Set 2 words, instructor noticed that student would spell many words that contained an "i" in their spelling by using an e. Swim was swem, list was lest. When author asked participant if she could hear the difference between the sounds the letters made, the participant responded with a no. Set 2 words focused on words containing an "i" in their spelling. It took a long time for participant to spell words correctly three sessions in a row and even with extra instruction and practice during maintenance testing words were spelled incorrectly. Author altered instruction for CCC from the previously instruction by having the participant orally read the word that she was going to practice, copy the word saying each letter as she wrote it down, write the word from memory saying each letter as she wrote it down, compare and write the word again saying each letter as she wrote it down for extra practice. The study took place at different times during the day and may be the cause of a little fluctuation in the graphs during intervention.

Overall, the increase that is shown in this study in reading sight words using Di flashcard s is consistent with other studies that show the effectiveness of the DI Flashcard System and sight words for students with learning disabilities. The increase in accuracy of spelling words using the CCC intervention found in this study is also consistent with other studies showing the effectiveness of CCC in increasing accuracy of spelling words for student with learning disabilities.

The DI flashcard procedure was very easy and practical to implement with our participant. It only took 15 minutes a day, five 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. It does take some time to prepare material in the beginning but the simplicity, effectiveness, and minimal cost of the procedure makes up the difference. The CCC procedure is nice for data collection because you have a permanent product that is easy to score and take reliability with. It is also very effective and once you have a CCC worksheet that is preferred it is simple to use and can be used simultaneously by many. It is an independent intervention that students can implement quickly and easily. This procedure is very cost efficient only needing copies of the worksheet and a pencil, all of which is found in all schools. The present results also provide a partial replication of employing both flashcards as well as CCC (25).

The first author is content with the study and has had a great learning experience that can be taken and used to enhance learning of others with learning disabilities. What was enjoyed most was when the participant was given an exit slip at the end of the study and she recorded that she felt more confident in her ability to read and spell. The participant also reported that DI flashcards and CCC were important and helpful for our participant.

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