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The effects of DI flashcards with a cover and compare, a passage reading procedure, and rewards to increase sight word skills 12-year-old middle school student with learning disabilities

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Abstract
The purpose of this study was to increase the participant's ability to read 2nd grade Dolch sight words with fluency and accuracy. A 12-year-old middle school student diagnosed with a specific learning disability was our participant. Also, he had been able to read past a 1st grade reading level. Direct Instruction (DI) flashcards were implemented using the 2nd grade Dolch sight word list. A multiple baseline design across five sets of Dolch words was employed. The overall outcomes of this study showed our participant increased his performance when DI flashcards were in effect. However, then copy and copy was added along with an oral reading component, our participant's performance further improved and became stable. The benefits and issues of employing DI flashcards with cover and compare and passage reading was discussed. Suggests for future research were provided.

Keywords: 2nd grade Dolch sight words, DI flashcards, maintenance, multiple baseline design, cover and copy, passage reading, middle school

Introduction

Reading is a necessary skill for life, as people read for a variety of purposes. This includes reading directions or instructions, road signs, information for work and for enjoyment. (Carnine, Silbert, Kameenui, & Tarver, 2006). Research shows that students need to be successful readers by the end of the 3rd grade. If students are not reading with accuracy, fluency and comprehension by this time, they are four times more likely to drop out of high school (Hernandez, 2011). Some students progress to middle school with reading problems that may not have been obvious. Middle school students are expected to read more information (Gajria, Jitendra, Sood, & Sacks, 2007). Using the number of students with free and reduced price lunch, it has been found that such schools and its students more likely to read under proficiency levels. Only 16% of 8th grade students in this situation read at or above proficiency levels (de Cohen, Deterding, & Clewell 2005).

Sight words need to be accurately and quickly read by middle school students. Sight words are important words to be read because they are common in a wide range of texts and subject matter areas (Ehri, 2005). Words found on the Dolch word list are the most common words used in English. They make up 50 to 70% of words in school curriculum. Therefore, they are often needed in a student's reading vocabulary in order to have success at school (Carnine et al., 2006).

The direct instruction (DI) flashcard procedure has been found to have positive effects on students with learning disabilities performance in basic skills, including reading (Gersten & Keating, 1987; Pfaff, McLaughlin, Neyman, & Everson, 2013; Thomas, McLaughlin, & Derby, 2015). The DI flashcard procedure can be used to increase reading accuracy and simultaneously support the increase of reading fluency (Romjue, McLaughlin, & Derby, 2011). DI flashcards also employs the use of an error correction procedure. Immediate error correction is an important component of Direct Instruction and other explicit teaching procedures (Marchand-Martella et al., 2004; Bulkley, McLaughlin, Neyman, & Carosella, 2012). Error correction has been shown to be a data-based and effective strategy to teach of variety of skills, across various populations (Marchand-Martella, Slocum, & Martella, 2004;

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Silbert, Carnine, & Stein, 1981). When error correction is employed with DI flashcards, the teacher models the correct response to the flashcard, next, the student and teacher carry this out together. Next, the student must independently provide the correct answer to the error card. The error card is placed two to four cards back in the stack, so it can be presented quickly after an error has been corrected (Brasch, Williams, & McLaughlin 2008; Glover, McLaughlin, Derby, & Gower, 2010; Green, McLaughlin, Derby, & Lee, 2010; Hayter, Scott, McLaughlin, & Weber, 2007; Ruwe, McLaughlin, Derby, & Johnson, 2011; Travis, McLaughlin, Derby, Dolliver, & Carosella, 2012). Overall, the use of DI flashcards has been found to be a successful method for teaching academic skills to elementary, middle, and high school students with a wide range of disability designations ranging from leaning disabilities to moderate to severe intellectual disabilities (Fox-Lopp, McLaughlin, Weber, & Hatch, 2015; Hayter et al., 2007; Green et al., 2010; Kaufman, McLaughlin, Derby, & Waco, 2011; Mann, McLaughlin, Derby, & Everson, 2011; Romjue, McLaughlin, & Derby, 2011; Ruwe, McLaughlin, Derby, & Johnson, 2011). Direct Instruction (DI) flashcards have been shown to be an effective method to help increase various skills in fluency and accuracy across a wide range of students (Brasch et al., 2008; Cravalho, McLaughlin, Derby, & Waco, 2014; Crowley, McLaughlin, & Kahn, 2013; Hayter et al., 2007; Green et al., 2010; Lund, McLaughlin, Neyman, & Everson, 2012; Mangundayo, McLaughlin, Williams, & Toone, 2013; Ruwe et al., 2011; Thomas et al., 2015).

Cover, copy, and compare (CCC) (McLaughlin & Skinner, 1996; Skinner, McLaughlin, & Logan, 1997) has been successfully implemented and evaluated in a wide range of settings (Joseph, Konrad, Cates, Vajcner, Eveleigh, & Fisheye, 2012). CCC has been modified to include the use of consequences (Hubbert, Weber, & McLaughlin, 2000), decreasing the number of items that a student had to master (Membrey, McLaughlin, Derby, & Antcliff, 2010) or adding a token reinforcement program (Bolich, Kavon, McLaughlin, Williams, & Urlacher, 1995). Finally, CCC is often employed using DI flashcards to provide an student managed explicit teaching procedure (Romjue et al., 2010; Sante, McLaughlin & Weber, 2010; Thomas et al., 2015)

One purpose of this study was to increase our participant's ability to read 2nd grade Dolch sight words with fluency and accuracy. Another goal was to increase the student's overall ability to read text independently. A second purpose was to implement the copy and compare aspect of CCC. The final purpose was to provide a replication for implementing DI flashcards at the middle school level (Chin, Chong, & Vignieri, 2012; Kazdin, 2011). A final purpose with to examine whether one could add additional interventions to DI flashcards if needed to improve student outcomes.

Method
Participant and Setting
The participant was a 12-year-old male, middle school student with a specific learning disability. This was determined through psychometric testing and the middle school's multi-disciplinary team (MDT). The instructional staff indicated that his learning disability prevented him from being able to read standard print. Though in the seventh grade at the time of the study, the participant was reading and writing at approximately the 1st grade level. The participant's cognitive ability was high and he was able to do well in math and other subjects, but required a reader and a scribe. He spent a one-hour class period a day in a Career and Academic Preparedness (CAP) class He had one to one instructional time with the teacher, the first author or an instructional aide to help him complete his assignments and homework for other classes. The other five class periods were spent in general education classes. In these classes, the teacher or a student would read questions to him and write the answers that he spoke verbally.

The participant had supportive parents whom spent the summer helping him learn kindergarten and 1st grade sight words to the mastery level prior to entering middle school. The participant's parents have also attempted to help him with school assignments, but often could not understand the assignments and would become frustrated. His parents also had documented low reading and writing levels. The participant often had to rely on help in CAP class and within his general education classes to complete his work.

The study took place in a low-income urban middle school in the Pacific Northwest, during CAP class. There were 12 students total in the participant's class, the especial education teacher, the first author and one instructional aide. The study was conducted outside the classroom door at a table, due to limited space and noise within the classroom itself. The study took place for about 15 minutes, an average of 4 days per week. The classroom has been the classroom setting for various single case research projects that are part of the certification program from a local private university (Bjordahl, Talboy, Neyman, McLaughlin, & Hoenike, 2014; McLaughlin, Williams, Williams, Peck, Derby, Bjordahl & Weber, 1999). Finally, most of these data were submitted as part of the first author's edTPA to Pearson Education. (edTPA, 2013).

Materials
All 46 words from the 2nd Grade Dolch Word List sets of flashcards were made. Every two or three sessions, a new version of the word list was introduced with the same words and was randomized to avoid memorization of the order of the words by the participant. The first author had the same word list to take data. Materials included for the lesson were a set of flashcards with the words from the 2nd Grade Dolch Word List, reading passages with the 2nd grade Dolch sight words, a blank piece of paper for writing sentences and a typed version of the sentences that the participant wrote. From baseline, the first author created 5 sets of 9 words for Sets 1-4 and for Set 5, 10 words were used. These can be seen in Figure 1.

always	off
around	or
because	pull
been	read
before	right
best	sing
both	sit
buy	sleep
call	tell
cold	their
does	these
don't	those
fast	upon
first	us
five	use
found	very
gave	wash
goes	which
green	why
its	wish
made	work
many	would
write	your

Fig 1: A list of the 2nd Grade Dolch Word List used in the research.

Dependent Variable and Measurement
The number of words correct out of nine words for Sets 1-4 and out of 10 words for Set 5 was the major dependent variable. Data were collected at the beginning of each session, to take note of the number of words that the participant could read correctly without reviewing the words first. A correct response was determined if the word was read from the word list within 2 seconds and if there was no self-correction, such as starting to say, "wi-" for "was" and then saying, "was." If the student made no response or said, "pass", the word was counted as incorrect. The student had the entire word list in front of him to read from. Every two or three sessions the order of the words changed.

Experimental Design
A multiple baseline design (Kazdin, 2011; McLaughlin, 1983) across four sets of sight words was used in this study. Descriptions of the baseline and DI flashcards using the 2nd Grade Dolch Word List follows. For set 5, a writing component was implemented along with DI flashcards and CC after a long baseline. No maintenance measures for this set of words took place.

Baseline: During baseline, the participant was given a white sheet of paper with the 2nd grade Dolch sight words, in alphabetical order. The participant was asked to "read the words" and he could choose to say "skip" for words he did not know, but he was encouraged to attempt to read as many as he could. The number of sessions in baseline ranged from 4 to 17 sessions.

DI flashcards + CC: The 2nd Grade Dolch Word List was used for instruction to teach the participant to sight read the words. The first author introduced each set one at a time.

We only adding a new set when the participant had mastered the previously one (based on data) with a 90% accuracy rate, or about 8 out of the 9 words per set. Mastery was based on just one day of data at 90%. This was done so our participant could learn new words and continue to practice the previous ones.

When a set was introduced, the participant held a set of DI flashcards, facing the participant and asked him to "read the words". The participant would read the first word and if he read the word correctly, the first author put the card in the back of the deck.

If the participant read the word incorrectly, the first author would quickly enter an error correction procedure of model, and test (Silbert, Carnine, & Stein, 1981). The first author said, "This word is _____. What word?" The participant then said the word again. The first author placed the card 2 or 3 words back, for extra practice. When that same card was on top of the deck again and read correctly, the card was then placed at the back of the deck. If it was read incorrectly again, the card was once again placed 2 or 3 words back, for extra practice (Crowley et al., 2013; Ruwe et al., 2011; Skarr et al., 2014. If the participant did not read the word at all, the first author would engage in the same error correction procedure again.

However, if the participant read the word correctly, but it took more than 2 seconds, he self-corrected or sounded out the word, the first author put the word 2 or 3 words back for extra practice and explained that the learner did say the word correctly, but that we're working on sight words, words that we want to read fast when we see them.

After two or three times of reading through the flashcards, the first author would begin placing the correct words on the table, until only the incorrect words were left, or sometimes no incorrect words left, if the participant had them all correctly. The incorrect words, usually less than 4, were practiced until the learner could read them correctly and quickly and also placed on the table, signaling the end of the use of the flashcards.

Next, the participant was given a modified version of CCC, (just Cover and Compare or CC) to practice spelling the same words that he was reading. The participant was asked to first read the word before spelling it. After reading it, the participant used his hand to cover the word and wrote the same word in a box adjacent to the box with the word. He then compared the typed word on the paper to his spelling and if it was spelled correctly, he moved on to the next word. If the word was incorrect, he spelled the word correctly three times in boxes adjacent to the word.

As a new set of words was introduced, the words from the previous set were kept with the new set of DI flashcards for maintenance. For the CC worksheet, the first author first used all the words in the current set in which the participant was learning. The first author then added in words from the previous set(s) that the participant had struggled to spell quickly. After two days of CC with each new set, the first author took out some words that the participant spelled correctly, in order to decrease the amount of the words on the sheet, but keep some words that the participant could spell correctly, so that he would feel successful in spelling some words correctly.

DI flashcards, CC, + reading passages: In later sessions, for Sets 3 to 5, additional procedures beyond DI flashcards and CC, were used to increase the participant's reading and

spelling skills. Since these words are not often read or written in isolation, so a reading passage with the words from the Dolch Word List was added for Sets 3 through 5.

When a new set of words was introduced, so was a new reading passage. The focus for each reading passage was on the Dolch Words. The same error correction procedure used above for reading the words in isolation was also used for the reading passage. In addition, the participant was also asked to go back to the beginning of the sentence to practice reading the word again. If the participant read other words (not from the 2nd Grade Dolch Word List) incorrectly, the first author would correct him, but the participant did not have to go back to the beginning of the sentence.

From Set 4 to Set 5, a writing element was added, in which the participant was asked to write sentences that contained two to four 2nd grade Dolch sight words, across all the sets that had been introduced. The first author read the entire sentence, then read it again in small pieces, giving time for the participant to write the sentence. There were three sentences in total. When the participant was finished, the first author highlighted the Dolch words in the sentence and then ask the participant to self-correct his work, focusing on the Dolch words, comparing his work to the typed version of the sentences. The participant put a star above words spelled correctly and made no mark for words not spelled correctly. The words spelled incorrectly were then placed into that lesson's CC worksheet, if the word was not already on the worksheet.

Maintenance: Once our participant had reached mastery, maintenance was employed. During maintenance DI flashcards were employed to gather data. Also, our participant had to employ CC if errors occurred. Maintenance was in effect for 4 to 15 sessions/

Interobserver Agreement
Interobserver agreement was taken three times during baseline and five times during intervention. Either the classroom teacher, the instructional aide or the first

author's supervisor took the reliability of measurement. The reliability observer was given a blank copy of the same 2nd Grade Dolch Word List that the participant and the first author had. The interobserver was trained to count responses as correct or incorrect based on the same criteria that the first author used. The first author and interobserver marked answers independently of each other. Interobserver agreement was calculated by dividing the small number of correct responses by the larger number and multiplying by 100. The percent of interobserver agreement was 92% with a range of 83% to 100%.

Results
During baseline for Set 1, the participant had an average of 3.25 words with a range of 2 to 7 words (See Figure 2). For DI flashcards only, he averaged 7.5 words with a range of 7 to 8 words out of 9 words. In maintenance his performance improved to a mean of 8.67 words with a range of 7 to 9 words.

With Set 2, our participant's baseline scores averaged 5.5 words with a range of 3 to 7 words out of 9 words. Then DI flashcard alone were employed his performance in creased to 7.5 words with a range of 7 to 8 words. For maintenance, his performance increased to 8.85 words with a range of 8 to 9 correct words out of a possible of 9 words.

For Set 3 words, our participant's baseline averaged 4.37 words with a range of 3 to 6 words. When DI flashcards+ CC and reading passages were employed his performance increased to a mean of 5.9 words with a range of 4 to 8 words. His performance in maintenance was somewhat stable ($M = 7.85$; range 7 to 9 words).

For Set 4 words, our participant's baseline performance was variable with an overall mean of 4.57 words (range 3 to 6 correct sight words). When DI flashcards were implemented alone, his performance improved slightly to 5.3 words with a range of 3 to 8 words. Adding CC + oral reading further improved his performance to 8.75 words with a range of 7 to 8 words.
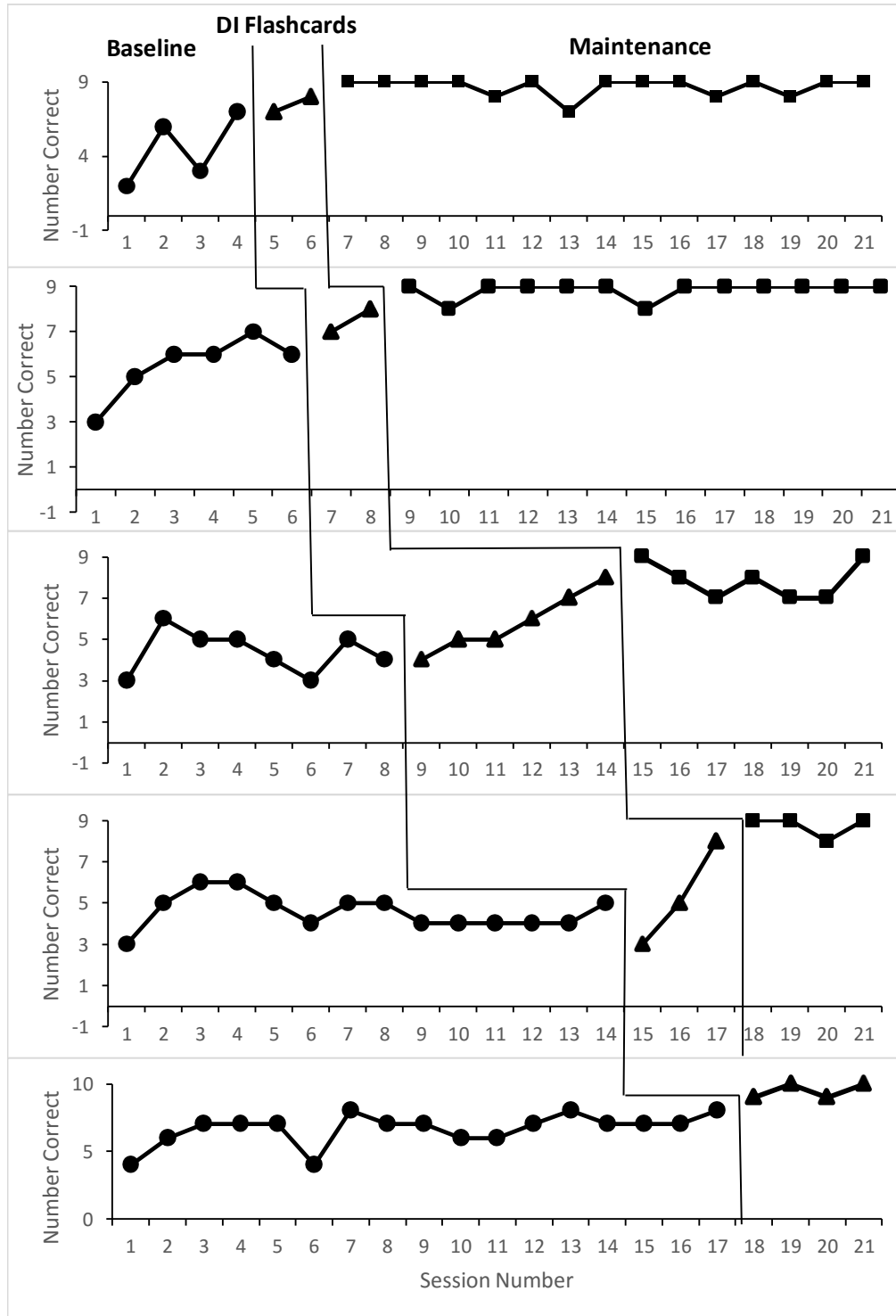
Fig 2: Number of words correct per session per set for each condition. Sets 1-2 employed baseline, DI flashcards and Maintenance. Sets 3-5 employed DI flashcards, a modified CCC called copy compare followed by maintenance. For Sets 4 and 5, a writing and oral reading component was added to the CC and DI flashcards and no maintenance was in effect.

For Set 5 that contained 10 words, the participant's baseline performance averaged 6.65 with a range of 4 to 8 correct sight words. When DI flashcards + CC + oral reading was employed, our participant's performance increased to a mean of 9.25 correct sight words with a range of 9 to 10 sight words. Due to the ending of the first author's practicum, maintenance data were not gathered for Set 5.

The number of sessions to reach mastery was small. It took two sessions for Sets 1 and 2. Six sessions were needed to Set 3. Set 4 required only three sessions.

Discussion

The outcomes indicated improvements in our participant's ability to know his sight words for the Dolch list. Our participant's ability to correctly read 2nd grade Dolch sight words was further enhanced his performance. When tested three weeks later after formal data collection stopped, with no instruction on the 2nd grade Dolch sight words in between, the participant had maintained his sight word skills and was able to correctly say 45 out of 46 words from the list. These outcomes replicate the idea that additional interventions can be employed with DI flashcards. This can

include reading or math racetracks (Kaufman et al., 2011; Green et al., 2010; Harris, Helling, Thompson, Neyman, McLaughlin, Hatch, & Jack, 2015; Lund et al., 2011; Skarr et al., 2014). Also, we could add different procedures such as CC and oral reading to further improve our participant's performance. We have added discrimination training to DI flashcards and found increases for a single preschool student (Kane, McLaughlin, Derby, & Mortensen, 2015).

The implementation of DI flashcards to teach the words during Intervention was a successful strategy and familiar to the participant, so he could catch on quickly. Though the DI flashcard strategy paired with model test had not used previously with the participant, using flashcards with words were familiar and comfortable for him, as he had learned to read the Kindergarten and 1st grade Dolch words using flashcards.

The use of a Model, Lead, Test error correction procedure was modified to Model, Test because of the participant's age. Being 12-years-old and in middle school, the participant did not want to say the word with the first author. Also, there were no issues with using MLT. Our results show that the participant successfully increased the number of words read correctly.

The CCC worksheet was modified to CC, after the first two sessions of intervention when the first author noted that the student preferred to just cover the word both times he wrote it, rather than copy it first. The modification was made with the observation that the participant did correctly spell most words, 78%, or 7 out of 9 words, on the worksheet. This was a high enough percentage for the modification, keeping in mind that the purpose of the study was to read with fluency and accuracy, not spell them correctly, though spelling them was important for reading them, as well.

As sessions progressed, our participant was able to read through the DI flashcards quickly and complete the CC worksheet with ease. The first author felt that it would be helpful to add more activities into the sessions to keep the participant's interest. Using various UFC fighters (the participant enjoyed UFC fighting), the first author created a series of reading passages about UFC fighters with 2nd grade Dolch sight words embedded throughout the passage. The participant was able to successfully read with ease the 2nd grade Dolch sight words that had been introduced so far. This showed that not only could the participant read the words in isolation, he could also transfer his knowledge to read the words in the context of a reading passage. Three reading passages, one for Sets 3, 4 and 5 were created and it was our view, greatly assisted our participant in his reading.

Writing sentences was another element added into sessions for Sets 4 and 5. Though spelling the 2nd grade Dolch sight words was not the focus of the study, the first author still found this to be an activity interesting for the participant, who was excited to write sentences with the words he was learning to read and spell using CC. The result showed that the student could correctly spell the same words he spelled correctly in isolation during the Cover, Compare worksheet, in the sentences.

Halfway through the sessions, the participant began to become distracted by people in the hallways and/or would slump in his chair due to feeling bored. The first author added a reinforcer to keep the participant motivated. The middle school had a reward system using Reward Bucks (name changed for security purposes), in which the students earned in class for a variety of behaviors, such as listening, being on task, being respectful, completing work, etc. The students could then trade them in at the end of the month for an ice cream sundae and a raffle drawing for prizes. The first author reminded the participant of expectations, such as not talking with other students who walked by in the hall and sitting appropriately (not slumped). If expectations were followed, the participant could earn a Reward Buck. However, since they were not withdrawn, we would urge you to view the efficacy of reward bucks with caution. This use of this consequence greatly improved the participant's willingness to complete the tasks.

There were several strengths in the present research. First, in contexts outside of the Intervention sessions, the participant was able to read and spell correctly the 2nd grade Dolch sight words in his daily classwork. When the first author took note of this, the participant was praised and reminded that he could now read or spell the word because he was learning them with the first author. As the participant realized this success, there was improvement in his willingness to read and write for himself, rather than have a reader or scribe (as deemed in his IEP). Prior to the study, the participant had expected others to read and write for him. During the study and after, the participant held a boosted self-esteem that he could do his own work (such as reading and writing answers on homework), with little help from others.

There were several limitations in the present case report. First, our participant was in a reading class to help improve his ability to read with fluency and accuracy. We were unable to observe the participant in this class, but some of the success of the participant in our case study could possibly be correlated with the content learned in the participant's reading class. However, data will have to be gathered to make such a position viable. Also, reliability of measurement should have been taken more often. Reliability of measurement in all phases of the research should have occurred. One could have taped the oral sessions and examined the CC work sheet.

Another limitation was the use of a mastery criterion that was not perfect performance or did not have to maintain over a number of sessions in succession. Perfect performance or 100% accuracy has been suggested (Stein et al., 1981) as a definition of mastery. Typically, this is what we have used in our previous research with DI flashcards (Cravalho et al., 2014; LeBrun et al., 2014; McGrath, McLaughlin, Derby, & Bucknell, 2012; Pfaff et al., 2013; Skarr et al., 2012, 2014).

To further continue this study, we would recommend using the 3rd grade Dolch sight word list as the next logical step in increasing the participant's fluency and accuracy level in reading sight words and to increase his reading level overall. Data should be taken for each session, for each word to note which words the participant read correctly or not with the 3rd grade list.

The maintenance of treatment effects (Stokes & Baer, 1977, 2003) over time was an interesting outcome. Others have found generalization and maintenance using DI flashcards with reading or math racetracks (McGrath, McLaughlin, Derby, & Bucknell, 2012; Skarr et al., 2012, 2014) or just DI flashcards (Mangundayo et al., 2013). We have also found such maintenance employing copy, cover, and compare (CCC) (Brinegar, Armstrong, Neyman,

McLaughlin, & Johnson, 2015; Manfred, McLaughlin, Derby, & Everson, 2015; Weber, McLaughlin, Cozza, & Miller, 2014). The continued use and monitoring of these procedures with prior sets makes such an outcome possible. Over time, words or math facts that are mastered can eventually be removed from the flash card stacks (Skarr et al., 2014).

This study took place over a month, approximately four sessions per week. To increase the rate of learning sight words, it should benefit the participant to practice the sight words at home with a deck of flashcards he could bring home with him. Accountability would be needed, by having a sheet for the participant's parents to sign when he went through the flashcards at home and a reinforcer offered at school, such as a Reward Bucks for practicing 3 or 4 times per week. The use of the single case design across sets allowed the first author to add some additional interventions to DI flashcards. In this way she could determine if these additions were helpful or detrimental to our participant's performance. However, since we never returned to baseline or just using DI flashcards, these procedures need additional examination. Finally, the effects of Reward Bucks for participation were not evaluated.

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