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USING AND EVALUATING COVER, COPY, AND COMPARE WITH A 4TH GRADE STUDENT WITH AUTISM: A CASE STUDY WITH BRIEF MEASURES OF MAINTENANCE OF TREATMENT EFFECTS OVER TIME

BRITTANY WEBER[1]
Certification Student

T. F. MCLAUGHLIN[2]
Full Professor
Gonzaga University

MEGAN COZZA[3]
Lecturer

and

TISHA MILLERSMITH[4]
Special and General Educator
Spokane Public Schools

Abstract: *The purpose of this study was to evaluate the effectiveness of cover, copy, and compare (CCC) on spelling accuracy with a single student with autism. CCC is a student-managed procedure that teaches discrete skills through self-tutoring and error correction. The effectiveness of CCC was evaluated using a multiple baseline and multiple probe design. The results indicated that CCC was effective in teaching a single student with autism his spelling words. A maintenance of treatment gains showed differential effects. The CCC method was easy to implement and employ in the classroom. Issues related to maintenance of treatment effects were discussed.*

Key Words: *cover, copy, and compare, spelling, autism, behavior disorders, written communication, self-contained classroom, maintenance of performance*

Introduction

A student's ability to spell words correctly shows clear understanding of the letters, sounds, and syllable patterns that make up the English language; as well as other languages is an important measure of literacy (Bear & Templeton, 1998; McLaughlin, Weber, & Barretto, 2004; McLaughlin, Weber, & Derby, 2013). As a consequence, spelling remains a very complicated and difficult subject to teach many students in an efficient manner (Wanzek, Vaughn, Wexler, Swanson, Edmonds, & Kim, 2006). Heron, Okyere, and Milldner, (1991) defined spelling as the formation of words through the sequential and meaningful arrangement of letters. Heron et al. also felt this was a process of encoding spoken utterances into written symbols

With the documented importance of spelling to academic success, it is particularly important that educators utilize teaching tools and methodologies that have been proven empirically to assist children at school (Graham, Harris, Fink-Chorzempa, & Adkins, 2004). This is important when one is working with children with autism spectrum disorder (ASD). Autism is a disability characterized by lack of communication and social functioning (Thompson, 2007, 2008, 2009; B. Williams & R. Williams, 2011). Research suggests that an intensive early behavioral intervention remains the best treatment currently available for autistic children (Fenske, Zalenski, Krantz, & McClannahan, 1985; Thompson, 2007, 2008, 2009). The

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prevalence of children diagnosed with autism over the last 10 yours has increased at an unprecedented rate and continues to do so (Heward, 2013). Many special education teachers who work with children with behavior disorders have reported working with increased numbers of students in their classrooms. There has been little research documenting was to teach spelling to students with autism. This may be because such issues as the development of language, improved social function has taken more of a priority There has been little research in this area. Recently, Kagohara, Sigafoos, Achmadi, O'Reilly, & Lancioni, (2012). were able to teach students with ASD to check their spelling using a spell checker. However, they did not present any data in terms of how accurate their participants spelling became. In addition, they employed technology that may not be readily available in many special education classroom.

Review of Literature

An academic intervention that decreases the need for one-on-one instruction, and has been shown to be effective in increasing spelling performance has been cover, copy, and compare or copy, cover, and compare (CCC) (Cates, Dunne, Erkfritz, Kivisto, Lee, & Wierzbicki, 2006; Joseph, Konrad, Cates, Vajcner, Eveleigh, & Fisheye, 2012). CCC requires the following steps: (1) student to write or say the word from the sample, (2) cover the word and sample and spell or say the word from memory, (3) check their work and if spelled or said correctly, move to the next word or (4) if an error was made, the child copies or says the word correctly three times with the aide of the sample, and then move to the next word. This self-managed self- tutoring strategy has been shown to be a cost effective, evidenced-based self-managed and self-tutoring intervention that does not require extensive classroom teacher training to implement and evaluate in the classroom (McLaughlin & Skinner, 1996; Neis & Belfiore, 2006; Skinner, McLaughlin, & Logan, 1997). CCC has been employed across a wide range of classroom arrangements such as resource rooms (McLaughlin, Mabee, Reiter, & Byram, 1991) to self-contained behavior intervention classrooms (Carter, McLaughlin, Derby, Schuler, & Everman, 2010; Cieslar, McLaughlin, & Derby, 2008; Darrow, McLaughlin, Derby, & Johnson, 2012; Hubbert, Weber, & McLaughlin, 2000).

With the increases in the number of students with ASD, teaching procedures need to be evaluated for use with such students (Heward, 2013; B. Williams & R. Williams, 2011). Recently, we implemented CCC with a single elementary student with autism to teach him sight words. (Ivicek-Cordes, McLaughlin, & Higgins, 2012). CCC was evaluated in an ABC single case design. They found that when CCC was employed, increases in correct labeling of Dolch sight words were found. Increases in labeling correct sight words were not as large for the second list of sight words. With the increases in the number of students with ASD, teaching procedures need to be evaluated for use with such students. Also, little data are available in using CCC in spelling with students with autism.

The purpose of this case study was to examine the effects of CCC with an elementary school student with severe behavior disorders and autism. We also wanted to replicate our previous research and that of Chris Skinner and colleagues (Neis & Belfiore, 2006; Skinner, Belfiore, &

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Pierce, 1992; Skinner, Turco, Beatty, & Rasavage, 1989; Smith, Dittmer, & Skinner, 2002) assessing CCC in spelling. Third, we wanted to examine the maintenance of treatment effects in spelling over time. Finally, we wished to extend and replicate our prior work in self-contained classrooms (Carter et al., 2008; Ciesler, McLaughlin, and Derby, 2007; Hollingsworth, Keith, McLaughlin, & Derby, 2012) with a younger student displaying academic deficits in spelling and with an older student with autism than we have assessed in our primary elementary school research (Ivicek-Cordes et al., 2012)

Methodology

Participant and Setting

The student in this study was a 10-year-old fourth grade male diagnosed with autism (ASD). He had been diagnosed with autism by the IEP team and a local licensed clinical psychologist. In addition, he had targeted goals in the areas of reading, writing and behavior. A subset of his writing goal was to be able to spell phonetically regular and irregular words at the 4th grade level with 80% accuracy. When the data collection began, he was able to spell 4th grade district level core words with 30% accuracy. He was chosen as our participant on the recommendation of his classroom teacher (fourth author). She felt that he needed to improve his spelling skills.

The study took place in a self-contained classroom for students with severe behavioral impairments. The classroom was located in a public elementary school in the Pacific Northwest. Typically, data were gathered fo3 3 to 4 days per school week. The participant had just begun full inclusion in music, physical education and math so the time of data collection varied dependent upon his daily schedule. The first author would work one on one with the student in the classroom when the rest of the class was at music or physical education. The study was conducted by the first author who was completing the study as part of a requirement for her endorsement in Special Education from Gonzaga University and the Office of the Superintendent of Public Instruction in the State of Washington.

Materials

The research project used a CCC worksheet created by the first author and it was very similar to that outlined by McLaughlin and Skinner (1996) (See Figure 1).

Other materials included a sample of 47 4th grade spelling words from the *Rebecca Sitton Spelling List* (Sitton, 1995). These words were selected for mastery as part of our participant's IEP goals in written communication.

Figure 1. A CCC worksheet employed with our participant.

Words	Copy	Cover/Compare	Check	Correct 3 Times

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Dependent Variable

The behavior measured was the accuracy of spelling target words on a written test at the beginning of each session. A correct response was writing all letters of each word in the correct order. An incorrect response was due to the student omitting a letter, adding an extra letter, substituting a letter or putting letters in the incorrect order.

Table 1.

Spelling words Devlin was assessed throughout the study.

Set 1	**Set 2**	**Set 3**	**Set 4**	**Set 5**	**Set 6**
Write	Family	It's	Groups	English	Able
There	Yet	Several	They're	Because	Often
Draw	Become	Listen	Follow	Mean	Different
Grow	Try	Ask	Single	Among	Examples
Really	Ago	Sure	Clear	Sentence	Really
Almost	Always	Its	Grew	Dog	Idea
Course	Less	Build	Together	There	Shown
Than	Words	Written	Check	Picture	
Then	Study	First	Their	Another	
	Learned	Faces	Most	Does	
		Surface			

Data Collection and Inter-observer Agreement

Before each session, the student was tested on the word set currently in intervention and one other word set that was still in baseline. The baseline set being tested on rotated each session. I read each word orally and used them in a sentence and the student wrote down the correct spelling for each word. The student was given no time limit. The data indicating words being tested on throughout the research project are displayed in Table 1.

After the student finished, I corrected his test. A correct response was recorded with a "+" and an incorrect response was recorded with a "-" on the data sheet next to the corresponding word. After the session, data were counted and transferred to another data sheet that recorded the total number of correct and incorrect responses for each word set.

The student's classroom teacher (fourth author) also corrected his test on days when inter-observer agreement was conducted. Each of us had our own data sheet to record responses. All other procedures were the same as above. Inter-observer agreement data were collected on 6 sessions during the study. Mean agreement was 100 % for regarding of his spelling tests.

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Data regarding the fidelity of implementation of the intervention was gathered by assessing student word for both baseline and CCC. Also, as part of this procedure a research verification form was completed and turned into the University as part of its compliance with the protection of human subjects (McLaughlin, B. Williams, R. Williams, Peck, Derby, Bjordahl, & Weber, 1999)

Experimental Design and Conditions

A non-concurrent multiple baseline and multiple baseline probe design (Kazdin, 2011; McLaughlin, 1983) across six sets of words was used to evaluate the effectiveness of CCC on the accuracy of spelling target words. Decisions were made to intervene on each word set based upon data trends and progress during the lessons. When the student showed mastery, by spelling at least 80% of the words correctly, on a word set then intervention continued onto the following set of words.

Baseline. During baseline conditions, I read the words orally and used them in a sentence and the student spelled them on a written test. The student was not given feedback about response accuracy during the test.

CCC. The start of each lesson began with a spelling test using the same procedures as above except that the student received feedback about response accuracy for the words that were in intervention. Once the test was complete, the student had to fill out a Cover, copy, compare worksheet on the word set that was in intervention. He wrote down each word, copied each a second time and then covered up the words with a sheet of paper and wrote the spelled the words from memory. After this, he checked his spelling and if he spelled the word correct he put a check mark and moved onto the following word. If he had misspelled the word he wrote down the correct spelling of the word and then continued on to the following word.

Maintenance. Maintenance of treatment effects (Stokes & Baer, 1977) was assessed when the words in a set were mastered. This procedure was simply a return to baseline conditions and these data were taken on three occasions with Set 1 and for two sessions with Set 2 spelling words.

Findings

Baseline

The results for correct responses for each set are displayed in Figure 2. For Set 1, Devlin spelled 4 to 5 words correctly. For set 2, the participant spelled 5 to 6 words correctly. For Sets 3, 4 and 5, our participant displayed had variable performance with just of 2 to 4 words spelled correctly. For the words in Set 6, Devlin had variable responses of 0 to 2 words correct.

CCC

For Set 1, our participant increased from 6 to 9 words spelled correctly. For Set 2, Devlin increased from 6 to 10 words spelled correctly. For set 3, he steadily increased from 5 to 10 words spelled correctly. For set 4, his performance remained at 2 of 10 words correct for the first two sessions and then increased to 8 words correct by the last session.

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Maintenance

For Set 1, Devlin had variable correct responses ranging from 3 correct to 7 correct.

With the words in Set 2, our participant decreased his performance to just 6 words correctly spelled over time.

Figure 2: The percent of words spelled correctly during baseline, CCC, and Maintenance

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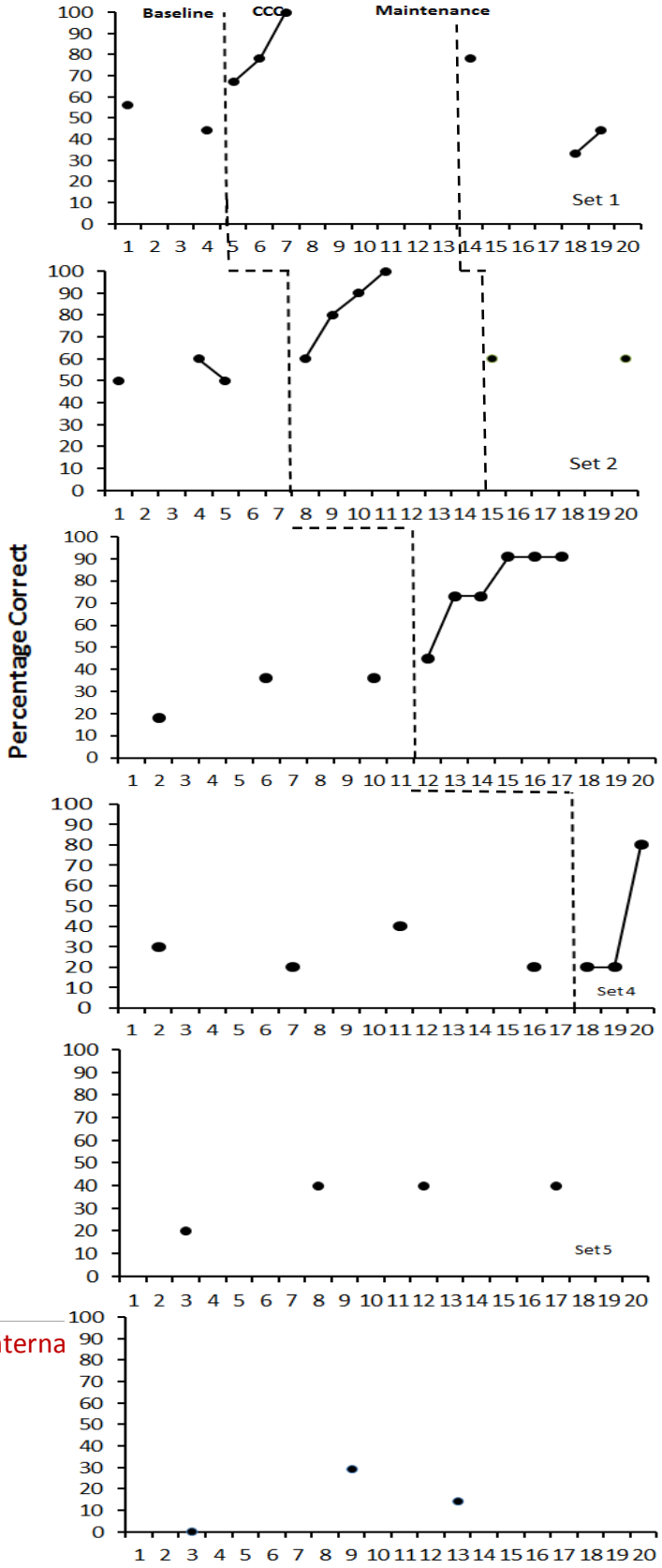

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Conclusion

The results indicated an increase in spelling performance for each set of spelling words where CCC was employed. In addition, the maintenance of treatment effects found for Set 1 and Set 2 words declined over time. This last finding needs further analysis and study.

The present research replicates the work of Cordes-Ivicek et al., (2012) who were able to increase the spelling of a younger student with autism. This also begins to extend the efficacy of CCC with spelling for students with autism. It also replicates a very large and impressive body of literature (Joseph et al., 2012) with various age levels, disability designations, and classroom settings. Also, one can begin to determine the effectiveness of CCC with a growing population of students with autism. However, classroom research with a larger sample of students appears needed before this conclusion can be verified. Our present outcomes does extend the previous research in reading math, and carried out at Gonzaga University (Darrow et al., 2012; Hollingsworth et al., 2012; Hochstetler, McLaughlin, Derby, & Kinney, 2013; Kaufman, McLaughlin, Derby, & Waco, 2011; Membrey, McLaughlin, Derby, & Antcliff, 2011; Murphy, Hern, Williams, & McLaughlin, 1990; Poff, McLaughlin, Derby, & King, 2012; Skarr et al., 2012; and that of Skinner and his coworkers (Nies & Belfiore, 2006; Poncy & Skinner, 2011; Skinner et al., 1991; Smith et al., 2002) at several other institutions. These replications (Jasny, Chin, Chong, & Vignieri, 2011; Kazdin, 2010) with CCC, adds to the confidence for educators that CCC is an efficient and effective data-based academic intervention that can improve the basic skills of the various students in our schools.

Suggestions and Recommendations

The strengths of the study were that it was inexpensive, and no special curricula were needed. It was also easy to implement and assess in a self-contained classrooms setting by a single preservice teacher candidate. The first author created modified CCC sheet and participant student also enjoyed working 1:1 with the first author during the project. It also appeared to increase his motivation to do well in school and to interact with more adults in the classroom.

There were also some limitations in the present case report. There were large gaps of time between some sessions. This was due to both student absences and time conflicts in the school day. These issues may well have had a negative effect on the student's progress. The first author was also unable to return to CCC with both Sets 1 and 2 due to time constraints in per practicum placement in the spring. If there would have been more sessions or days of school in the school year, when the participant's performance during maintenance with Set 1 and 2 words, we should have returned to CCC when the maintenance data indicated that he was not retaining the skill. Clearly, such an issue needs further assessment and analysis.

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Special Education, Gonzaga University, Spokane, WA 99258-0025 or via email at mclaughlin@gonzaga.edu

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