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A Comparison of Two Self-Managed Spelling Interventions: Cover, Copy, and Compare and Taped Spelling Intervention

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A COMPARISON OF
TWO SELF-MANAGED SPELLING INTERVENTIONS:
COVER, COPY, AND COMPARE
AND TAPED SPELLING INTERVENTION

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ABSTRACT

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Cover, copy, and compare (CCC) is an effective academic intervention for many academic subjects, but most often implemented as a spelling intervention. Taped interventions (TI) have also been found to be effective in increasing academic performance (Freeman & McLaughlin, 1984), but are most often implemented as math interventions. Recently, a Taped Spelling Intervention (TSI) was developed and found to be effective in improving the spelling of middle school students with learning disabilities (McCallum, Schmitt, Evans, Schaffner, & Long, 2014). CCC and TSI are self-managed interventions that include error self-correction components and high rates of opportunities to respond. Both interventions are viewed favorably by students and teachers. Direct comparisons of CCC and other taped interventions have previously been examined (Poncy, Skinner, & Jaspers, 2007; Poncy, Skinner, & McCallum, 2012), but this is the first study to directly compare CCC and the recently developed TSI. The

current study compared the effects of CCC and TSI on the spelling accuracy of four fifth-grade students with identified learning disabilities in reading and writing. The effectiveness of the two interventions was compared by way of an adapted alternating treatments design (Barlow & Hayes, 1979), taking into account instructional time required by each intervention and the resultant learning rates. The TSI condition included the use of a media device in the form of an *iPhone* while experimenter-created intervention worksheets were used during the CCC condition. Lists of grade level spelling words were compiled from aimsweb, a tightly controlled for difficulty, curriculum-based measurement system. Three spelling word lists were used in the study (one word list per condition including a control condition) with each list consisting of 10 words made up of 75 correct letter sequences.

The effectiveness of the interventions was evaluated using visual analyses. Specifically, mean total words correct (TWC) and mean correct letter sequences (CLS) for each word list were graphed and visual analysis was used to compare the trends of the data. Both interventions (CCC and TSI) resulted in increased mean TWC and CLS for each of the students when compared to his initial baseline assessments. In terms of TWC, CCC was most effective for two of the students and TSI was most effective for another student. Regarding CLS, three students performed better by way of TSI when compared to CCC. Learning rate was higher in the CCC condition and students generally preferred CCC over TSI. Spelling gains were maintained on an assessment administered approximately two-weeks following the final intervention session. Discussion focuses on the importance of easily implemented, socially acceptable, time- and cost-efficient interventions for increasing the academic performance of students, and the value of comparative analyses for choosing appropriate interventions. Practical implications, recommendations for use, limitations, and direction for future research will be discussed.

DEDICATION

This dissertation is dedicated to my parents who, over four decades ago, came to a strange country where they did not speak the language, and worked tirelessly to make a great life for my siblings and me. From as early on as I can remember, my mother and father emphasized the importance of getting an education. The value that they placed on education throughout my life greatly influenced my pursuit of this doctoral degree. Finally, I dedicate this dissertation to my two favorite girls, my beautiful wife Beth and my adorable two-year-old daughter Elliana. Beth, the love you show Ellie and me each and every day is remarkable, and I hope you know how much we love you. You are an amazing teacher, and your students will continue to benefit from your talent, but more so from your kindness and sense of humor. And Ellie, there simply are no words to adequately express what you mean to me. I hope that your days continue to be filled with smiles and laughter, because for me, there is no greater sight or sound. I love you.

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CHAPTER I

Introduction

Spelling instruction is an important component of the school day for elementary students. As students advance to the intermediate and junior high grade levels, the amount of spelling instruction decreases or stops altogether while some students continue to experience difficulty with spelling. Students who have difficulty learning to spell may also struggle with the reading and writing process. The inability to quickly and accurately spell can hinder an individual's ability to express ideas in writing, limit written vocabulary to those words that can easily be spelled, and impede vocabulary growth and reading comprehension (Erion, Davenport, Rodax, Scholl, & Hardy, 2009). Additionally, application materials that contain spelling errors can reflect negatively on an applicant by colleges and employers alike (Sipe, 2008). Identifying and developing research-based spelling interventions is important because traditional spelling activities have not been shown to be effective for many students (Schlagal, 2002). Academic interventions that are no- or low-cost, easy to implement, socially acceptable, and effective are welcomed by teachers and administrators. Self-managed academic interventions are optimal for maximizing the instructional time of teachers especially as schools face increased class sizes as a result of recent federal and state budget cuts in education.

Cover, Copy, and Compare (CCC) is an empirically validated academic intervention that has been found to be effective in improving the spelling skills of students (Cates, Dunne, Erkfritz, Kivisto, Lee, & Wierzbicki, 2007; Darrow, McLaughlin, Derby, & Johnson, 2012; Erion et al., 2009; Hochstetler, McLaughlin, Derby, & Kinney, 2013; Jaspers, Williams, Skinner, Cihak, McCallum, & Ciancio, 2012; Mann, Bushell, & Morris, 2010; Merritt, McLaughlin, Weber, Derby, & Barretto, 2012; Nies & Belfiore, 2006). The CCC intervention, which is easy to implement and socially acceptable, includes multiple practice opportunities, immediate

corrective feedback on performance, and access to reinforcement. The Taped-Problems intervention (TP), which is also easy to implement and socially acceptable, uses these same components (practice, feedback, and reinforcement) to improve the math fact fluency of students (Aspiranti, Skinner, McCleary, & Cihak, 2011; McCallum, Skinner, Turner, & Saecker, 2006; Poncy, Skinner, & Jaspers, 2007; Poncy, Skinner, & McCallum, 2012).

Taped-Problems procedures have been adapted for use with spelling words by way of the Taped Spelling Intervention (TSI). In a recent study, four middle-school students with reading and writing difficulties listened to mp3 recordings of spelling words followed by pauses in which the students attempted to write the correct spellings before they were provided by the recording (McCallum et al., 2014). When spelling mistakes were made, the students were instructed to correct their spelling. Results showed that the spelling performance of all students increased immediately upon introduction of the intervention and these gains were maintained over time.

The current study sought to extend the developing literature base on TSI and CCC by comparing the interventions and their effects on the spelling accuracy and learning rate of middle school students with learning disabilities in reading and writing. Student acceptability data will be collected to determine the more favorable intervention among students.

Significance of the Problem

A Survey of Adult Skills was recently released by the Programme for the International Assessment of Adult Competencies (PIAAC) that painted a concerning picture regarding the literacy skills of Americans and their future job and health outcomes (OECD, 2013). The survey, which included 166,000 adults from 24 countries, reported on adults' proficiency in literature, numeracy, and problem solving in technology-rich environments. This comprehensive report emphasized the importance that literacy has on many facets of adult life. For example, the

report stated that adults with low literacy skills are more than twice as likely to be unemployed and to report poor health. The importance of literacy cannot be understated, and as a component of literacy, the ability to spell for children and adults is a critical skill. The results from this report lend support to the need for the development of effective academic interventions.

The Individuals with Disabilities Education Improvement Act (IDEIA, 2004) contains language that gives school practitioners the option to use *Response to Intervention* or RTI as an alternative to the often critiqued IQ-achievement discrepancy method of diagnosing specific learning disabilities. After passage of the reauthorized federal law known as Public Law No: 108-446 or IDEIA, 2004, local education agencies (LEA) were no longer required to consider whether a child had a severe discrepancy between achievement and intellectual ability in order to diagnose specific learning disabilities. In the state of Pennsylvania's Chapter 14 special education regulations, in choosing to use RTI to diagnose specific learning disabilities, it states that school teams, as part of the RTI process, must include documentation that, "(a) the student received high quality instruction in the general education setting, (b) research-based interventions were provided to the student, and (c) student progress was regularly monitored" (Title 1, Pennsylvania Code, Section 14.125). As such, school teams are tasked to identify research-based interventions to be used during the pre-referral intervention process.

However, RTI is more than just a procedure for diagnosing specific learning disabilities. RTI is a tiered-system for providing early intervention to all students at risk for school failure (Fuchs & Fuchs, 2006). Within an RTI framework, the academic and behavioral progress that students make is monitored closely and often to determine if students are making progress or if a higher level of intervention is needed, which would result in the student moving to a more intensive tier (e.g., Tier II or Tier III). The upper level tiers consist of more frequent, intensive,

and specialized interventions. The need for research-based interventions in the school setting increased when engaging in an RTI process became mandatory for school teams. The basic components (universal assessments, progress monitoring, research-based interventions) of RTI tend to be similar from school to school, and even state to state.

Fuchs, Fuchs, and Compton (2012) described a multilevel prevention system called *Smart RTI* that includes components of multistage screening and assessment, and special education services that complement the general education program and contributes to prevention efforts. In fact, these researchers replace the "tier" terminology with "level," and the levels are described as primary prevention, secondary prevention, and tertiary prevention. The academic and behavioral interventions that are available within each tier or level differ from school district to school district, and even among school buildings within the same district. Nonetheless, the need for empirically validated academic interventions is emphasized within an RTI framework. Identifying effective academic interventions is critical for a school system to have a successful RTI process. It is anticipated that the results from the current study will help school teams make informed decisions when choosing between CCC and TSI and determining if the interventions belong in their respective intervention libraries.

How Spelling is Usually Taught

Traditional spelling instruction typically consists of students receiving a list of spelling words at the beginning of the school week and engaging in a variety of educational activities that make use of the words. Some of the educational activities include copying spelling words multiple times, alphabetizing spelling words, and using the words in original sentences and stories (Wirtz, Gardner, Webber, & Bullara, 1996). While the traditional method of spelling instruction is effective for many students, others struggle with spelling deficits throughout their

educational careers and into adulthood. Students with weak spelling skills may become frustrated and try to avoid written expression activities altogether (Alber & Walshe, 2004). There is a paucity of research that supports the use of traditional spelling instruction over other approaches (Johnson, 1998).

Learning to spell is a complicated and frustrating task for many students. The fact that the English language has a deep orthography, meaning that it contains many inconsistent and complex grapheme-phoneme correspondences, likely adds to the frustration that students experience (Ise & Schulte-Körne, 2010). As such, teaching spelling with an overreliance on phonics, which is typical of traditional spelling instruction, will not be effective for many words in the English language. For example, Kirk and Gillon (2009) indicated that a child using a phonemic spelling strategy without paying attention to morphological relationships will likely spell a word like "photography" as "fitografe." Teaching students to use a "sound the word out" strategy, which is often a component of traditional spelling instruction, has not been found to be an effective practice (Rader, n.d.). Students who experience difficulty with learning to spell by way of traditional spelling methods may benefit from additional forms of spelling intervention.

Cover, Copy, and Compare (CCC) and Taped Interventions (TI)

Cover, copy, and compare (CCC) and taped interventions (TI) have been found to be effective academic interventions for students with and without disabilities across many academic subject areas including spelling (Darrow et al., 2012; Hochstetler et al., 2013; Nies & Belfiore, 2006;), reading (Bliss, Skinner, & Adams, 2006; Freeman & McLaughlin, 1984; Sterling, Robinson, & Skinner, 1997), mathematics (Krohn, Skinner, & Fuller, 2012), geography (Skinner & Belfiore, 1992), and foreign language (Carter, Wong, & Mayton, 2013).

The basic CCC spelling intervention consists of the following: a) the student views the correct spelling of the word; b) the student covers the word; c) the student writes the word; d) the student uncovers the word and compares her spelling to the correct model; e) the student provides herself with reinforcement (e.g., checkmark) if correct, and if incorrect, the student rewrites the word a predetermined amount of times (usually three rewrites) while viewing the correct model. The procedure is repeated until all of the spelling words have been attempted, or for a predetermined amount of time.

The basic TSI procedure consists of the following: a) the audio file containing the spelling words is started on a media device (e.g., *iPhone*/*iPod*, compact disc player); b) the audio file begins and presents the student with a series of words to spell one at a time; c) a fixed time-delay (e.g., 8-seconds) occurs after the presentation of the word where the student attempts to write the correct spelling; d) following the fixed time-delay, the correct spelling of the word is presented to the student by way of the media device at a rate of one letter per second; e) the student checks her spelling to determine if it is correct; f) if correct, the student provides herself with reinforcement (e.g., checkmark), or if incorrect, the student rewrites the word a predetermined amount of times. The procedure is repeated until all of the spelling words have been presented on the audio file. The TSI can be administered to a group of students at one time by playing the audio files over an external speaker or individually via the use of personal media devices.

While a direct comparison of CCC and the TSI does not currently exist in the research literature, CCC and taped problems (TP) interventions have been evaluated in the area of math. Poncy, Skinner, and Jaspers (2007) compared the effects of CCC and TP on the math fact accuracy and fluency in an elementary student with low cognitive functioning. The study

consisted of an adapted alternating treatments design combined with a multiple-probe design. The dependent variables included the percentage and number of digits correct per minute. Baseline data was collected followed by counterbalancing of the CCC and TP interventions, and assessments of the student's performance occurred immediately following each intervention. Results showed that the student's accurate responding to the single-digit addition problems increased to 100% during TP and remained at that level throughout the study. The student's accuracy on CCC problems increased to 90% immediately and then stayed at high levels for the remainder of the study. The student's accuracy on the control problems remained low suggesting that the observed increases in performance were due to the effects of the CCC and TP interventions. TP was found to be the more efficient intervention because it required less time for the student to complete, which was indicative of a higher learning rate. Regarding limitations of the study, due to the student's low cognitive ability level, the researchers indicated that they underestimated the student's responsiveness to the interventions by targeting only four problems under each condition. As a result, it is possible that ceiling effects hindered their ability to detect differences in acquisition between the two treatments. The researchers cited additional limitations including failing to collect treatment acceptability data and the fact that only one student participated in the study, which limited the generalizability of the results of the study.

In a more recent study, Poncy, Skinner, and McCallum (2012) employed an adapted alternating treatment design to compare the effects of class-wide applications of TP and CCC on subtraction fact fluency. The study included 20 third-grade students in a general education classroom in Iowa, none of whom received special education services in the area of mathematics. Baseline and intervention assessment data were collected on one-digit minus one-digit and two-digit minus one-digit subtraction facts, which were divided into three mutually exclusive sets

containing 21 or 22 problems. The difficulty level of the three sets of problems was determined to be equivalent following the administration of the baseline assessments. Six different assessment probes were developed for each set of problems, with each assessment probe consisting of 48 problems. The CCC intervention consisted of the students working with a CCC worksheet developed by the experimenter, which consisted of a grid containing 42 boxes that the students used to practice the Set B target problems. Fact family triangles were included in the first and fourth columns and were used as the CCC stimuli. Two empty boxes were included to the right of each fact family triangle where the students were instructed to write a subtraction problem and its answer from the fact family triangle and its corresponding reciprocal fact. The students were given 6 minutes to complete as many fact family triangle CCC's as possible while using the CCC procedures (i.e., view fact family triangle, cover fact family triangle, write one of the possible problems, write corresponding reciprocal fact in next box, check accuracy, move to next fact family triangle and repeat). The TP intervention consisted of the students receiving a packet of two experimenter-constructed intervention probes that contained the Set C problems. The researchers randomly chose problems and recorded the corresponding problems and answers on a cassette tape, and a 2-second delay was included between each problem and its answer until 6 minutes had passed. The students were given the intervention probes and provided with directions. After the directions were read and questions were answered, the researcher started the tape recorder. Results indicated that the TP intervention was superior to CCC in terms of math-fact fluency. A limitation cited by the researchers was the potential for multiple treatment interference in that intervening with one problem set may have caused increases in the other problem sets. The researchers also noted that the students liked the TP procedure better than CCC because it required less writing, which may have decreased the effectiveness of CCC.

In another study targeting math, CCC and TP were compared with a third intervention called *Math to Mastery* (MTM). Mong and Mong (2012) evaluated the effects of CCC, TP, and MTM by way of an alternating treatments design (ATD) to determine the most effective intervention for increasing the math fluency of 3 second-grade regular education students with math fluency deficits. MTM was described as a structured intervention package that shares similarities with CCC and TP including the previewing of problems, repeated practice, immediate corrective feedback, and self-monitoring. Results revealed that MTM was the most effective intervention for two of the students while CCC was most effective for the third. While the TP intervention was the least effective intervention for the three students, the performance for two of the students increased by 20% or more when compared to their respective median baseline scores. MTM and CCC were most effective at increasing students' DCPM, but all three interventions were found to be effective at decreasing errors. More teacher time was required to implement MTM than was required for CCC and TP. It was noted that CCC and TP can be delivered as group interventions while MTM is generally designed as an individualized intervention. Regarding social validity, the students generally liked all three interventions and indicated that the interventions would help them in school.

Problem Statement

Many studies have evaluated the effects of the CCC intervention on various academic skills of school-age students. The effectiveness of taped interventions on various academic skills, especially in the area of mathematics, has also been examined extensively. However, a literature review resulted in only three studies that compared the effects of CCC and a taped intervention, and that was in the academic area of mathematics as described above (Mong & Mong, 2012; Poncy, Skinner, & Jaspers, 2007; Poncy, Skinner, & McCallum, 2012). As mentioned earlier, a direct comparison of CCC and the TSI does not currently exist. This is not surprising due to the fact that

the TSI is a relatively new intervention. This study sought to compare the two spelling interventions to determine which would prove to be the most effective and have the highest student acceptability ratings.

Research question 1

Will Cover, Copy, and Compare (CCC) or the Taped Spelling Intervention (TSI) result in a greater increase in mean Total Words Correct (TWC)?

Hypothesis 1: It is hypothesized that both interventions will result in improved TWC (when compared to individual baseline performance and a control condition) for the students participating in the study. However, this researcher believes that implementation of the TSI will result in a higher mean TWC for the students when compared to CCC. While the interventions share several similarities, there are some slight differences between the interventions that this researcher believes will lead to greater spelling performance by way of the TSI. During the TSI, the students will attempt their own spelling prior to being presented with the correct spelling of each word letter-by-letter audibly by way of the *iPhone*. The students will have to pay close attention to the *iPhone* in order to copy the correct spelling letter-by-letter onto the "follow along" sheet. During CCC, the correct spelling of the word will be presented visually for the students to copy onto the "follow along" sheet. It is hypothesized that this slight difference between the TSI and CCC will require a higher level of attention and more active engagement from the students that will result in the TSI being more effective in terms of mean TWC. Because the correct spelling of the word will not be visually present during the TSI (as it will be during CCC), the students will have to focus intently on the information being presented by way of the *iPhone*, and this increased level of attention will help the students learn more spelling words.

Research question 2

Will Cover, Copy, and Compare (CCC) or the Taped Spelling Intervention (TSI) result in a greater mean Correct Letter Sequences (CLS)?

Hypothesis 2: It is hypothesized that both interventions will result in improved CLS (when compared to individual baseline performance and a control condition) for the students participating in the study. However, as hypothesized above, the TSI will require a higher degree of attention from the students and lead to more student engagement by way of the design of the intervention, which will result in a higher mean CLS.

Research question 3

Will Cover, Copy, and Compare (CCC) or the Taped Spelling Intervention (TSI) result in a greater learning efficiency rate?

Hypothesis 3: The TSI will have a more efficient rate of learning because the intervention requires less corrective rewrites following errors than does CCC. As such, even though it is hypothesized that the TSI will lead to improved spelling for the students, they will be engaged in the TSI for less time than the CCC intervention. Because the students will be engaged in the TSI for less time than the CCC intervention, it is hypothesized that the TSI will prove to have a more efficient rate of learning.

Research question 4

Which intervention, Cover, Copy, and Compare (CCC) or the Taped Spelling Intervention (TSI) will have a higher student acceptability rating?

Hypothesis 4: It is hypothesized that the TSI will have a higher student acceptability rating due to the use of technology in the form of an *iPhone* that will serve to maintain the students' level of interest during the intervention. Similar to another study (Poncy, Skinner, &

McCallum, 2012), the researcher hypothesizes that the students will like TSI better than CCC because it will require less writing in the form of corrective rewrites. That fact may be more attractive than CCC due to the multiple corrective rewrites required of that intervention, which the students may consider to be too punitive.

CHAPTER II

A synthesis of spelling and reading interventions reported that spelling outcomes for students with learning disabilities were consistently improved when the spelling interventions included components of explicit instruction, multiple practice opportunities, and immediate corrective feedback after spelling mistakes (Wanzek, Vaughn, Wexler, Swanson, Edmonds, & Kim, 2006). These components, along with the self-managed design of the interventions, are important features of CCC and TSI and are described in detail below.

Self-Management and Self-Monitoring

A central feature of CCC and TSI is the self-management/self-monitoring component. Both interventions are designed to be self-managed by students with only minor prompting and direction from teachers. Cooper, Heron, and Heward (2007) described self-management as the personal application of behavior modification tactics that produces a change in one's behavior. Axelrod, Zhe, Haugen, and Klein (2009) indicated that "self-management is essentially self-monitoring with an added reward component based on meeting the predetermined expectations of an external observer" (p. 326). During the CCC intervention, the student compares her self-generated answer against a correct model to determine if the answer she produces is correct. A correct response from the student may lead to the student experiencing a sense of intrinsic reinforcement (e.g., "I'm proud of myself"), and typically an opportunity for extrinsic reinforcement is provided. Extrinsic reinforcement can be provided in the form of tangible rewards when the student achieves some predetermined level of success (e.g., student will receive a healthy snack/computer time/homework pass if she scores 80% or higher on test). During TSI, the student attempts to provide a self-generated response prior to the correct answer being given by the mp3 player or other media source (e.g., *iPhone/iPod*, CD player). Intrinsic

and extrinsic reinforcement are components of TSI as well. As with CCC, the student may experience intrinsic reinforcement when she learns her self-generated spelling is correct, and extrinsic reinforcement can be provided by presenting the student with a tangible reward.

As mentioned earlier, self-monitoring and self-management are significant components of both CCC and TSI. A large amount of research exists in the area of self-monitoring and self-management. The self-monitoring component in this study consisted of the students comparing their self-generated spellings against correct models to check for accuracy followed by an error self-correction procedure, when errors were made. The self-monitoring component of CCC and TSI is believed to be one of the important factors that leads to improved academic performance.

Self-monitoring interventions have recently been developed to address improving the homework completion of students. A self-monitoring intervention was effective in improving the completion and accuracy of spelling and math homework for students with disabilities receiving instruction in general education classrooms (Falkenberg & Barbetta, 2013). The study included a self-monitoring component that took place at the homes of students in the evenings and at school in the mornings, and brief individualized conferences were held between the students and their special education teacher 4 days per week. In another study, the rate of incomplete homework assignments decreased for residents of a large residential treatment program who ranged in age from 13 to 16-years that were taught to use a self-monitoring intervention (Axelrod et al., 2009). Prior to the intervention, the residents tended to engage in high rates of off-task behavior during time allotted for working on homework.

Self-monitoring interventions appear to be effective for students' homework accuracy and completion as indicated in the aforementioned studies. However, the accuracy and completion of students' homework is not the only area targeted for self-monitoring interventions.

In one study, a self-monitoring intervention improved the academic performance and behavior (e.g., being in one's seat, using materials appropriately, participating in class discussions) of at-risk middle school students (Wood, Murdock, & Cronin, 2002). The students in the study were taught to use self-monitoring sheets that included descriptions of the various academic behaviors, and feedback was provided to the students by the principle investigator regarding the accuracy of the students' self-monitoring data. In other words, the students were made aware of instances where the actual behaviors they presented with were not represented accurately on their own self-monitoring sheets. The researchers concluded that self-monitoring was an effective intervention for the students. It was reported that the change in the students' academic performance and behavior from baseline to the intervention phase was abrupt and substantial, and that the results generalized to settings and teachers where the training had not occurred. In addition, the positive changes that were observed during the study were maintained during the following school year.

In another study, students were taught the *ACT-REACT* self-monitoring strategy in order to evaluate its effect on the students' academic engagement, accuracy, and productivity during math-related independent seatwork assignments (Rock & Thead, 2007). Results showed that academic engagement and productivity improved for all students across new versus previously learned material, but accuracy did not improve for some of the students. During a fading condition, the students' performance generally exceeded that of baseline conditions.

Self-monitoring interventions have recently incorporated the use of technology. A combination of video modeling and a self-monitoring intervention (including the use of an *iPod*) was found to increase an elementary student's time on-task and decreased instances of disruptive behavior during small-group math instruction (Blood, Johnson, Ridenour, Simmons, & Crouch,

2011). By watching video snippets of himself engaged in various on-task and off-task behaviors, the student learned to identify times when he was on-task or off-task and to use that information during the self-monitoring component of the intervention.

The aforementioned studies support the effectiveness of self-monitoring interventions for students' improved homework completion, academic production and accuracy, and reduction of disruptive behaviors. As mentioned earlier, CCC and TSI are academic interventions that include a self-monitoring component.

Error Self-Correction

The self-monitoring component of CCC and TSI involves the student comparing her self-produced answer with that of a correct model. The error self-correction component begins when the student observes that her answer, when compared to a model, is incorrect. During CCC, the student compares her self-generated answer or spelling with that of the preprinted model word in the left hand column of the page. During TSI, the student compares her self-generated answer or spelling with the answer provided audibly by the media player's audio file. When the student learns that her self-produced answer is incorrect, she is instructed to copy the correct answer one or more times while referring to the correct model. This is known as an overcorrection procedure. It is believed that this error self-correction procedure is one of the components of CCC and TSI that leads to improved academic performance. A number of studies described below show the effectiveness of interventions that include error self-correction procedures.

Viel-Ruma, Houchins, and Fredrick (2007) found that the use of an error self-correction procedure with three high-school students with deficits in written expression was effective in increasing the percentage of correctly spelled words when compared to traditional repeated practice. Traditional repeated practice involves the student copying spelling words multiple

times while referencing a correct model without requiring the student to produce a self-generated response. The error self-correction procedure was found to have high treatment acceptability among teachers, which is important because teachers may be more likely to continue advocating the use of interventions that they find to be effective for their students. The researchers reported that evidence existed that error self-correction procedures were effective for younger students, but there was limited evidence regarding its effectiveness for older students with spelling difficulties. The participants in the study indicated that they learned more and preferred the error self-correction procedures when compared to traditional spelling instruction. A follow-up phase used the self-correction procedure on words that were previously assigned to the less effective condition, and a functional relationship was observed between those words and the error self-correction procedure.

In a study of six low-achieving students ranging in age from eight to ten years attending a general education third grade classroom, Wirtz, Gardner, Weber, and Bullara (1996), found that a self-correction strategy proved to be more effective than traditional spelling instruction. The results were commensurate with those observed in the Viel-Ruma et al. (2007) study. The students in the self-correction condition correctly spelled 97 more words over the course of the study than the students in the traditional condition. On average, the students reportedly learned 11.5 words per week in the self-correction condition compared to 7.5 words per week during the traditional spelling condition. The traditional method of spelling instruction consisted of different instructional activities for a period of 20 minutes per day over a period of 4 school days, Monday through Thursday. Traditional spelling activities included copying target spelling words three times each, arranging the words in alphabetical order, using as many of the words as possible in a story, and using each word in a sentence. The self-correction method was described

as an instructional strategy where students used proofreading marks to correct their own spelling errors. Regarding generalization of the results, which were assessed by way of an oral spelling bee, all students except one correctly spelled more words learned in the self-correction condition than in the traditional condition. The researchers indicated that by way of traditional spelling methods, spelling errors could go undetected and be practiced by students for extended periods of time. Students reportedly found the self-correction method to be more socially acceptable than the traditional spelling methods. The researchers suggested that teachers should individualize spelling instruction for students of varying ability levels, and they reported that gains from self-correction could help students improve academic performance in other academic areas. Finally, immediate corrective feedback was found to be more effective than the more delayed feedback found in the traditional method.

In an older study, Okyere, Heron, and Goddard (1997) employed a delayed multiple baseline across word lists design to examine a self-correction procedure on the acquisition, maintenance, and generalization of the written spelling of elementary students attending an after-school clinic. Students were taught to use four proofreading marks to correct their spelling mistakes. These proofreading marks included insert (^), omit (O), reverse (~), and wrong letter (/). The students were reportedly not able to spell any of the words on the word lists correctly during the baseline phases. Results showed that by the end-of-session posttests, each student spelled a minimum of 14 out of 15 words correctly. Regarding the social validity of the intervention, all of the students indicated that the intervention helped them improve their spelling and that they liked the method and would use it on their own in the future to help them when spelling. Notable limitations reported by the researchers included the setting and times, subject characteristics, and student absences and withdrawal. Several implications regarding self-

correction were made by the researchers. Briefly, Okyere and colleagues noted that self-correction can be used with individuals and groups, mastery is linked to specific words (not a passage of time), and students practice the correct spelling for a word and receive immediate, precise, and differential feedback. Additionally, the researchers indicated that self-correction is easy, manageable, and flexible. They noted that self-correction procedures can be implemented in home-based programs, and students prefer self-correction to other spelling methods.

In another older study, Goddard and Heron (1998) found that over the course of a school year, students could learn up to 180 more words using error self-correction strategies than by way of traditional spelling instruction methods. The researchers indicated that students become more aware of common spelling mistakes, can move at their own pace, receive immediate feedback, and like the self-correction procedure.

Timing of Self-Correction

The studies reviewed above support the utility of students engaging in error self-correction procedures when learning how to spell. Additionally, the timing of when to engage in error self-correction procedures has been investigated previously. The importance of providing students with immediate feedback on their performance so as to prevent them from practicing errors appears to be supported by many researchers (Alber & Walshe, 2004; Goddard & Herron, 1998; Okyere et al., 1997; Wirtz et al., 1996).

Alber and Walshe (2004) evaluated whether the timing of self-correction had a significant effect on the acquisition and maintenance of spelling words for students with severe spelling difficulties. Students were instructed to self-correct words under two conditions; 1) after an individual word was attempted, or 2) after the entire list of 10 words was attempted. This single-subject alternating treatment design study included six fifth grade boys identified as

having either learning disabilities or an attention deficit disorder. The researchers found that students who self-corrected after each individual word produced more words spelled correctly than students who waited to self-correct until after the administration of the entire list of words. In addition, maintenance of correct spelling words was greater for the students who self-corrected after each word. The researchers indicated that when students are acquiring new skills, providing them with immediate feedback on their performance after each response is important so that they are not practicing errors. Additionally, the researchers noted that teaching students to self-correct is important when working with groups of students, because it would be difficult and time consuming for teachers to provide immediate feedback for each response made by every student. Regarding student acceptability, only half of the students indicated a preference for the self-correcting after each word condition. The students who liked self-correcting after each word reported that it was easier to catch spelling errors and to not look at all the words at one time. However, the students who preferred self-correcting after the entire list indicated that it was faster and that they were not tempted to look at the next word before having to write it. The results from this study emphasize the importance of immediate feedback on performance to avoid practicing errors. The researchers noted that students being able to see and correct their own mistakes without their peers or teacher knowing may help build their self-confidence, and teachers may be more likely to implement interventions that do not require a great deal of teacher time and effort. A limitation reported by the researchers was that baseline spelling data was not obtained for each of the students prior to the implementation of the interventions. The researchers obtained information about the students' pre-intervention spelling achievement by way of informal discussion with the special education teacher. An additional limitation cited by the researchers was that maintenance data was gathered just one week following the

interventions and they indicated that including long-term assessments of maintenance might strengthen future research. As a final limitation, the researchers reported that they did not assess the extent to which students were able to generalize to new spelling words.

The timing of self-correction has also been studied in the area of mathematics. Bennett and Cavanaugh (1998) investigated if the timing of self-correction, whether immediate, delayed, or no correction, was significant in the acquisition and maintenance of multiplication facts for a fourth grade student with learning disabilities. An alternating treatments design was used to measure the effects of the timing of self-correction on the number of correct responses per minute, mean accuracy, and the percentage of errors repeated. In the first experiment, the student received instruction on single-digit multiplication facts under two conditions, no-correction and immediate self-correction. In a subsequent experiment conducted one week following the conclusion of the first experiment, immediate self-correction of errors was compared to a delayed self-correction procedure. The self-correction component of the experiments consisted of the student self-correcting her work by referring to answer keys. When the student discovered an error, she would circle the error, and then immediately write the correct answer below each of the circled responses. During the maintenance assessments, the same procedures were used as in the two experiments, the only exception being that no correction or feedback was provided to or by the student. Results showed that the number of facts correct per minute was higher for the student under the immediate self-correction condition than the delayed or no self-correction conditions. The implementation of the delayed self-correction condition resulted in the student committing the same errors on subsequent tests. During the immediate self-correction condition, the student was exposed to the correct answer prior to coming across the same problem on the subsequent group of multiplication facts. As a

result, there was a greater likelihood that the same problem would be answered correctly. Limitations cited by the researchers included that few conclusions could be made about the generalized effects of immediate self-correction due to the brevity of the experiment, and that the student completed multiplication-fact worksheets unrelated to the procedures of the current study during the two-week period between the final instructional session and the first maintenance check.

Opportunities to Respond

Haydon, Mancil, and Van Loan (2009) defined an opportunity to respond (OTR) as "the interaction between a teacher's academic prompt and a student's response" (p. 268). In the school setting, an OTR most often takes the form of teachers asking academic questions to their students and providing them with opportunities to answer the questions.

Opportunities to respond are an important component of CCC and TSI and are thought to be a significant factor contributing to the effectiveness of the interventions. The structures of TSI and CCC are set up in such a way that students have an OTR every few seconds. The high rates of OTR during CCC and TSI encourage active participation from the students. Providing students with high rates of OTR has been found to increase their correct responding and on-task behaviors, and decrease disruptive behaviors (Haydon, Mancil, & Van Loan, 2009; Sutherland, Alder, & Gunter, 2003). Haydon et al. indicated that OTR is an important teaching tool because it can lead to more frequent responses from students, their comprehension of material can be measured, and questions can be adjusted to reflect the skill level of students. The researchers noted that the purpose of using OTR is to increase the amount of correct responses and the time on-task for students during instruction.

Sutherland, Alder, and Gunter (2003) employed an ABAB withdrawal design to examine the effects of OTR on the classroom behavior of students with emotional and behavioral disorders (EBD). As part of the intervention, the observer asked the teacher to make a prediction about his current rate of OTR per minute, and then the teacher's actual rate of OTR was provided to him. Then, the benefits of increasing rates of OTR were shared with the teacher, and the teacher set a personal goal of providing his students with three OTR per minute. Finally, the teacher was provided with a baseline rate of his OTR per minute, and he was taught to graph his OTR rate per minute daily. Results showed that the teacher's mean rate of OTR per minute increased during the intervention phase as compared to the baseline phase. A withdrawal phase resulted in the teacher's mean rate of OTR per minute decreasing before increasing once again during the reintroduction of the intervention. Implementation of the intervention resulted in an increase in the amount of praise provided by the teacher, correct responses, percentage of correct responses, and on-task behaviors from the students, and the students' disruptive behaviors were observed to decrease. It stands to reason that students will learn more and engage in less disruptive behaviors when their teachers provide them with increasing levels of academic interaction. For one, more exposure time to academic skills that students are provided with increases the likelihood that an effective transfer of learning will take place. Secondly, teachers who keep their students actively engaged for the majority of the school day reduce the students' opportunities to display disruptive behaviors.

In a replication of the Sutherland et al. study, Haydon et al. (2009) used an ABA withdrawal design to evaluate the effects of an increased rate of OTR on disruptive behavior, correct academic responding, and on-task behavior of a student who was identified as at-risk for an emotional or behavioral disorder (EBD), during instruction on science definitions. The

participant was a fifth-grade female student who presented with significant behaviors of concern including fighting with peers, off-task behaviors during instruction, and calling out in class. The intervention phase consisted of an increased rate of questions and a varied mode of questioning. During the intervention phase, the student's on-task behaviors increased and her disruptive behaviors decreased. Similar to the results from the Sutherland et al. study, increasing OTR resulted in a higher number of correct responses from the students and an overall decrease in disruptive behaviors.

Burns (2007) employed a single-subject alternating treatment design to determine if two different levels of OTR (moderate or high) within the same drill ratio (10% unknown sight words to 90% known sight words) would lead to differences in the sight word retention of a child identified as moderately mentally retarded (currently termed "intellectual disability"). The second grade Fry instant sight word list was used during the study. Results showed that retention of sight words increased for the student under both conditions (moderate and high OTR). However, the high OTR condition led to higher retention rates than the moderate OTR condition. The student's retention rates were 40% to 60% of the sight words for the moderate OTR condition measured up to one week later, and 72% to 92% of the sight words for the high OTR condition. The findings from this study support the notion that higher levels of OTR tend to result in increased academic performance.

In a replication of a 2008 study by Tincani and Crozier, Lamella and Tincani (2012) employed a single-subject alternating treatments design to study the effects of varying wait times on OTR, rates of responding, rates of correct responding, and the disruptive behaviors of students with autism during one-on-one instruction. After asking questions or giving directions, the instructor prompted the student on when to respond, either after a brief wait time (one second

or less) or an extended wait time (about 4-seconds). Incorrect responses from the student resulted in prompts from the instructor progressing from a least restrictive method (gestural prompt) to most restrictive (hand-over-hand prompt) in order to elicit an accurate response from the student. More OTR, higher rates of responses, and more correct responses per minute were observed in the brief wait time condition as compared to the extended wait time condition. Additionally, during the brief wait time condition, the students displayed fewer disruptive responses than in the extended wait time condition. The researchers noted that the increased OTR with brisk instructional pacing likely increased the rates of participation and correct instructional responding for students. Interestingly, the researchers posited that the extended wait times may have contributed to students becoming distracted and presenting with more problem behaviors. The results from this study support an approach to teaching that includes brisk instructional pacing and high rates of OTR in order to elicit more accurate responding from students and fewer disruptive behaviors.

Approaches to Spelling Instruction

A number of different approaches to spelling instruction exist in the research literature. A sampling of these spelling approaches include: traditional classroom-based, developmental, structured language, transitional, student-oriented, incidental, developmental word study, and modified basal planner. Some of the spelling approaches overlap in terms of the theories they are based on and the activities involved. For example, several of the approaches described below acknowledge the importance of students' engaging in frequent reading and writing when learning how to spell.

Traditional Classroom-Based Spelling

Traditional classroom-based spelling instruction typically includes a focus on word frequency, word selection, memory techniques, generalizability, and the organizing of spelling lists and a plan for the school week (Schlagal, 2001). Under this approach, spelling is taught as a separate subject and emphasis is placed on phonetics and spelling rules in order to prepare for weekly tests (Heald-Taylor, 1998). During traditional spelling instruction, Heald-Taylor (1998) indicated that the students are thought of as "empty vessels" who engage in passive learning by way of rote memorization. Emphasizing a phonetics approach during traditional classroom-based spelling instruction can be problematic because relying on phonics is not an effective strategy for the majority of words in the English language (Heald-Taylor, 1998). As mentioned earlier, the English language has many inconsistent and complex grapheme-phoneme correspondences, which limits the usefulness of a heavy phonics-based spelling program. Adopting an approach to learning how to spell that is effective on only a certain percentage of English words does not seem to be an advisable strategy. Varnhagen (1997) recommended that spelling instruction should include more than just phonics-based strategies. Rather, a combination of strategies should be used including phonologic, visual, orthographic, and morphologic methods for students to be more successful.

Additional activities that are common during traditional spelling instruction such as unscrambling words, putting the words in alphabetical order, and looking words up in the dictionary do not have research support and are unlikely to promote orthographic learning (Schlagal, 2002). In a comparison study, a rule-based strategy group based on the *Spelling Mastery Level D* program was found to be more effective than a traditional spelling instruction group in terms of greater spelling achievement for elementary-age students (Darch, Eaves, Crowe, Simmons, & Conniff, 2006).

Structured Language

The structured language approach to spelling consists of Orton-based methods, where reading, spelling, and word analysis exercises are carefully controlled for types of syllables and phoneme options (Schlagal, 2001). The pace of instruction depends on the progress made by each student. The structured language approach centers on the direct teaching and exercise of syllable segmentation of polysyllabic words.

Transitional

The transitional approach to spelling consists of an integration of numerous spelling strategies and an appreciation for the importance of reading in learning to spell (Schlagal, 2001). Transitional spelling instruction consists of word study, word games, spelling conventions, spelling resources, and spelling lists and study procedures. By way of the transitional paradigm, students reportedly become more involved in their learning and are not viewed as "empty vessels" as is the case with the traditional spelling instruction (Heald-Taylor, 1998).

Student-Oriented

Learning to spell is viewed as a developmental process in the student-oriented paradigm. This paradigm is based on the contributions of Bruner (scaffolding) and Vygotsky (zone of proximal development) where the ability to read provides a context for learning how to spell, and spelling is viewed as a functional component of writing (Schlagal, 2001). The student-oriented approach reportedly takes the needs and developmental stages of students into account, and focuses on reading and writing processes. This includes word study through the reading of literature, theme units, special words, spelling and writing, metacognitive conferences, teacher conference log, and mini-lessons. Heald-Taylor noted that under a student-oriented approach to spelling, the role of the teacher changes from predominantly giving information to facilitating

learning based on the developmental levels and individual needs of students. In addition, similar to the transitional approach to spelling, students are active learners in the spelling acquisition process.

Incidental

Schlagal (2002) indicated that the incidental spelling approach does not use a specific curriculum and that a spelling curriculum is unnecessary and undesirable. Similar to the transitional and student-oriented approaches, this approach views spelling as best learned from broad reading and meaningful writing. Activities within this paradigm can include mini-lessons, editing workshops, and students can compile words with which they have difficulty into individual notebooks for study and reference. Students reportedly learn the spelling of words best when the spellings become relevant to them through efforts to communicate effectively.

Developmental Word Study

As is the case in the student-oriented perspective, the developmental word study position holds that spelling should be taught in a systematic fashion as it relates to individual development (Schlagal, 2002). Teachers reportedly design instruction based on students' growth as they monitor the students' progression through developmental stages. Students are taught to manipulate groups of words and taught the target features of those words in the orthography.

Modified Basal Speller

Schlagal (2002) indicated that a modified basal speller approach should be considered for use by those who teach spelling. Schlagal recommended that the instructional level of each student should be obtained by way of a graded diagnostic spelling test, and that students should be placed in spelling groups based on their instructional levels. Schlagal reported that students are at the correct instructional level when they are spelling about 50% of their spelling words

correctly. The researcher indicated that some important features of a spelling program would include incorporation of the study method where misspelled words are visualized and practiced correctly two to three times (similar to CCC), a Monday pretest where students self-correct errors and copy the corrected version twice, word sorts to highlight the targeted word pattern of the week, spelling games where words are grouped by pattern, word hunts in printed material to search for words that fit a particular pattern, speed sorts to improve sight recognition of words, practice tests between students, and an end of the week test on Friday.

Embedded and Self-Selected

Johnson (1998) discussed two alternative approaches to spelling, namely an embedded approach and a self-selected approach. The embedded approach allows for multiple exposures to words used in meaningful context. The words are taken from students' reading, science, social studies, and other subject areas. In the self-selected approach, students are taught to create their own spelling lists. Johnson (1998) recommended that students should engage in wide reading and wide writing, and that students spend too much time studying words out of context in basal workbooks. Through wide reading, students reportedly see a greater number of words with varying letter patterns used in meaningful contexts. By way of wide writing, students can effectively use words to create meaning. In word class (used with a self-selected approach), students generate and choose words they will study each week, and they may be given a topic and create their own spelling lists, or develop a spelling list after given a specific pattern. Word class activities might also include using their own interests, current reading, and/or experiences to create their spelling list.

Ultimately, based on the descriptions of the aforementioned spelling approaches, the modified basal speller appears to be the most consistent with the methods contained within CCC

and TSI. As mentioned above, the modified basal speller includes a graded diagnostic test where students are placed in groups based on their instructional levels. By way of CCC and TSI, students are given a baseline spelling probe that provides the teacher with information regarding students' degree of spelling deficit. While the baseline spelling probe is not considered a diagnostic test, it does provide valuable information regarding the types of words to include on a student's CCC and/or TSI word list. Additionally, similar to CCC and TSI, this approach incorporates error self-correction procedures. Error self-correction, and the brisk timing of the self-correction, is arguably the most important component that make CCC and TSI effective interventions.

How Spelling Develops in Children

The developmental spelling perspective holds that children progress through various stages when learning how to spell. The stages are labeled *nonphonetic*, *semiphonetic*, *phonetic*, *within word pattern*, *syllable juncture*, and *derivational constancy* (Schlagal, 2001). During the nonphonetic stage, children attempt to spell words without displaying an understanding for the sounds that letters represent. In this earliest stage of the developmental spelling perspective, children may write a "word" as a combination of letters, numbers, and other idiosyncratic markings. The semiphonetic stage describes when children begin to use the letter names to represent words or syllables. In this stage, children begin to learn about consonant phonemes, but their phonemic analysis skills are still in need of development, and they often omit vowels from the middle of words. Children begin to pay significant attention to phonetic detail during the phonetic stage. Learning to spell short vowel sounds is of particular difficulty during this stage, and children may continue to experience difficulty with consonant phonemes. Children begin to display more of a focus on the orthographic structures of words during the within word

pattern stage, and begin to understand that spelling accurately requires more than a phonics approach. The syllable juncture stage is when children show understanding of suffixes and the rules that lead to correct spelling such as when to double the consonant so as to not create a new word (e.g., tapping and not taping). Finally, the derivational constancy stage is when students learn that orthographic patterning is used to represent meaning. Within this stage, the spelling skills of students have matured, as correct spelling is often dependent on the meaning of the word.

Varnhagen (1997) examined the notion that children progress through stages when learning how to spell. The developmental stages of children's spelling that he described are similar to those described by Schlagal (2001). The stages are labeled *precommunicative*, *semiphonetic*, *phonetic*, *transitional*, and finally, *correct spelling*. Varnhagen posited that developmental stages do not adequately describe the development of spelling ability for students in the elementary school grades. He found that children's spelling of silent-e long vowels and different types of –ed past tense words did not follow a strong developmental progression of qualitatively distinct stages from the semiphonetic stage to the end point of correct spelling. The spelling errors that students made were reportedly characteristic of the phonetic stage and progressed directly to correct spelling, while the different rates of progression appeared to be related to the spelling curriculum. Varnhagen concluded that the spelling development of children cannot simply be described as progressing through a series of stages because a stage description is too broad and does not consider the depth of children's existing knowledge about the spelling system.

Spelling Techniques and Strategies

The various strategies that students employ when learning to spell have been studied in previous research. Phonological strategies were the most common type of strategy used by first grade students in northern Canada when learning how to spell new words (Kwong & Varnhagen, 2005). In this study, a student's response was coded as phonological if he indicated that he used the sounds to determine how to spell the word. If the student stated that he used another word to help him spell a particular word (e.g., "I can spell 'bug' which helped me spell 'hug'"), then it was coded as an analogy strategy. A retrieval strategy was indicated if the student claimed to already know how to spell the word or remembered the word. Kwong and Varnhagen (2005) found that use of a retrieval or an analogy strategy led to the most accurately spelled nonwords. Use of a phonological strategy to spell nonwords was slightly less accurate, which seems to support previous research indicating that relying on phonological strategies when learning how to spell new words could be problematic.

A significant moderate association was found between early name writing ability and later invented-spelling ability in a longitudinal study of 92 kindergarten to first year of instruction-aged children in New Zealand (McNeill, Westerveld, van Bysterveldt, Boyd, & Gillon, 2013). The children were initially assessed while in kindergarten and then again one year later. Name writing ability was found to be significantly correlated with initial phoneme awareness, letter knowledge, receptive vocabulary, and home-writing practice. This study emphasized the importance of children's name writing ability and their developing print knowledge. The researchers noted that "name writing plays an indirect role in facilitating the use of more sophisticated spelling strategies as evidenced in invented-spelling development" (p. 60). When children learn how to correctly write their name, a greater understanding of the alphabetic

principle may occur. Therefore, this research suggests that spending time teaching young students how to correctly write their names is an important and worthy instructional activity.

Instructional versus Frustration Levels

When providing spelling instruction to students, it is important to consider the level at which the students are functioning. Low achieving students who were taught to spell at their instructional levels rather than at their frustration levels achieved greater spelling gains (Schlagal, 2008). Students are at their instructional level when they are spelling about 50% of their spelling words correctly (Schlagal, 2002). Students performing below this level are said to be working at a frustration level. In terms of reading, frustration level is text that the student reads at a less than 90% accuracy rate, while instructional level is when the student reads text with at least 90% accuracy. For optimal gains, teachers should strive to instruct their students in spelling and reading at their respective instructional levels. When teaching spelling to children, Schlagal (2002) recommended placing students in basal spellers at their respective instructional levels using a pretest with guided self-correction and practice, incorporating the study method (CCC), and scheduling 15- to 20-minute instructional periods distributed across the days of the week.

Multisensory Techniques

Schlagal (2008) suggested that multisensory techniques should be incorporated into spelling lessons for students with weak spelling skills, including simultaneous oral spelling and the "tapping out" of phonemes. For example, *Spelling in Parts* (SIP) emphasizes sound, visual, and meaning strategies and includes saying and clapping the words in syllables (Powell & Aram, 2008). In an older study, Cunningham and Stanovich (1990) found that having first-grade students write words resulted in better spelling performance than having the students type the

words on a computer or manipulate letter tiles to spell out the words. An additional component was investigated where the students were asked to either name the letters or not name the letters while completing each condition. A 3 X 2 analysis of variance (ANOVA) found the effect of motor activity to be statistically significant while the letter naming interaction was not found to be statistically significant. The results from this study suggest that engaging in the motor activity of writing when learning to spell is an effective practice.

Keller (2002) described a spelling strategy using Classwide Peer Tutoring (CWPT). The spelling strategy is called *SPELLER* and it consists of spelling instruction for the entire class in 20-minute sessions, at least 3 days per week. Students are given their spelling words for the week and teachers can decide whether to give the entire class the same words or assign words based on pretests conducted with the students. Students are then prompted to write their spelling words on flash cards. The students are then paired into dyads using one of three methods; either by way of random assignment, personality characteristics, or based on spelling ability. During the CWPT procedure, one student plays the role of the teacher for the first 10 minutes while the other remains in the student role and then the students switch roles during the last 10 minutes. Keller described the SPELLER strategy as a seven-step strategy that makes use of visual imagery, systematic testing, and auditory reinforcement. The seven steps that students engage in during SPELLER are similar to that of CCC as students are prompted to spot the word and say it, picture the word, close their eyes and see the picture, open their eyes and see if the picture was correct by looking at the model of the word, look away and write the word, examine the spelled word, and reward their selves if spelled correctly or repeat the process if incorrect. Similar to CCC and TSI, the SPELLER strategy includes components of self-monitoring, immediate corrective feedback, and reinforcement.

Examination of Spelling Errors

When teaching spelling, examining the errors that students make is critical for understanding what they know and do not know, and to inform instruction and intervention (Carreker, Malatesha, & Boulware-Gooden, 2010). For example, students that tend to make errors related to morphology should be presented with spelling activities that target improving morphological understanding. Investigating the types of spelling errors students commit in order to inform instruction was also found to be of importance in the next study. Ahmed and Lombardino (2000) examined the invented spelling patterns made by kindergarten students at each of three levels of mastery (low, mid, high) in order to develop early intervention guidelines for spelling. The researchers noted that invented spelling is highly predictive of phonological awareness and early reading achievement. Samples of the kindergarten students' spelling were analyzed to determine the types of spelling errors made and to differentiate the three levels of spelling. Letter omissions and substitutions were reported to be the two predominant error patterns observed in the invented spellings. Ahmed and Lombardino indicated that regardless of level, the long-term intervention goal for any child is accurate conventional grade-level spelling, and the short-term intervention goal should be to move the child from their current spelling level to the next acquisition level (from low to mid and mid to high). The researchers reported that the short-term goals at each level should be incorporated into activities to include the use of real and nonsense words, card games, match the picture with the word tasks, songs, and story/diary writing and invitation cards. Current research-based programs that have been found to be effective were identified by the researchers as the *Lindamood Phoneme Sequencing (LIPS) for Reading, Spelling, and Speech, Orton-Gillingham Multisensory Program for Reading and*

Spelling, and the *How to Teach Spelling* resource manual. Ahmed and Lombardino emphasized that children learn to write through experimentation and instruction.

Identifying and analyzing the types of spelling errors that students make is of great importance in designing and implementing spelling interventions (Ahmed & Lombardino, 2000). In a more recent study, teachers who possessed the greatest knowledge of phonemes, syllables, and morphemes were found to be more adept at selecting the most appropriate spelling activities for students (Carreker et al., 2010). Teachers who lack knowledge of phonemes, syllables, morphemes, and other features of spelling may not be able to identify the types of spelling errors that their students make, and subsequently may not select the most appropriate spelling interventions to address those errors.

Morphology and Orthography

Devonshire and Fluck (2010) indicated that a morpheme is the smallest unit of meaning in a language, citing the suffix "-ed" as an example of a morpheme that denotes past tense. The researchers reported that teaching students about morphology, or the study of morphemes in a language, should be an important component of spelling instruction. In a sample of 5 to 11-year old children, Devonshire and Fluck found that those children who were given an intervention lesson highlighting the morphological/meaning connection between words and how to apply morphological rules correctly significantly improved their spelling. In the first study conducted by the researchers, it was found that the most frequent spelling strategies used by the students were retrieval and sounding-out, while the least used strategy was visual. In the second study, the researchers sought to determine if teaching children about the morphological structure of words and how to combine morphemes, in addition to teaching about etymology and phonology, would be more effective than traditional phonics-based methods. Results showed that both

groups improved significantly when comparing pre-test and post-test spelling scores. However, the researchers indicated that the intervention group significantly outperformed the control group on all of the spelling measures. The intervention group reportedly spelled significantly more morphemes correctly, indicating that the lessons on morphology were effective in teaching students how to understand morphology and apply the knowledge learned. The researchers suggested that the results of the study support a conceptual model of spelling, where morphological instruction is combined with etymological and phonological instruction leading to improved spelling performance for students.

Carlisle and Stone (2005) indicated that the English language is morphophonemic and that the spelling system is based on phonemes, which are representations of sounds, and morphemes, which are units of meaning. Morphological awareness is described as the ability to analyze words into their component morphemes and it involves the ability to recognize families of words and their shared meanings (Kirk & Gillon, 2009). Phonology is an important element of the English writing system, and it is the main strategy taught to children throughout their primary education (Devonshire & Fluck, 2010). As mentioned earlier, the English language is not a phonologically transparent orthography, meaning that one cannot solely rely on phonetic strategies when spelling words. Manning and Kato (2006) indicated that many educators view phonemic awareness as a skill that can be taught, rather than an ability that children develop as they become literate. The researchers indicated that knowledge of phonics develops gradually and simultaneously as children begin to read and write.

Kirk and Gillon (2009) evaluated the effects of an intervention program aimed to improve reading and spelling in children with specific spelling difficulties whose first language was New Zealand English. The intervention reportedly was structured to teach the children to

coordinate morphological awareness with knowledge of phonology, orthography, syntax, and semantics. The study, which consisted of repeated-measures ANOVA at 3 points in time, included 16 children ranging in age from 8 to 11 years. The participants were randomly assigned to either an experimental group who received intervention immediately or to a control group who did not receive intervention until after the experimental group had completed the intervention program. The researchers indicated that the focus of the intervention program was on mastering a few frequently occurring orthographic patterns instead of on learning to read and spell particular words. Those students in the experimental group made significantly greater gains in reading and spelling accuracy than those in the control group on both experimental and standardized measures of reading and spelling. Also, the results showed that students were able to generalize to new words what they had learned during the intervention sessions. Regarding maintenance effects, the improved reading and spelling performances of the experimental group were maintained when measured again 6 months after intervention.

It is reasonable to suggest that teachers should have thorough knowledge of the subject matter before instructing their students. Carreker et al. (2010) found that inservice and preservice teachers did not have thorough knowledge of morphemes, and that participants in the study often displayed difficulty with thinking about spoken words as being different from written words. It was observed that teacher literacy-related content knowledge was related to their ability to identify the most appropriate spelling instructional activities based on spelling errors committed by students. An implication cited by the researchers is that all inservice general education, special education, and dyslexia teachers should be provided with professional development and mentored teaching to improve their literacy-related content knowledge.

Providing an orthographic spelling training for fifth and sixth-grade students with spelling disabilities in a consistent orthography like German significantly enhanced their spelling and reading ability (Ise & Schulte-Körne, 2010). The researchers indicated that German is regarded as a "shallow" orthography with consistent grapheme-phoneme correspondences. As previously indicated, the English language is regarded as a "deep" orthography with many inconsistent grapheme-phoneme correspondences. With that being the case, an orthographic spelling training would likely need paired with other approaches for increasing the written English spelling skills of students.

The Complete Spelling Programme (McMurray, 2006) reportedly has been designed in such a way that the processes involved in learning to spell are activated and children follow a developmental sequence, where regardless of ability level, children can learn to spell in the same classroom. Components of *The Complete Spelling Programme* include exposure to high frequency words, the development of working memory, phonological knowledge, curriculum word banks, and an emphasis on the importance of developing visual sequential memory. In order to evaluate the effects of *The Complete Spelling Programme* on the spelling accuracy and quality in independent writing of 81 children ranging in age from 5 to 6 years, a 2 x 2 quasi-experimental longitudinal design was developed. At the end of the study, children who had participated in the program had made significant improvements in spelling and independent writing as compared to children in a control condition. It was reported that in the control schools, the standardized spelling score for 24% of the children decreased over the period of the research, whereas in the experimental schools, the standardized spelling score for all the children increased over the same time period.

Masterson and Crede (1999) developed spelling interventions for a 10-year-old, fifth-grade student with above average intelligence and below average spelling achievement. The interventions designed by the researchers addressed phonological awareness, visual storage, and orthographic knowledge problems. For phonological errors, activities included crossword puzzles and word searches, and the researchers noted how word searches may have rewarded a partial-cues reading strategy, but with crossword puzzles, the correct spelling of the entire word was needed in order for all the words to fit into the puzzle together. The researchers indicated that various computer programs were also used during the intervention to target phonological awareness, orthographic knowledge, and visual storage errors. While computer programs reportedly proved to be very motivating for the student, the researchers noted that those programs that were flexible in allowing the clinician to individualize stimuli for the student were the most useful and efficient. The results of the study revealed that individualized intervention proved to be successful in improving spelling performance for this student. The researchers indicated that standardized and criterion measures showed a general improvement in spelling, whereas performance on probes indicated improvements specific to the error patterns (i.e., phonological awareness, orthographic knowledge, and visual storage) targeted during intervention.

Amount of Spelling Instruction

Shippen, Reilly, and Dunn (2008) investigated whether increasing the amount of spelling instruction in a given school day would lead to improved spelling performance. A significant difference was not observed between elementary students receiving one spelling lesson per day and elementary students receiving two daily spelling lessons. In another study, Graham, Harris, and Chorzempa (2002) provided supplemental spelling instruction to students in the second

grade who were experiencing difficulty with spelling, and then assessed the immediate as well as long-term effects of such instruction in three academic areas, specifically in spelling, writing, and reading performance. The supplemental spelling program implemented in this study was found to be effective in improving students' lexical knowledge and knowledge of the spelling system. The researchers also found that the effects of spelling instruction generalized to writing, resulting in improvements in children's text-production skills. However, the researchers reported that the supplemental spelling instruction did not enhance the overall length or quality of the students' stories. A related benefit was the fact that students' reading performance was also enhanced as a result of the spelling instruction. In terms of educational implications, the researchers indicated that poor spellers became better spellers when they received extra spelling instruction, lending strength to the contention that spelling instruction is an important component of the school program and should not be viewed as an expendable subject.

Spelling Strategies

Schlagal (2008) recommended that word sorts should be conducted with the various patterns in spelling lists, and that if spelling lists are reduced for students, so should the number of patterns. Students have the opportunity to improve upon their ability to discover new spelling patterns by way of a program called *Spelling in Parts* (Powell & Aram, 2008). Schlagal (2002) offered a number of spelling principles that teachers should adhere to when teaching spelling. A few of these principles included shared components of CCC and TSI. These included the notion that a study method should be taught and practiced, pretests should be used, and children should self-correct copying the words over correctly no more than three times. Schlagal indicated that learning to spell from word lists is more efficient than learning from context, and that creating spelling words from frequency lists guarantees the usefulness of the words. Additionally,

Schlagal reported that the organization of spelling lists should highlight linguistic principles of English spelling, teachers should find opportunities for incidental spelling instruction, students should be able to read words they are asked to spell, and students should engage in abundant writing.

Sipe (2008) mentioned that effective strategies when teaching spelling in high-school include weaving lessons that relate directly to the needs observed in students' writing, strategically reviewing patterns and skills, keeping examples of words on the walls, helping students develop tools for quick support and reference, and building students' abilities to think reflectively about their use of language. The researcher noted that by the time students reach high school, teachers assume that students either already know how to spell or will be unable to learn to spell any better. It was reported that students are often asked to engage in spelling activities that require established visual memory skills, and when students have deficits in this domain, they are often perceived to be poor spellers. Sipe indicated that while there are over one-half million words in the English language, 50% of word use comes from about 100 words, and 1000 words represent approximately 89% of the words used in most writing. Focusing on the words most often used in the English language would seem to be an effective strategy when teaching spelling to students, but especially those with weak spelling skills and/or learning disabilities.

Williams, Phillips-Birdsong, Hufnagel, Hungler, and Lundstrom (2009) emphasized the benefits of word study, which they described as "an approach to spelling instruction that moves away from a focus on memorization" (p. 570). Williams et al. noted that word study incorporates what researchers have learned regarding the alphabetic, pattern, and meaning layers of English orthography. They indicated that students learn about the relationship between letters

and sounds, search for sound patterns that guide the grouping of letters, and learn about how the English spelling system can directly reflect the semantic relationships across related words. The researchers offered tips for implementing word study in elementary classrooms. A sample of these tips included assessing students' word knowledge using multiple assessment tools in order to inform instruction, making use of homogeneous small-group instruction, allowing for ample time to prepare lessons and word work activities, teaching about word knowledge and the way English words work, and encouraging students to engage in daily extended, authentic reading and writing activities where they can read and write on topics of their choosing. There seems to be no debate that having students engage in frequent reading and writing activities leads to improved spelling skills. The significance of engaging in frequent reading and writing activities when learning to spell are a major component of the incidental and transitional spelling approaches described earlier.

In order to gain an understanding of students' mastery of vowels, prefixes, suffixes, and affixes, Barger (2009) recommended the administration of qualitative spelling inventories. Barger noted that data obtained from qualitative spelling inventories assists teachers in discovering where their students fall along a developmental stage continuum, and teachers may find that the range of knowledge in a particular class may be wide, which would suggest that differentiated word study instruction would be needed.

Cover, Copy, and Compare

Cover, copy, and compare (CCC) is an academic intervention that has been used successfully to improve student performance across academic subjects including spelling (Cates et al., 2007; Erion et al., 2009; Jaspers et al., 2012; Mann et al., 2010; Merritt et al., 2012; Nies & Belfiore, 2006), math (Cieslar, McLaughlin, & Derby, 2008; Codding, Chan-Ianetta, Palmer, &

Lukito, 2009; Codding, Eckert, Fanning, Shiyko, & Solomon, 2007), foreign language (Carter et al., 2013), and geography (Skinner & Belfiore, 1992). In a review of studies, spelling and math were identified as the academic areas most targeted using CCC (Joseph, Konrad, Cates, Vajcner, Eveleigh, & Fishley, 2012). CCC as a spelling intervention has been most frequently employed with elementary-aged students, but has also been found to be effective for high school students (Zielinski, McLaughlin, & Derby, 2012). Several studies have found CCC to be an effective spelling intervention for students with disabilities (Cieslar et al., 2008; Hochstetler et al., 2013; Nies & Belfiore, 2006; Zielinski et al., 2012).

Skinner, McLaughlin, and Logan (1997) described CCC as "a simple, efficient, self-managed academic intervention for improving accuracy, fluency, and maintenance across students and academic skill domains" (p. 295). Features of CCC that teachers may find to be attractive are the fact that the intervention is simple to learn and implement, self-managed, efficient, and arguably of most importance, that CCC is effective in improving the academic skills of students. The basic CCC method for spelling consists of the following steps: The student will (a) look at a correctly spelled word; (b) cover the word; (c) write the word; (d) uncover the word and compare it to what was written; (e) if correct, provide his or her self with reinforcement, and if incorrect, copy the word multiple times (Cates et al., 2007). The procedure of requiring students to copy the correct spelling of the word multiple times is known as an overcorrection. The overcorrection procedure is a significant component of CCC and generally regarded as an important factor in the effectiveness of the intervention. The student will usually work from a sheet of lined paper with her spelling words for the week listed from top to bottom along the left hand margin of the page. The page will typically include at least three columns to the right of the weekly spelling words. The student will use the first blank column to write the

spelling word (while the model word is covered) and the additional columns to allow for multiple rewrites of misspelled words (while the model word is uncovered). The columns are sometimes created by way of the student folding the paper lengthwise into the desired amount of columns. The student can use an index card, her hand, or some other item to cover the model word when attempting to spell the word. Reinforcement following the correct spelling of a word usually consists of the student marking the word with a checkmark or some other positive mark of her or her teacher's choosing.

As mentioned above, CCC has been found to be an effective academic intervention for several different school subjects. Prior to reviewing the extant literature regarding CCC as a spelling intervention, its use as an academic intervention in the areas of geography, foreign language, math, and reading will be reviewed.

CCC with Geography and Foreign Language

The CCC intervention has been shown to be effective for students when learning geography (Skinner & Belfiore, 1992) and foreign language (Carter et al., 2013). In an early CCC study, Skinner and Belfiore (1992) employed a multiple baseline across items design to evaluate the effectiveness of the CCC intervention on the accuracy of students identifying states on a map of the United States of America. The students were diagnosed with social emotional disturbances and were educated in a self-contained classroom. Two types of maps were used, one that contained all 50 states with the names labeled and the other was identical to the first map except that the names of the states were deleted and horizontal lines were included for writing the U.S. postal abbreviations (e.g., PA for Pennsylvania). During the CCC intervention, the students were trained to find states on the map with the states labeled, turn the map over, place a marker on the appropriate state on the unlabeled map, and then check their responses for

accuracy. Results revealed that accuracy of responding increased during the CCC intervention, and the increased accuracy remained on a maintenance assessment one-month later. In addition, CCC was rated as highly acceptable by the students.

In a more recent study, Carter, Wong, and Mayton (2013) evaluated the effects of using CCC for enhancing the foreign language vocabulary for three 15-year-old students diagnosed with learning disabilities in reading. It was noted by the researchers that the CCC intervention had not previously targeted the foreign language skills of students. It was found that the CCC intervention resulted in improved foreign language vocabulary for the students. The researchers reported that students may need time to adapt to a learning model like CCC because the students did not show proficiency with CCC until the later stages of the study. This statement is important for future researchers in terms of making sure that participants understand and can demonstrate the correct procedures required when using the CCC intervention. The small sample size was identified by the researchers as a limitation of the study, as was the study's limited scope as it only examined how CCC could improve the students' written vocabulary of a foreign language and not their reading fluency.

CCC with Math

A number of studies have been conducted showing the effectiveness of CCC as a math intervention. As described earlier, the extant literature includes studies where CCC was compared with taped interventions to determine the most effective math intervention. The studies listed below include those where CCC was paired with goal setting and performance feedback conditions, but not with taped interventions.

In one study, CCC was paired with a goal setting condition, which resulted in higher final scores on the math fluency of 173 third-grade students (Codding et al., 2009). Two goal setting

strategies were included as part of the study. One of the goal setting strategies consisted of the students setting goals for problems correct, while the other goal setting strategy consisted of setting goals for decreasing incorrect answers. Results revealed that CCC + GSC (goal setting correct) led to significantly higher scores at the conclusion of the intervention along with greater growth between sessions when compared to most of the other groups. Codding et al. (2009) reported that retention and generalization of skills were also found to be significantly higher for the CCC + GSC group than that of the other groups. While not as effective as the CCC + GSC group in terms of overall math fluency, the CCC + GSE (goal setting errors) condition was found to be the most socially acceptable among the students. It was reported that the control group students made the fewest gains during the study followed by the students in the CCC + GSE group.

Codding, Eckert, Fanning, Shiyko, and Solomon (2007) employed an alternating treatments design to compare the isolated effects of CCC with the combined effects of CCC and two types of performance feedback for 3 sixth-grade students referred by their teachers for additional support in mathematics calculation fluency. The dependent variables included number of digits correct per minute (DCPM) and number of digits incorrect per minute (DIPM). Due to the fact that differentiation between the treatment conditions was not demonstrated, the researchers noted that it was difficult to determine if adding the performance feedback variable produced better mathematics fluency. Social validity was established as the participants rated each intervention favorably. Codding et al. (2007) reported that repeated learning trials promote mathematics accuracy by providing the students with practice of accurate responses.

CCC with Reading

Kaufman, McLaughlin, Derby, and Waco (2011) found that pairing a reading racetrack with flash cards was effective in teaching unknown sight words to three students with learning disabilities. A reading racetrack is a teaching strategy that is considered to be engaging and fun for students and that is used to improve a particular academic skill such as increasing sight word recognition. In the Kaufman et al. (2011) study, the reading racetrack was designed to resemble a racecar track with a start and finish line and a predetermined number of cells with a single sight word printed in each cell. The student was given one-minute to read around the track moving from cell to cell with the goal of the student improving her fluency and accuracy. The researchers decided to incorporate a CCC procedure when one of the students was having difficulty with one of the specific racetracks. This particular student was reportedly difficult to motivate and did not enjoy reading due to the fact that reading was difficult for him. When asked how he could learn the words better, he responded that writing the words would help him. As a result, the researchers employed the CCC procedure paired with the flashcards and the racetrack to afford him more practice so that he would become familiar with the words. After the student would read the racetrack, he was provided with positive reinforcement in the form of allowing him to draw for 5-minutes, and his sight word reading reportedly improved. Some positive aspects of the intervention cited by the researchers were the fact that it was inexpensive, time-efficient for both students and the researchers, easy to create and implement in the classroom, and did not take significant time out of the students' school day.

Conley, Derby, Roberts-Gwinn, Weber, and McLaughlin (2004) found CCC to be more effective than a picture-matching intervention of the percentage of words read correctly by students in a half-day kindergarten program. The study was described as a five-phase investigation that used a multi-element design. Maintenance of word recognition was generally

found to be better by way of CCC than that of the picture-matching intervention. It was noted that CCC required a larger number of training sessions than did the picture-matching intervention before students reached word recognition mastery. Conley et al. noted that the students were able to self-check as part of the CCC intervention whereas this was not the case during the picture matching intervention, and that self-correcting resulted in multiple learning trials.

CCC with Reading and Spelling

Jaspers, Williams, Skinner, Cihak, McCallum, and Ciancio (2012) used an adapted alternating treatments design to compare two variations of the CCC method on spelling acquisition and maintenance, as well as word reading and vocabulary of three African American first grade students. The spelling and word reading sections of the Woodcock-Johnson III Tests of Achievement (WJ-III Ach) were administered to the students as a pretest, and each student's performance on both subtests was found to be in the average range. The researchers indicated that the average scores obtained by the students on the pretest were indicative of basic academic ability and prerequisite skills for engaging in the spelling intervention. The first intervention was described as traditional CCC where the students were taught to look at the word, cover it, attempt to write the word, and then compare the written response with the original model. As in previous descriptions of CCC, if the student spelled the word correctly, the experimenter and student moved on to the next word. If the student spelled the word incorrectly, he was prompted to rewrite the misspelled word three times as an overcorrection procedure. The second CCC intervention (CCC + SD) added a component where the experimenter read a sentence containing the word followed by a brief definition of the word. The researchers reported that both CCC interventions resulted in the students' increased spelling at an equivalent rate, both of which

were greater than that of a control condition. The researchers indicated that both interventions were equally effective at increasing the spelling acquisition rates of the students. Regarding word reading, when compared to the control condition, all of the students made greater gains via the CCC and CCC + SD conditions. However, the researchers noted that all three students demonstrated increases in words read correctly in the CCC condition, but the rates were less than what was found in the CCC + SD lists. Only one student was better able to define words learned in the CCC + SD condition when compared to the traditional CCC condition. In terms of treatment acceptability, all students indicated that they liked the CCC + SD intervention better than the CCC intervention, and that the CCC intervention was harder than the CCC + SD intervention. Finally, all students indicated that words were learned better during the CCC + SD intervention.

CCC with Math and Spelling

Cieslar et al. (2008) evaluated the effects of CCC on improving the mathematics and spelling performance of a high school freshman with a diagnosed behavioral disorder enrolled in a special education class. The student was a 16-year-old male student receiving special education services in the academic areas of reading, written language, and mathematics. His math calculation skills were assessed by way of the Wechsler Individual Achievement Test, Second Edition (WIAT-II) and were observed to be at a third grade level while his spelling achievement, which was also assessed using the WIAT-II, was found to be at a second grade level. A multiple-baseline single-case design was used to evaluate the effectiveness of CCC, and the results showed that the CCC procedure was effective in improving the student's accuracy in math calculation and spelling. The researchers indicated that the student, who was diagnosed with a behavioral disorder, remained on task during the intervention sessions, had a positive

attitude, and even came in to school early or stayed after school when he had been absent for an earlier session due to an in-school suspension. The researchers indicated that the student appeared to be excited when showing his math teacher the graph of his progress. It was reported that the benefits of CCC included that the method was practical in terms of time and money, easy to implement, and easily understood by students.

CCC with Spelling

A thorough review of the extant literature revealed many studies that have examined the effectiveness of CCC as a spelling intervention. In one study, Merritt et al. (2012) used a multiple baseline design to evaluate the effectiveness of CCC on learning weekly core spelling words with 4 second-grade students. Three of the students reportedly were at risk for school failure while the fourth student was diagnosed as having a learning disability. Results indicated that the students' scores on daily and weekly spelling tests taken in the general education classroom improved following the teaching and subsequent implementation of the CCC intervention. The researchers emphasized the ease with which the CCC procedure can be taught to students and implemented in classrooms, and the fact that the intervention was inexpensive and administered within minutes each school day.

Nies and Belfiore (2006) examined the effects of CCC and a copy-only strategy on the acquisition and retention of spelling words for 2 third-grade students with learning disabilities. An adapted alternating treatments design was employed to compare the effects of CCC and the copy-only strategy. As implied by the name, the students were required to look at the target words and simply copy each word during the copy-only condition. During the copy-only condition, the students were not required to attempt to spell the words on their own. In other words, the correct model was always present during the copy-only condition. The results

showed that both students learned and retained more words in the CCC condition than the copy-only strategy. During CCC, the students learned an average of 7.3 new spelling words per week. The students only learned an average of three new spelling words per week via the copy-only strategy. Retention of the new spelling words learned was also found to be greater via CCC (95%) than the copy-only condition (64%). In the copy-only condition, the researchers indicated that the students never had the opportunity to evaluate their work due to the fact that the correct model was always present. Additionally, the students never had to correct errors because the correct spelling was always visible to them. During the CCC condition, the students engaged in a process of self-evaluation (e.g., comparing one's own response to a correct model) and self-correction, which may be the components of the strategy that contributed to more spelling words learned than the copy-only condition. The multiple rewrites of incorrectly spelled words component may have facilitated more efficient storage of the correct spelling of the words into long-term memory. Finally, the students reportedly preferred the CCC method over the copy-only strategy.

Cates, Dunne, Erkfritz, Kivisto, Lee, and Wierzbicki, (2007) investigated whether employing a constant time delay (CTD) procedure with 3 third-grade students identified as having spelling deficits would be more effective than traditional CCC in the acquisition and retention of spelling words. The CTD procedure consisted of (a) providing the target spelling word; (b) providing a constant time interval (e.g., 5 seconds) for a student to initiate a response; (c) if a correct response occurred, provide some form of reinforcement and move on to the next word; (d) if an incorrect response occurred, provide some form of positive practice (e.g., copy the word correctly from a model more than once) and no reinforcement; (e) if no response was provided, provide a model for the student to copy the word one time correctly without

reinforcement. The results indicated that both procedures were effective in helping students efficiently acquire spelling words. However, while CCC resulted in more words learned for each of the students, the CTD procedure resulted in higher levels of maintenance for two of the three students. Both procedures resulted in the students acquiring many spelling words in a relatively short period of time. For two of the three students, more instructional time was required before the students were able to learn more words under the CCC condition. The CTD condition, in which the students were prompted to respond within a very short time interval, may have increased the students' anxiety levels in such a way that the words spelled during the CTD condition became more memorable, which may have resulted in more efficient and effective long-term memory storage. A limitation of the CTD procedure cited by the researchers was that a second independent person was needed to implement the intervention in a one-to-one format.

Erion et al. (2009) compared two versions of CCC to determine if varying the number of times a student was prompted to copy a word (one time versus three times) following an error would be significant during acquisition and retention phases. An adapted alternating treatments design with counterbalancing was used with four elementary age students (3 second-grade students and one third-grade student), none of whom were receiving special education services at the time of the study. The students were selected for participation after being identified by their classroom teachers as failing on weekly spelling tests and/or scoring below average. Performance in both versions of CCC was greater than a baseline phase, but an appreciable difference was not observed between the two versions. The researchers indicated that marginally better results were observed in the multiple rewrites condition. It was concluded that having students produce multiple corrective rewrites of misspelled words was not significantly more effective than one corrective rewrite. The researchers noted that numerous studies have found

that error identification and immediacy of error correction play a critical role in accurate spelling. Limitations identified by the researchers included that none of the students were identified as having a learning disability. As such, generalization of the results to students with learning disabilities could not be made. In addition, the researchers noted that because an adapted alternating treatments design was used, an interaction effect could not be ruled out. Because each student was exposed to both CCC conditions, it is possible that exposure to either of the conditions could have impacted the results of each respective condition. In other words, it is possible that students may have practiced multiple rewrites at home of words that were part of the single rewrite CCC condition or vice versa. A final limitation of the study reported by the researchers is that only one of the students consistently demonstrated scores of 80% or better during the acquisition phase of the study via the CCC conditions, and none of the students consistently demonstrated 80% or better during the retention phases.

Mann et al. (2010) found that having typically developing students sound out words while using the CCC method resulted in higher posttest spelling accuracy than implementing CCC without sounding out words. This study included three phases consisting of a pretest, practice, and posttest. During the pretest sessions, the experimenter dictated the words to be spelled until the student misspelled five words, which the experimenter then used in the practice session that followed either on the same day or the next day. During the practice sessions, the students were instructed to use the CCC method to practice spelling their words in both the CCC-alone condition and the CCC with sound out condition. The researchers noted that the procedures were the same in the CCC with sound out practice sessions, with the exception that immediately after the student read the word out loud, the experimenter prompted the student to say each sound in the word in each written rehearsal. If a mistake was made, the experimenter

asked the student to try again. The post-test sessions occurred the day following the practice sessions. During post-test, students did not sound out in the CCC-alone condition, but did sound out in the CCC with sound out condition. The researchers noted that conducting a phonological awareness assessment with the students prior to implementing this intervention may be beneficial as deficiencies in basic letter-sound correspondence would limit the efficacy of the sounding out with CCC intervention. Also, as in the Erion et al. (2009) study, the researchers mentioned that the design of the study did not rule out the possibility that students were using the sound out strategy during the CCC-alone condition, which would be considered a treatment interaction effect. It is possible that the students used the sound out strategy covertly during the CCC-alone condition.

Zielinski, McLaughlin, and Derby (2012) evaluated the effectiveness of CCC for improving the spelling accuracy of high school students with learning disabilities. The experimental design consisted of a multiple baseline with a brief reversal across students. A short baseline was implemented with each student where the students were given 10 words randomly selected from their weekly vocabulary packets. The researchers found that the spelling accuracy for each student increased during the implementation of the CCC intervention. During the reversal phase, the students were instructed to no longer use the CCC method. The reversal phase resulted in a decline in correct words spelled for two of the students. The researchers noted that the student whose spelling performance remained stable during the reversal phase had been studying his words at home using CCC, and they reported that students often study at home when they have learned individual testing methods. Regarding limitations of the study, the researchers noted that due to the small number of students, external validity of the results to other populations was limited.

Hochstetler et al. (2013) used a multiple-baseline across word lists design to study the effects of the CCC method on the spelling performance for three middle school special education students. Each of the students who participated in the study was diagnosed with a specific learning disability. The researchers reported that the three students were at-risk for school failure due to low socio-economic levels and also poor school attendance. Results showed that each of the students improved his spelling accuracy throughout the study. The researchers reported that using CCC in a middle school resource room was found to be practical and straight-forward, and that the intervention did not require a large amount of materials. Limitations included that daily data collection did not occur, and that after observing some generalization of the skill in the general education classroom of the students, the researchers indicated that a more powerful statement could have been made if they had collected data in the general education classes.

Hollingsworth, Keith, McLaughlin, and Derby (2012) implemented CCC with a seventh grade male student with a severe behavior disorder educated for a portion of the school day in a self-contained classroom. The researchers were interested in learning if the CCC intervention would result in an increase in the number of words spelled correctly by the student. By way of a multiple baseline across three word sets design, the researchers found a statistically significant result in terms of the number of words spelled correctly for the student. The spelling words used in the study were obtained from the Dolch instant sight word list. The researchers noted that the student enjoyed the individualized attention that he received as part of the study. A limitation identified by the researchers was that a small number of words were used, which may have allowed the student to memorize the words that he would be tested on and may have looked up the words in a dictionary while in the general education classroom. The researchers also

mentioned that only one student was included as part of the study, which limited the generalizability of the results.

Darrow et al. (2012) used a multiple baseline design across participants to evaluate the effects of CCC on words spelled correctly and time to completion for two elementary students educated in a self-contained behavior intervention classroom. Following baseline procedures consisting of pretests, the CCC procedure was implemented for both students. The results indicated that the overall spelling accuracy for both students improved during the course of the study. Time to completion was evaluated for one of the students, and it was found that the student did not reduce the amount of time it took him to complete his spelling tests. The researchers reported that the student would spend significant time erasing letters to make them more legible, or repeating the word out loud rather than writing the word at the same time. However, the researchers noted that the CCC procedure resulted in improved spelling for the student. Limitations reported by the researchers included the limited amount of time available to work with one of the students because he was mainstreamed out of the behavior intervention classroom and into a regular education classroom, and the amount of time needed to prepare and score the tests. The researchers reported that the students appeared to enjoy the procedures and did not present with any behavioral issues during the course of the study. Positive implications reported from the study included that a classroom teacher could implement CCC in the classroom, and the data collection procedures and analysis needed could be completed within a typical teaching environment. Additionally, CCC is an intervention that could consist of self-tutoring or a self-management strategy, and the intervention was found to be effective in an elementary classroom.

CCC Precautions and Recommendations

McLaughlin and Skinner (1996) offered some precautions and recommendations regarding the implementation of CCC in the classroom setting. The researchers indicated that error-correction procedures following a mistake should not be overly aversive for students so that students are not tempted to cheat (thereby negatively affecting the treatment integrity of the intervention). It was reported that if students are afraid to make a mistake while using CCC due to potentially harsh consequences (e.g., student told to rewrite misspelled words an excessive number of times), the social validity of the intervention will likely be compromised. The researchers noted that the motivation levels of students can be kept high by encouraging them to respond both accurately and rapidly, and by keeping track of their personal records. It was indicated that if students are graphing their own progress in order to keep their results private, their personal records should not be posted for the entire class to see. Rather, each student's performance can be included on a class-wide total graph showing cumulative progress.

While CCC is a self-implemented intervention, the researchers suggested that teachers should monitor their students' use of the strategy to ensure proper implementation. Prior to using CCC, students should be provided with ample instruction time regarding proper implementation procedures for the intervention. In a few studies, a large number of trials were needed before students were able to demonstrate mastery and/or proficiency using CCC (Carter et al., 2013; Conley, Derby, Roberts-Gwinn, Weber, & McLaughlin, 2004). A sufficient amount of learning trials should be provided so that students understand and feel comfortable employing the CCC intervention.

Taped Interventions (TI)

As mentioned earlier, studies on taped interventions have primarily focused on the academic area of mathematics (Aspiranti et al., 2011; Bliss, Skinner, McCallum, Saecker, Rowland-Bryant, & Brown, 2010; Krohn et al., 2012; McCallum, Skinner, Turner, & Saecker, 2006; Miller, Skinner, Gibby, Galyon, & Meadows-Allen, 2011). Taped interventions have also targeted the reading skills of school-age children (Sterling, Robinson, & Skinner, 1997; Bliss et al., 2006; Kupzyk, McCurdy, Hofstadter, & Berger, 2011). Only recently has a taped-intervention been developed to address the spelling performance of students (McCallum, et al., 2014).

TI with Math

Miller, Skinner, Gibby, Galyon, and Meadows-Allen (2011) designed a taped-problems intervention to study its effect on the addition facts performance of students in a second grade classroom. The researchers sought to determine if the taped-problems (TP) procedure would lead to improved addition-fact fluency for the students, and additional assessments of inverse problems were conducted to assess for generalization. A multiple-baseline across fact sets design was used to evaluate the effectiveness of the TP intervention. The participants included students who did not present with any identified disabilities, and the primary dependent variable of the study was digits correct per minute (DCM). The TP intervention was observed to be effective for each of the three groups (lower, middle, and high baseline) within the second grade classroom where the study was conducted. The researchers reported that the results from the study supported previous studies where it was concluded that TP enhanced class-wide math-fact fluency. Generalization of the skill to inverse facts was observed even though the procedure was not directly addressed by the TP intervention. Limitations cited by the researchers included that

social validity data was not collected, the study was conducted mostly with Caucasian students, and the study only examined addition-fact fluency.

Krohn, Skinner, and Fuller (2012) employed a multiple baseline across students design to study the effectiveness of a taped numbers (TN) intervention on the number-identification accuracy of four kindergarten students. The students were referred for inclusion in the study due to observed difficulty with number identification. As a baseline measure, the students participated in their regular math instruction and individual assessments took place during a transition period. The TN intervention was provided to the students both individually and in small-group settings. As with most taped interventions, the students were instructed to "beat the clock" by reading the number presented aloud before the number was provided to them by the recording. The researchers observed that all of the students displayed a clear increasing trend in number-identification accuracy following the TN intervention. The researchers reported that the results lend support to the effectiveness of tape-assisted interventions and also give evidence of generality to a population of learners including kindergarten students (three English language learners) and tasks. Regarding maintenance data, the students' teacher indicated that all of the students continued to demonstrate mastery at the end of the school year. Limitations cited by the researchers included the absence of data on responding during the taped intervention sessions, which could serve to identify the mechanism resulting in the behavior change. The researchers also noted that peer influence was not accounted for in the study.

Aspiranti, Skinner, McCleary, and Cihak (2011) evaluated the class-wide use of a taped problems (TP) intervention on digits correct per minute of first grade students in a general education classroom. The classroom consisted of 20 students, none of whom had any identified disabilities, but 4 students were reportedly referred to the reading specialist for early

interventions in reading. The dependent variable of this study was digits correct per minute (DCM). A multiple baseline across sets design was employed in order to evaluate the effects of TP on DCM, as well as percentage correct, and student instructional levels (frustrational, instructional, mastery). Individual and group contingent rewards were provided to the students during the study. During the TP plus rewards phase for each of the three problem sets, the researchers noted that a steeper than baseline trend was observed, and this steeper increase in trend was only observed for each set when the TP plus rewards condition was in effect. The researchers suggested that changes in the students' performance were a result of the TP plus rewards treatment. Maintenance data collected found that while there was a slight decrease from the highest TP performance, DCM scores were consistently higher in the maintenance phase than when in baseline. It was noted that engaging in repeated practice via daily assessments provided the students with multiple opportunities to respond quickly and accurately, and that might be one characteristic that contributed to the effectiveness of the TP interventions. The researchers indicated that the students were exposed to the correct answers for each problem multiple times (similar to CCC), and that natural reinforcement contingencies were a part of the TP intervention. Additionally, the researchers suggested that the game-like nature of TP where students attempt to "beat the tape" provided an element of competition. A limitation cited by the researchers is that the study was conducted toward the end of the school year, which means that the students had already received several months of mathematics instruction prior to the start of the study. Nonetheless, the researchers noted that, when the study began, none of the students in the class performed at the mastery level, and that more than half of the class performed at the frustrational level.

Bliss, Skinner, McCallum, Saecker, Rowland-Bryant, and Brown (2010) evaluated whether adding an additional immediate assessment (AIA) following a taped-problems (TP) intervention would result in an increase in the multiplication fact fluency of 6 fifth-grade students. An adapted alternating treatments design was used in the study. All of the students were receiving their math instruction together in a class for the lowest-performing mathematics students in the fifth grade, and the students were placed in this class based on achievement test results and teacher referrals. Three problem sets were developed (including one control set), with 12 problems per set, and each assessment sheet contained 3 columns, resulting in a total of 36 problems per assessment sheet. Digits correct per minute (DCM) was the primary dependent variable of the study. Results showed that all students increased DCM following the implementation of the TP and TP + AIA interventions. However, the researchers noted that none of the students displayed consistently better performance on one intervention over the other, and they also reported that baseline data across sets was highly variable. The researchers indicated that including the additional assessment immediately following TP can enhance multiplication fact fluency, but that it was not found to be effective across students. A teacher acceptability scale seemed to support that teachers liked the intervention, believed that it increased the multiplication fact fluency of their students, would use the intervention again, and would also recommend the intervention to other teachers. Student ratings reportedly tended to be positive as well.

McCallum, Skinner, Turner, and Saecker (2006) evaluated the effects of the taped problems (TP) intervention on multiplication fact fluency for use on a class-wide basis using a multiple-probes-across-tasks design. The study included 18 regular education students from a third grade general education classroom. Twelve sets of basic multiplication fact problems were

developed for use during the study, and 12 cassette tapes were created that consisted of the problem sets along with varying time delays (no time delay, 4-s, 2-s) per tape. In addition, 5 different assessment probes were developed for each set of problems consisting of 48 problems each (12 problems repeated 4 times each). Digits correct per minute (DCM) was the primary dependent variable of the study. The results showed that the TP intervention increased the class's average DCM score, and the increases were maintained over one day and over a period of weeks. The researchers indicated that the TP intervention was an effective class-wide procedure for enhancing math fact fluency, and that the majority of students found the TP intervention to be acceptable. The absence of maintenance data for one of the problem sets was identified by the researchers as a limitation of the study. An additional limitation cited by the researchers was the limited number of different assessment probe forms, and that more diverse problem lists (division, addition, and subtraction) should be studied to promote generalization to other types of math problems.

TI with Reading

While most taped academic interventions have been developed for use in the area of mathematics, taped interventions have also been designed to improve the reading performance of students. Sterling, Robinson, and Skinner (1997) studied the effects of two taped words interventions on the sight-word reading accuracy of three elementary students with mental retardation (currently termed intellectual disability) who were instructed in a self-contained special education classroom. The researchers also attempted to determine if tape-recorded reading rates were functionally related to the acquisition rates of the students. The students were selected for inclusion in the study due to their teacher's assertion that these three students would benefit most from additional sight-word intervention. Fourteen unknown words were selected

for the study and they were assigned to one of two word sets. Each set contained 2 three-syllable words, 3 two-syllable words, and 2 one-syllable words. The experimenter prepared corresponding audiotapes where the words were read by the experimenter at either rapid (one word per second) or slow (one word per 5-seconds) rates. In order to evaluate the effectiveness of the treatments, a multiple-baseline across subjects design was used, and in order to compare treatments, an alternating treatments design was employed. The number of words correct during the assessments was the dependent variable. The results showed that both TW interventions were effective in terms of increasing the students' word accuracy. However, inconsistent results were found in terms of whether the slow or rapid rate was most effective in terms of increasing the sight-word accuracy of the students. The researchers indicated that word presentation rates during TW interventions may not have a powerful or consistent effect on student learning. A limitation cited by the researchers was that the study did not address stimulus generalization. Additionally, it was noted that although they did not formally collect treatment acceptability data, the students' special education teacher asked the researchers to construct additional tapes to be used for other words included in the students' IEPs.

In a more recent study, Bliss, Skinner, and Adams (2006) employed the Time Delay Taped Words (TDTW) intervention to determine if the procedure would improve the sight-word reading fluency of a fifth-grade student whose primary language was Russian. The study consisted of a multiple-baseline across word list design. Various time delays were used across word repetitions for different reasons. An initial delay was added to prevent inaccurate responding, followed by an increased delay to allow more time for the student to respond prior to the correct word being read on the tape. During the final trial, words were presented rapidly to encourage automatic responding and to increase the chances that the student's final response was

correct. Results showed that the student's sight word reading accuracy increased rapidly and was maintained across all three word lists. Results from this study support the Cates et al. (2007) and McCallum et al. (2006) findings indicating that time delays can be used effectively as components of CCC and TI to increase academic functioning. An intervention acceptability questionnaire completed by the student seemed to indicate that the student liked the strategy and believed that it helped him learn to read words. The researchers noted that the student participated in the intervention without extrinsic reinforcement for participation or progress. An important characteristic of the study cited by the researchers was that the TDTW intervention was self-managed meaning that time was not taken away from regularly scheduled instruction from the teacher.

Kupzyk, McCurdy, Hofstadter, and Berger (2011) evaluated the effects of a parent-delivered prerecorded reading program on the oral reading fluency of two children who spoke English as a second language. The parent, who reportedly had limited reading proficiency, was trained in how to use the program and it was implemented during parent tutoring sessions at home 3 to 4 days per week. Two Hispanic regular education elementary school-aged children participated in the study with their mother, who provided the tutoring sessions within the family's home. The dependent variables were the students' oral reading fluency, growth rate, and social validity. Results indicated immediate improvement in the oral reading fluency rate in the instructional passage for both children when compared to baseline. Maintenance data revealed that the students showed continued improvement in reading fluency 2 months following the end of the recorded readings program. Both children and their mother rated the interventions as highly acceptable. A positive result of the study is that the parent reported that she encouraged her children to read more at home following the use of the program, and both the

parent and her children reported enjoying practicing reading at home. The time needed to implement the tutoring program for the mother to her children was only 13.5 minutes per day, which is important because parents may have limited time due to their other household and career responsibilities.

TI with Spelling

McCallum et al. (2014) employed a multiple baseline across word list design to evaluate the effects of a taped spelling intervention (TSI) on the spelling performance of 4 sixth-grade students identified as having reading or writing difficulties. The TSI developed by McCallum et al. (2014) and described below is the same intervention that will be compared to CCC in the current study. Each participant was provided with an mp3 player that contained audio files of the word lists used during the intervention, spelling worksheet and assessment probes, and an intervention acceptability questionnaire. The general TSI procedure consisted of the student wearing headphones to listen to words presented individually on her mp3 player, a constant eight-second delay after the presentation of each word to allow the student to attempt to spell the word on her own, the correct spelling of the word presented on the mp3 player at a rate of one-second per letter, and the student self-correcting her work. The dependent variables included total words correct (TWC) and correct letter sequences (CLS). The results showed that the mean spelling performance of the students increased from baseline to intervention across the word lists, and the same was true between the intervention and maintenance phases for all but one of the students. The TSI was generally regarded as socially valid as the participants believed that learning to spell words with the mp3 player was fun, and they thought their ability to spell had improved. The researchers reported that the direct and explicit components that contributed to the effectiveness of the TSI included a high number of OTR, immediate performance feedback,

error correction, and intrinsic reinforcement. Limitations cited by the researchers included the possibility of testing effects, generalizability of the results to the traditional classroom environment, and increasing baselines limiting the interpretation of results for some of the students.

PURPOSE

Some students continue to present with significant deficits in spelling even after formal instruction in spelling has decreased or stopped completely. These same students likely struggled with learning to spell early on in their educational careers and may have become frustrated with traditional spelling instruction. Alternatives to traditional spelling instruction activities are needed for those students who continue to struggle in spelling. The current study compared CCC and TSI and sought to identify the important variables (i.e., error self-correction, multiple practice opportunities, reinforcement) contributing to increased spelling accuracy and rate of learning in middle-school students with reading and writing disabilities. The student acceptability of the interventions was also gauged by having the students complete a questionnaire at the conclusion of the study. While both CCC and TSI have been found to be effective academic interventions, it would be beneficial to understand which intervention would be most effective for improving spelling performance of middle-school students with significant spelling weaknesses. Additionally, because a limited amount of time exists during the school day for spelling instruction, especially now that more time is being devoted to the teaching of reading and math, it would be important to learn which intervention results in a greater rate of learning for students. As mentioned earlier, CCC has been compared with other taped interventions, but not in the area of spelling, and not with the recently adapted taped intervention known as TSI.

CHAPTER III

Method

Participants and Setting

Participants included four fifth-grade male students who attended a regular public school in an urban school district in the Mid-Atlantic region of the United States. The socioeconomic status of the families residing within the school district is generally considered to be low. The school building where the study took place was relatively new as it opened to students approximately 15 months ago. Regarding racial background, the participants included three Caucasian students and one African-American student. Pseudonyms were used in place of the participants' real names.

Barry was 11-years-old at the time of the study. A records review indicated that he repeated his kindergarten school year. Prior to the current school year, he received speech and language support services, but was exited from services after meeting his speech and language treatment goals. Barry's full scale IQ was found to be 93 on the Wechsler Intelligence Scale for Children, Fourth Edition (WISC-IV). The special education services that he received consisted of learning support due to a specific learning disability in the areas of oral reading fluency and written expression. Barry's reading and language arts programming were provided to him in a special education classroom. He was in the regular education classroom for the remainder of his classes. Barry's IEP contained a spelling-related goal and an adapted spelling list was included in the specially designed instruction section. The adapted spelling list typically consisted of a reduced spelling list. In other words, if students were required to learn 15 words per week, Barry would only need to study and learn 10 words.

Nick was ten years old at the time of the study. A review of his educational records revealed that Nick had a fluid-crystallized index score of 98 on the Kaufmann Assessment Battery for Children, Second Edition (KABC-2). He received special education services due to a speech or language impairment and a specific learning disability in the areas of oral reading fluency, reading comprehension, and written expression. With the exception of his speech and language support services, Nick participated in the regular education classroom for the entirety of his school day. His IEP included a spelling-related goal, but did not indicate the need for an adapted spelling list.

Gary was 11 years old at the time of the study. His overall IQ score was found to be 95 on the Reynolds Intellectual Assessment Scales (RIAS). He reportedly was diagnosed with Attention Deficit Hyperactivity Disorder (ADHD). Gary initially qualified for special education services when he was a third-grade student, and since then has been receiving learning support due to a specific learning disability in the areas of oral reading fluency, reading comprehension, and written expression. He was fully included in the regular education classroom for all of his educational programming. Gary's IEP included a spelling-related goal as well as an adapted spelling list in the specially designed instruction section.

David was 11 years old at the time of the study. His Full Scale IQ of 79 on the Wechsler Intelligence Scale for Children, Fourth Edition (WISC-IV) was observed to be the lowest among the group of participants. David recently reenrolled within the school district after having been gone from the district for a period of two years. A review of his educational records revealed a significant history of school absences. David received special education services due to a specific learning disability in the areas of basic reading skills, reading comprehension, written expression, and math problem solving. He received language arts (reading, spelling, and

writing) and math instruction in a special education classroom. David also received occupational therapy in the school setting due to reported fine-motor weaknesses. The rest of his classes were received in a regular education classroom. David's IEP included a spelling-related goal, but did not indicate the need for an adapted spelling list in the specially designed instruction section of the IEP.

General Information

The intervention sessions began soon after the students returned from the winter break. The original plan was to have the study take place over the course of 10 consecutive school days. However, due to student absences and cancellation of school due to weather, the study was conducted over the course of three consecutive weeks. Maintenance data were collected two weeks following the final intervention day of the study. All of the intervention sessions were conducted in the main conference room of the school building, and were facilitated by the researcher. The participants were seated strategically at a large rectangular table with at least one empty chair between each pair of students.

A student was only considered for participation in the study if he or she was identified by classroom teachers as having extensive spelling weaknesses, and if the student was diagnosed with reading and writing disabilities, in addition to any other comorbid special education diagnoses (i.e., such as a student with speech or language impairments indicated above). A student was not considered for participation in the study if he or she was diagnosed with only a reading disability or only a writing disability; both were required.

As mentioned above, three of the four students received some level of "pull-out" special education support in reading and language arts. This consisted of small-group instruction in a special education classroom with accommodations and modifications provided by the special

education teacher and/or special education paraprofessional. There were typically ten or fewer students in the special education classroom during reading and language arts instruction. Regular education classrooms consisted of approximately 24 students. Instruction in the special education classroom and regular education classroom consisted of whole group, small group, and individual instruction on a limited basis.

As indicated above, some of the students were provided with adapted spelling lists as specially designed instruction in the respective IEP. The regular weekly spelling list consisted of 15 words that typically followed one or more specific spelling pattern (e.g., words with silent-e endings, r-controlled vowels), and the addition of 5 "challenge" words. The "challenge" words, which, as their name implies, are at a higher difficulty level for students, are usually eliminated or not graded when students are provided with an adapted spelling list. The spelling words that appeared on the students' regular weekly spelling tests were obtained from the Harcourt Story Town (2009) series. The words were used throughout the week in various educational activities. These activities consisted of the students copying the words multiple times, using the words in sentences and stories, unscrambling the words, in crossword puzzles, just to name a few. This practice was consistent with the traditional method of spelling instruction described earlier. The students were given an end of the week spelling test on most Fridays.

The researcher was employed as a special education supervisor in the school district where the study was conducted. He was a certified school psychologist for the state of Pennsylvania and previously worked in that capacity in the same school district that the study was conducted prior to beginning work as a special education supervisor seven years ago. The researcher sought and received approval from the appropriate school district personnel in order to conduct the study.

The participants were recruited for the study after approval was received from the Institutional Review Board (IRB) of Duquesne University. The researcher conducted a search in the school district's electronic special education student data base for the following inclusionary criteria to be considered as a potential participant in the study: fifth-grade students with specific learning disabilities in the areas of reading and writing. This initial search resulted in 12 potential participants. After reviewing the referrals received from the teachers and the educational records of the students, eight were selected for participation due to their extensive spelling weaknesses and having met the inclusionary criteria described above. Parental consent forms were mailed home to the parents/guardians of those students, and written consent was received for four of the eight students (50% response rate).

On the first intervention day of the study, child assent forms were passed out to the students, and the student investigator read the contents of the form orally to the students while they were instructed to follow along. After reading the child assent form to the students, the student investigator asked if anyone had any questions. The students asked no questions. The parental consent forms that were mailed home to the parents/guardians of possible participants included notice that any student who participated in the study would receive compensation in the form of one $25 gift card to *Barnes & Noble*, a national bookstore with many local locations. Parents/guardians were informed that the students would be provided with the $25 gift card even if they withdrew from the study prior to its conclusion. Ultimately, as indicated above, four students participated in the study. No participant withdrew from the study early.

Materials

Word Lists. Three lists of spelling words were constructed with each list consisting of ten words (see Appendix A). The words were obtained from the aimsweb website (Aimsweb, 2015),

which is a nationally recognized curriculum-based measurement system. The 30 words were selected from a large sample of fifth-grade level words. Three word lists were constructed because three separate conditions (TSI, CCC, and a control condition) were compared during the study. As such, students used the TSI with the spelling words assigned to the TSI condition. Students used the CCC intervention with the spelling words assigned to the CCC condition. Finally, students did not receive any formal intervention on the words assigned to the control condition.

The word lists were randomly assigned in the following manner: List A – CCC, List B – TSI, and List C – Control. The researcher reviewed all of the spelling words that the students were exposed to as part of their spelling curriculum during their current fifth-grade school year. This was done to make sure that the students were not already exposed to one or more of the spelling words included in the study as part of their general fifth grade spelling curriculum. It was observed that none of the words from the general fifth grade spelling curriculum were included on the three word lists from this study. On the first day of the study, the students were assessed on all 30 words. On average, the students spelled 5% of the words correctly on the initial baseline assessment.

Common letter sequences.

The three word lists were carefully constructed to make sure that all 30 words contained unique common letter sequences. If the same letter sequences were found among any two or more words from the lists, additional words were selected from the aimsweb fifth-grade level word pool until none of the words repeated common letter sequences. No prefixes or suffixes were repeated among the word lists. For example, if a word was included on a list ending in –ing, no other word with the same –ing ending appeared among the word lists. This procedure

was not just limited to prefixes and suffixes. As an additional example, the words were selected in such a manner to make sure that consonant digraphs like "sh" or "wh" only occurred once across all of the spelling words. This procedure as described above in the two examples was followed in an effort to avoid any potential interaction effects among the three word lists. If common letter sequences in words among the three word lists were not avoided, it would have been difficult to determine which intervention was responsible for any improvement in spelling observed from the students. If the consonant digraph "wh" appeared in words contained on both the TSI and CCC word lists, and the student learned to spell one or more of the words containing "wh" correctly, we would not be able to determine with much degree of certainty which intervention contributed to the student spelling the word(s) correctly.

Spelling probes. Daily spelling probes were used to collect dependent variable data from the participants on the effectiveness of the interventions. The spelling probes also assessed the students on the ten words that were assigned to the control condition. The spelling probes consisted of a daily spelling test, prior to the implementation of each day's interventions, which assessed the students on their ability to spell the words that made up the three word lists. It should be noted that the spelling probe for the control list of words was assessed approximately every third intervention day; not each day as was the case for the TSI and CCC word lists. Due to the fact that the spelling words from the control list were not intervened upon, probing those words each day was determined to be unnecessary as minimal improvement in the spelling of the control list words would be expected with no intervention.

The results from the daily spelling probes were analyzed to evaluate the effectiveness of the interventions in terms of the participants' mean total words correct (TWC), mean correct letter sequences (CLS), and rate of learning. The spelling probes that were administered to the

participants prior to the first day of interventions served as a baseline as the participants had not yet received any formal intervention.

CCC intervention materials. During the CCC intervention, the participants were provided with CCC "follow-along" worksheets, sharpened pencils, and index cards to cover the model words. The CCC "follow-along" worksheets contained the ten stimulus words from List A typed down the left hand column of the page, and the back of the worksheets consisted of the same ten words, but in a different order from the words on the front (See Appendix G). Two versions of the CCC "follow-along" worksheet were developed with the words in different orders to minimize order effects. The CCC "follow-along" worksheets were counterbalanced so that the participants never received the same CCC "follow-along" worksheets more than two days in a row. Four columns were included next to the typed stimulus words on each CCC "follow-along" worksheet. The first column was used for each student to attempt to write the word on his own while the model word was covered, and the additional columns were used for each student to copy the correct spelling three times while referring to the correct model, if an error was made on the initial attempt.

TSI materials. During the TSI, the students were provided with the TSI "follow-along" worksheets and sharpened pencils. An *iPhone* contained the intervention audio files and was placed in the center of the conference room table where the four students were seated. The TSI "follow-along" worksheets were double-sided just like the CCC "follow-along" worksheets, and each side included ten numbered rows of two columns with each column containing a blank line (See Appendix H). The first blank line was provided next to each number so that each student could attempt to spell the word on his own after hearing it presented on the audio recording. The blank line next to the first line (in the second column) was used for each student to copy the

correct spelling of the word letter-by-letter as the word was dictated aloud from the audio recording. If the student observed that his spelling of the word was correct, he was instructed to give himself a checkmark on the first line where he wrote the word. If the student observed that his spelling of the word was incorrect, he was instructed to give himself a checkmark after spelling the word correctly on the line in the second column (after hearing it dictated letter-by-letter from the audio recording).

Procedures

Experimental design. An adapted alternating treatments design was used in the study in order to allow for two separate spelling interventions to be compared within a single subject. (Barlow & Hayes, 1979). An adapted alternating treatments design can be used to compare two different interventions on similar sets of instructional items by way of a continuous control condition (Poncy et al., 2007). Two distinct spelling interventions (TSI and CCC) were evaluated across three sets of ten spelling words (one set was used as a control condition). After each daily spelling probe was administered, one of the interventions was implemented followed by the second intervention. The interventions were counterbalanced each day so that one intervention was not always implemented first or last (see Appendix E for intervention schedule). The amount of time that it took each student to complete each of the interventions was measured in order to evaluate rate of learning. This helped identify which of the two spelling interventions was most efficient.

The study was conducted over the course of three consecutive school weeks during the months of January and February. The first day of the study began with the spelling probes from Lists A, B, and C being administered to the students. The spelling probes were administered to the participants according to the predetermined schedule (after randomization occurred). After

each daily assessment, the spelling probes were collected by the researcher. The interventions were implemented immediately following the daily spelling probes. On the first day of the study, prior to the commencement of the daily spelling probes, the researcher described the procedures and modeled the steps for each intervention to the students.

Dependent variables.

The dependent variables included mean Correct Letter Sequences (CLS), mean Total Words Correct (TWC), and mean rate of learning. Correct Letter Sequences is a method of assessing spelling performance that gives students credit for each correctly spelled letter sequence in a given word. As such, students can receive partial credit even if a word is spelled incorrectly. Students are given credit for each correctly sequenced pair of letters including one CLS for beginning the word with the correct letter and one CLS for ending the word with the correct letter (White & Haring, 1980). For example, the word *BUG* consists of four CLS (^B^U^G^). Total Words Correct (TWC) gives the student one word correct for each word spelled correctly. Partial credit is not given to the student on the measure of TWC. The word spelled by the student is either correct or incorrect. Total Words Correct is the typical measure of spelling performance used in most classrooms. By measuring CLS in addition to TWC, subtle spelling improvements can be identified. The procedure for scoring CLS is more time consuming than that of TWC, which may not be attractive to some teachers. However, having the ability to detect even slight spelling improvements in their students, which may be indicative of the effectiveness of an intervention, might make the CLS method preferable when compared to the traditional method of scoring only TWC. For each word list, an equal number of TWC and CLS were included (TWC maximum = 10, CLS maximum = 75).

Daily Spelling Probe Procedure.

In order to administer the daily spelling probes efficiently, the researcher prepared 30 index cards with one spelling word listed per card. The 30 index cards were divided into the three lists of ten words that represented the word lists that were constructed prior to the start of the study. The spelling probes were counterbalanced from day to day. On the first day, spelling probes were administered to the students in the following order: Probe A, Probe B, and Probe C. On day two, spelling probes were administered to the students in the following order: Probe B, and Probe A. Again, the control list of words was administered to the students approximately every third day of the study. For a complete listing of the daily spelling probe schedule, see Appendix E. The randomization of words within each word list was achieved by shuffling the ten index cards and presenting the words to the participants in the resultant order. The following instructions were read to the participants prior to administering the spelling probes:

> "I have provided you with a sheet of paper. You will be asked to write a series of spelling words that I will read aloud to you. I will say the number of the word, followed by the word, and then I will repeat the word once more. Do your best to spell each word correctly even if you are not sure how to spell the words. This procedure will be repeated until all of the spelling words have been presented. Do you have any questions? Let's begin."

The spelling probes were collected from each student after the last word was presented and each student was finished writing. Feedback regarding their performance on the daily spelling probes was not provided to the students. At the conclusion of each day's spelling probes, the intervention procedures began.

CCC intervention. The participants were instructed to complete both sides of the CCC "follow-along" worksheet. Each morning, after the daily spelling probes, the researcher read the following directions:

> "I have provided you with a worksheet with spelling words on the front and back. I want you to use cover, copy, and compare to write the spelling words. Remember, use your hand or index card to cover the word you are working on. Then attempt to spell the word on your own on the first line. When you are finished spelling the word, uncover the word and compare it to what you have written. If you spelled the word correctly, give yourself a checkmark. If you did not spell the word correctly, rewrite the correct spelling of the word three times using the additional blank lines. When you complete the front of the page, turn the worksheet over and continue on the back page until you have finished with the last word. Do you have any questions? Begin."

These instructions were shortened or eliminated altogether after it was evident that the students were well-versed on the CCC procedures. The students progressed through the following steps during the CCC intervention: (a) each participant located the first word on the CCC "follow-along" worksheet, (b) used an index card or his hand to cover the model word, (c) wrote the word in the first blank column, (d) uncovered the model word, (e) compared his written word to the model, (f) gave himself a checkmark if correct, (g) and if incorrect, rewrote the word three times in the subsequent columns while referring to the correct model. This procedure was repeated until the student completed both sides of the CCC "follow-along" worksheet.

As mentioned earlier, the amount of time that it took each student to complete the CCC intervention was recorded in order to evaluate the rate of learning. The CCC "follow-along"

worksheets were collected by the researcher as each participant indicated completion of that day's CCC intervention. The design of the CCC intervention was set up in such a way that students moved at their own pace based on the rate at which they progressed through the aforementioned steps of CCC. In other words, unlike the TSI, the CCC intervention did not include a fixed or finite amount of time that students had to progress from the first word to the last word on the CCC "follow-along" sheets. During CCC, students had the ability to progress at a rate faster or slower than the predetermined time that it took to progress through the steps of the TSI (due to the fixed amount of time of the audio recording from first word through the last word).

TSI. After each student was provided with the TSI "follow-along" worksheet and a pencil, the researcher read the following directions:

> "I have provided you with a worksheet that you will use to spell words. When I say 'begin,' I will press play on the *iPhone* and a list of spelling words will be read to you one at a time. Try to write the correct spelling of the word on the first line before you hear it read aloud letter-by-letter from the *iPhone*. When you hear the correct spelling read aloud letter-by-letter, use the line next to the line where you spelled the word to copy the correct spelling. If you find that you spelled the word correctly, give yourself a checkmark next to the word you wrote. If you find that you spelled the word incorrectly, give yourself a checkmark after the word that you copied letter-by-letter. Do you have any questions? Ready? Begin."

These instructions were shortened or eliminated altogether after it was evident that the students were well-versed on the TSI procedures. A pause consisting of a fixed 8-second interval was included between the presentation of each word and the correct spelling provided by

the recording. The students attempted to spell the word within that fixed 8-second interval. The correct spelling of each word was presented on the audio file at a rate of one letter per second. Each subsequent word was presented on the audio file 3-seconds after the presentation of the last letter of the previous word. The TSI "follow-along" worksheets were collected by the researcher at the conclusion of the intervention session.

Treatment integrity. A treatment integrity worksheet (See Appendix B) was developed by the researcher that included a checklist indicating the procedural steps needed to implement the interventions as intended. An independent observer completed the treatment integrity worksheet for 20% of the study's intervention sessions. Treatment integrity was observed to be 100% over the course of the study.

Interscorer agreement. An independent observer reviewed 25% of the spelling probes that were administered over the course of the study. Interscorer agreement for TWC and CLS was calculated by dividing the number of agreements by the number of agreements plus disagreements multiplied by 100. Across the spelling probe assessments, interscorer agreement was observed to be 100% for TWC and 100% for CLS.

Learning rate was calculated by taking each student's mean TWC divided by mean amount of time engaged in the intervention multiplied by 60 (which represents the amount of seconds in one minute). In determining the effectiveness of an intervention, learning rate can be measured to indicate the amount of time needed for the intervention to bring about a change in behavior (Skinner, Belfiore, & Watson, 2002). As a result, two apparent similarly effective interventions can be more deeply evaluated to determine which of the two interventions provides the student with greater learning in a shorter time period.

Student acceptability. In order to assess the student acceptability of the interventions, the participants were asked to complete a student acceptability questionnaire (see Appendix C). In general, the students were asked to identify which of the two interventions helped them learn to spell words best, which intervention was the most fun to use, and which intervention they would continue to use, if any.

Maintenance and Generalization. Maintenance data were collected at least 2-weeks after the last intervention day of the study. Two students were administered the maintenance assessment 16 days after the final intervention day, one student was assessed 15 days after the final intervention day, and the fourth student was assessed 14 days after the final intervention day. The results from this final spelling probe were analyzed to determine if spelling gains made during the course of the study were maintained.

CHAPTER IV

Results

This study utilized an adapted alternating treatments design with Total Words Correct (TWC), Correct Letter Sequences (CLS), and rate of learning as the dependent variables. The students were exposed to both treatments (CCC and TSI) on each intervention day in order to determine which of the two would be most effective in terms of improved spelling performance. In addition, a control condition was included in the study that consisted of the students being assessed on a list of 10 spelling words where no formal intervention took place. The control condition was administered two to four times per student over the course of the study.

Research question 1

Will Cover, Copy, and Compare (CCC) or the Taped Spelling Intervention (TSI) result in a greater increase in mean Total Words Correct (TWC)?

Research question 2

Will Cover, Copy, and Compare (CCC) or the Taped Spelling Intervention (TSI) result in a greater increase in mean Correct Letter Sequences (CLS)?

Both interventions (CCC and TSI) resulted in increased mean TWC and CLS for each of the students when compared to his initial baseline assessments. Refer to Table 1 below for the students' mean TWC and CLS by intervention. On the initial daily spelling probe (prior to the introduction of the interventions), the students' TWC on words from the CCC and TSI lists ranged from 0 to 3 (out of a possible 20). The students' CLS on words from the CCC and TSI lists ranged from 13 to 64 (out of a possible 150). On the final daily spelling probe (prior to the maintenance assessment), the students' TWC ranged from 11 to 20, which was a significant increase from the baseline session. The students' CLS ranged from 95 to 150, which also was a

significant increase from the baseline session. Additionally, spelling performance improved from the intervention phase to the maintenance phase for each of the students (see Maintenance Assessment section).

Spelling performance remained low throughout the study for all students when probed on the control list of words. This result was not unexpected considering the fact that no intervention took place on the words from the control list. After the first few administrations of the control list spelling probes, it became clear that the students were making little to no progress and were experiencing frustration while engaged in the control assessments. It was determined that the control list spelling probe would be administered less frequently than originally planned to prevent unnecessary frustration for the students, which could have compromised the effectiveness of the interventions and the validity of the study. Also, the control probes were not consistently administered to all students during the same sessions. Due to various motivational factors and school absences that came into play for the students, there was variability in terms of when students were administered the control probes. For example, two students may have been administered the control probe during a given session, while the remaining two students were only administered the regular daily intervention spelling probe.

Total Words Correct (TWC)

Described in greater detail below, Nick scored highest on the words from the TSI list, whereas Barry and Gary performed better on words from the CCC list. David's performance on words from the CCC and TSI lists was the same. In general, the CCC intervention was more effective in terms of mean TWC when compared to the TSI, which differed from this researcher's hypothesis. Over the course of the study including the maintenance assessment, there were a total of six perfect scores on the words from the CCC list and five perfect scores on

the words from the TSI list. It should be noted that one student (Nick) was responsible for the five perfect scores on the words from the TSI list and four of the perfect scores on the words from the CCC list.

Correct Letter Sequences (CLS)

Nick scored more CLS on the words from the TSI list, whereas the remaining three students scored more CLS on the words from the CCC list. In general, the CCC intervention was more effective in terms of mean CLS when compared to the TSI, which differed from this researcher's hypothesis.

Table 1

Mean Total Words Correct (TWC) and Correct Letter Sequences (CLS) for Cover, Copy, and Compare (CCC), Taped Spelling Intervention (TSI), and Control Word Lists by Student

Student	CCC	TSI	Control
		Total Words Correct	
Nick	7.00	7.50	0.33
Gary	7.38	4.63	0.50
David	2.13	2.13	0.00
Barry	6.00	3.60	0.50
		Correct Letter Sequences	
Nick	59.50	64.00	33.00
Gary	64.38	55.13	35.00
David	30.63	28.38	9.00
Barry	57.00	49.00	30.33

TWC Individual Student Summary

Nick achieved mastery by the fourth day of the study as he spelled 90% of the words correctly from the TSI list. He never scored lower than 80% on words from the TSI list for the remainder of the study. By the sixth day of the study, Nick scored 100% on words from the CCC list. He continued to score 100% on words from the CCC list for the remainder of the study with the exception of one day (not including the maintenance probe) where he correctly

spelled 90% of the words. Nick's mean TWC for the TSI list was 7.50 and he scored a mean TWC of 7.00 on the words from the CCC list. He was the only student among the four participants who experienced greater success on words from the TSI list rather than the CCC list. Over the course of the 10 intervention days, Nick scored an average of 75 TWC (out of 100 possible) on words from the TSI list as compared to an average of 70 TWC on words from the CCC list. Regarding the control list of words, Nick was assessed a total of four times, but only spelled one word correctly out of the 40 words attempted. It was evident that Nick's success on the words from the intervention lists did not generalize to the control list of words.

Gary achieved mastery by the third intervention day scoring 90% TWC on the words from the CCC list. He spelled 80% or more of the words correctly on the CCC list for the remainder of the study. His best performance on the words from the TSI list was on the final spelling probe before the maintenance assessment where he correctly spelled 80% of the words. Gary's mean TWC for the CCC word list was 7.38 and his mean TWC for the TSI word list was 4.63. Over the course of the 8 intervention days, Gary scored an average of 59 TWC on words from the CCC list as compared to an average of 37 TWC on words from the TSI list. Gary was assessed on the control list of words a total of three times and only spelled one word correctly out of the 30 words attempted. Similar to Nick, it was evident that the progress that Gary made on the intervention words did not generalize to the words from the control list.

On the baseline spelling probe on the first day of the study (prior to the introduction of the interventions), David did not spell any of the words correctly. In fact, for most of the words administered to him on the baseline probe, he would only write the first letter of the word or no letter at all. Even when David did write at least one letter, it was not consistently the correct first letter of the given word. It became obvious that the words from the study were very difficult for

David to spell and strong consideration was given as to whether or not he should continue to participate in the study. After discussing the concern with this researcher's dissertation chair person, it was decided that the student would continue, but that his progress would be monitored closely to determine if he should be exited from the study.

On the first five spelling probes, David's mean TWC was 1.00 on words from the CCC and TSI lists. By the end of the study, David's mean TWC for the CCC list increased to 2.13, which equaled the mean TWC on words for the TSI list. However, on the final spelling probe prior to the maintenance assessment, David displayed significant spelling improvement as he spelled 11 of the 20 words correctly (5 from the TSI list; 6 from the CCC list). Compared to the 2.13 mean TWC on CCC and the TSI that he earned over the course of the study, spelling over half of the words correctly as he did on the final probe was quite an improvement. David was probed a total of two times on the control list of words, but was not able to spell any of the words correctly.

Barry consistently scored higher on the words from the CCC list, but his performance on the words from the TSI list, while slightly lower, improved by the end of the study. When taking only the last 5 intervention days into account, Barry's mean TWC on words from the CCC list was 8.20 and his mean TWC was 6.20 on words from the TSI list. Overall, Barry's mean TWC on words from the CCC list was 6.00 and his mean TWC was 3.60 on words from the TSI list. Over the course of the 10 intervention days, Barry scored an average of 36 TWC on words from the TSI list as compared to an average of 60 TWC on words from the CCC list. Barry was assessed a total of three times on the control list of words and he never scored higher than 10% correct. Figures 1 through 4 below graphically display each student's individual TWC performance.

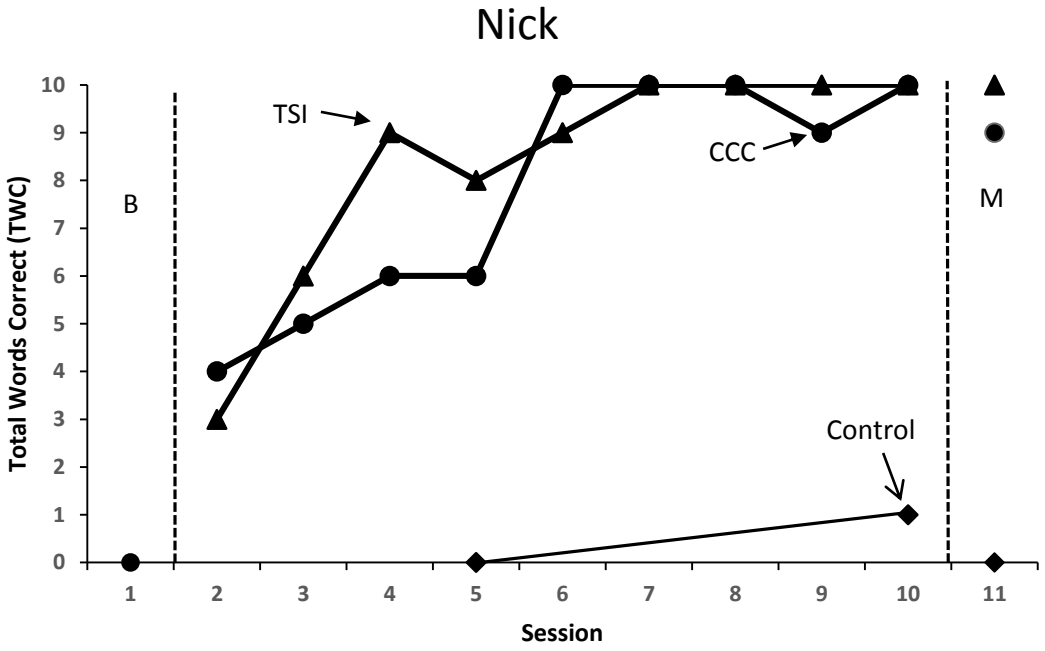

Figure 1. Total Words Correct (TWC) across Baseline (B), Intervention, and Maintenance (M) phases for Nick

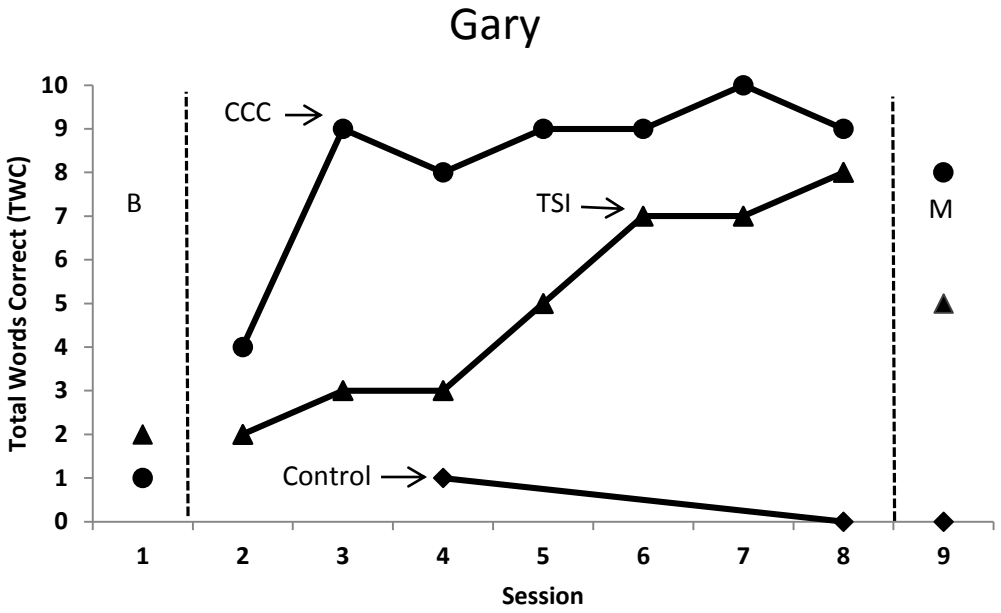

Figure 2. Total Words Correct (TWC) across Baseline (B), Intervention, and Maintenance (M) phases for Gary

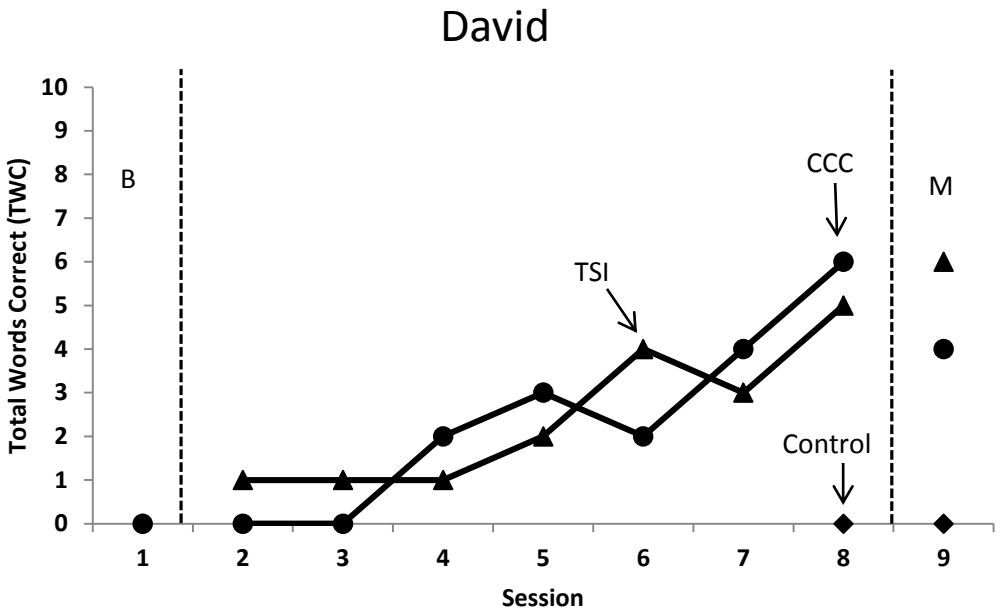

Figure 3. Total Words Correct (TWC) across Baseline (B), Intervention, and Maintenance (M) phases for David

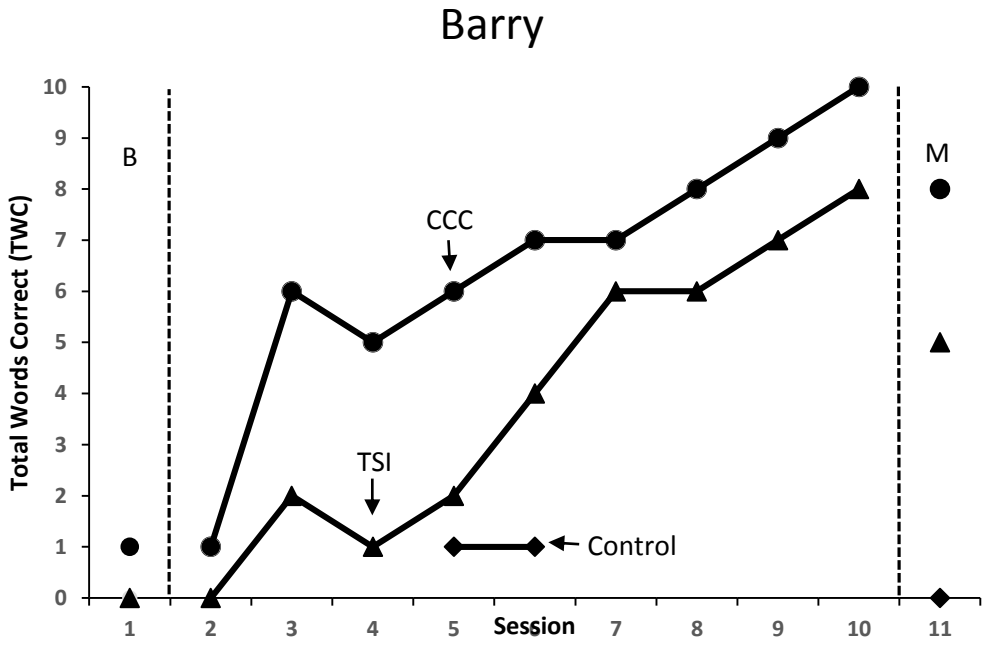

Figure 4. Total Words Correct (TWC) across Baseline (B), Intervention, and Maintenance (M) phases for Barry

CLS Individual Student Summary

Nick's mean CLS for the CCC word list was 59.5 and his mean CLS for the TSI word list was 64 (See Table 1). His CLS ranged from 31 to 75 CLS on the TSI word list, and from 21 to 75 CLS on the CCC word list. By the fourth intervention day, Nick consistently scored higher than 65 CLS for the remainder of the study on the words from the TSI word list. On the sixth intervention day, Nick scored a perfect 75 CLS on the words from the CCC word list, and never scored lower than 72 CLS for the remainder of the study. Regarding the control list of words, interestingly, Nick scored highest in terms of CLS on the initial assessment and scored lower on the two additional control assessments that occurred over the course of the study. His CLS ranged from 30 to 38 on the three control list probes.

Gary's mean CLS for the CCC word list was 64.38 and his mean CLS was 55.13 for the TSI word list. Regarding the CCC word list, Gary scored from 42 to 75 CLS. He scored from 42 to 67 CLS on the TSI word list. By the third intervention day, Gary scored 69 CLS on the words from the CCC word list, and he consistently scored higher than 67 CLS for the remainder of the study. Gary did not score 66 or higher CLS on the words from the TSI word list until the sixth intervention day, and his highest CLS was 67 on the TSI word list. Regarding the control list of words, he was assessed twice prior to the maintenance assessment and received scores of 36 and 34 respectively.

David's mean CLS on the words from the CCC word list was 30.63 and his mean CLS was 28.38 on the words from the TSI word list. His CLS ranged from 7 to 51 on the CCC word list. David's CLS ranged from 6 to 44 on the TSI word list. He was assessed on the control list probe only once during the study (prior to the maintenance assessment), and he scored 9 CLS.

Barry's mean CLS on the words from the CCC word list was 57 and his mean CLS was 49 on the words from the TSI word list. His mean CLS ranged from 32 to 75 on the CCC word list. His mean CLS ranged from 27 to 66 on the TSI word list. Barry was assessed on the control list of words a total of three times (prior to the maintenance assessment) and his scores ranged from 23 to 35 CLS.

Figures 5 through 8 below graphically display each student's individual performance in terms of CLS.

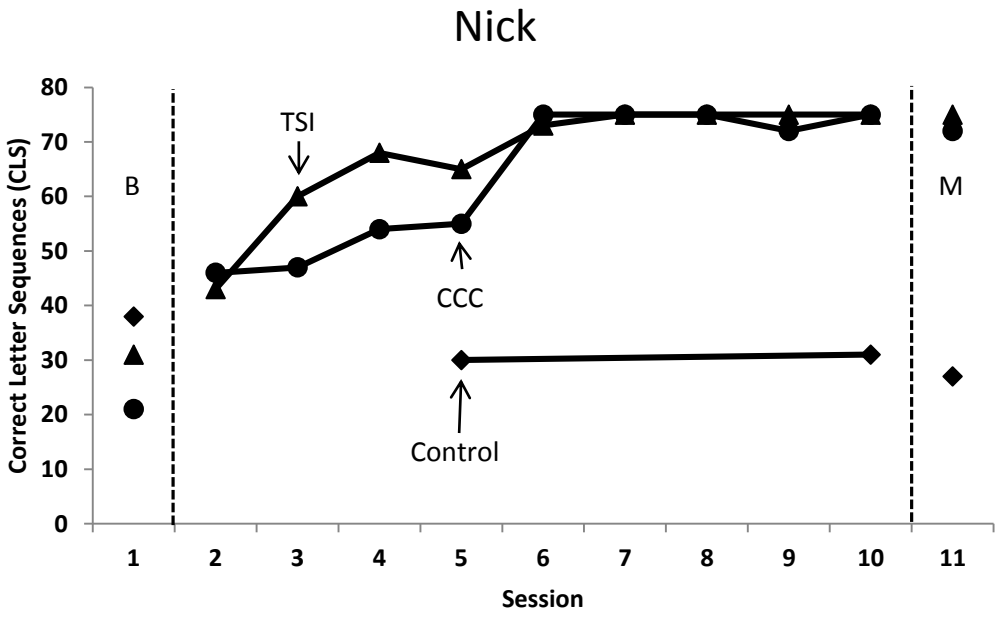

Figure 5. Correct Letter Sequences (CLS) across Baseline (B), Intervention, and Maintenance (M) Phases for Nick

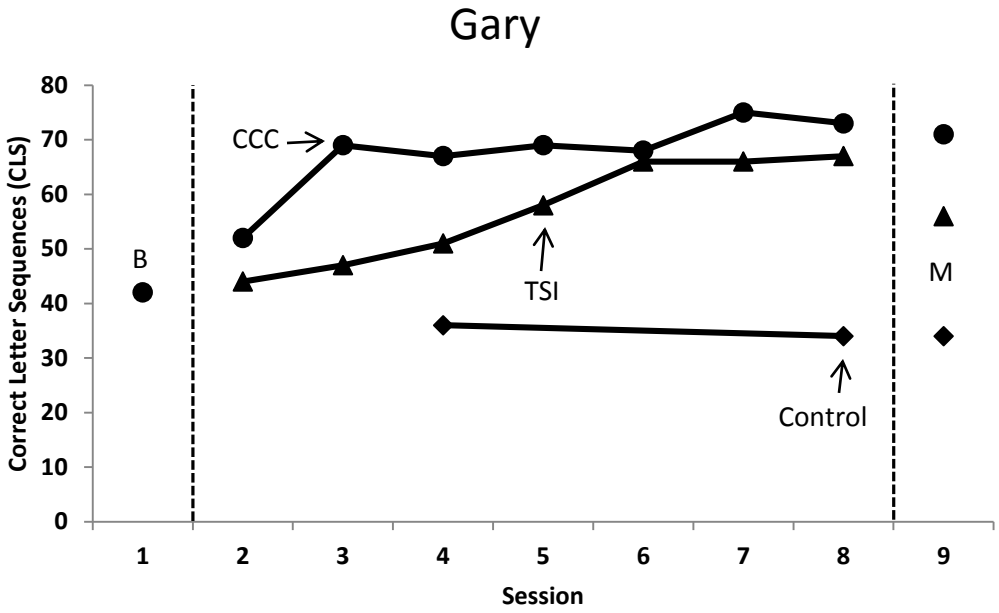

Figure 6. Correct Letter Sequences (CLS) across Baseline (B), Intervention, and Maintenance (M) Phases for Gary

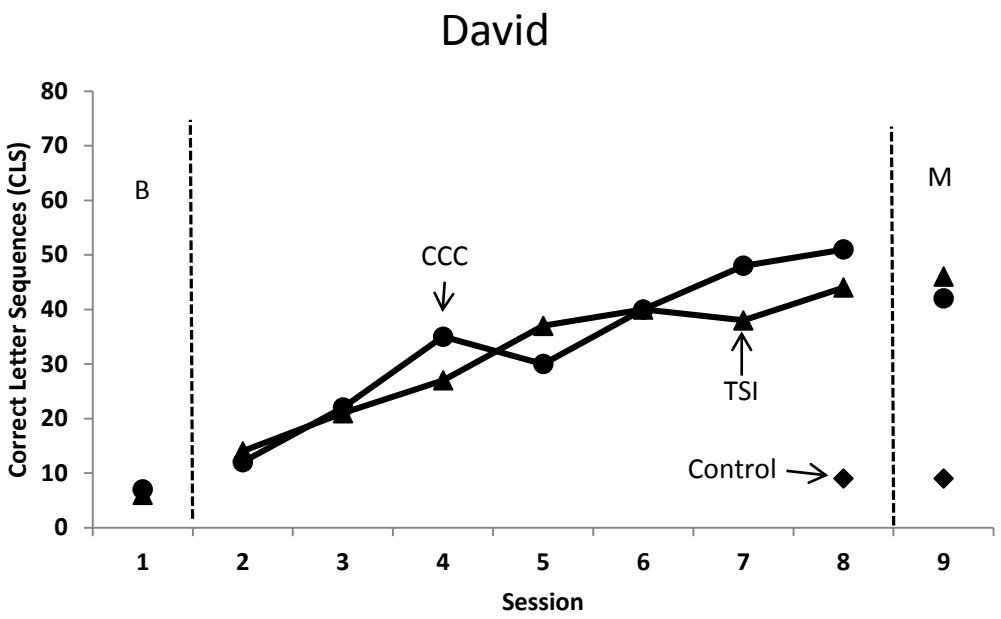

Figure 7. Correct Letter Sequences (CLS) across Baseline (B), Intervention, and Maintenance (M) Phases for David

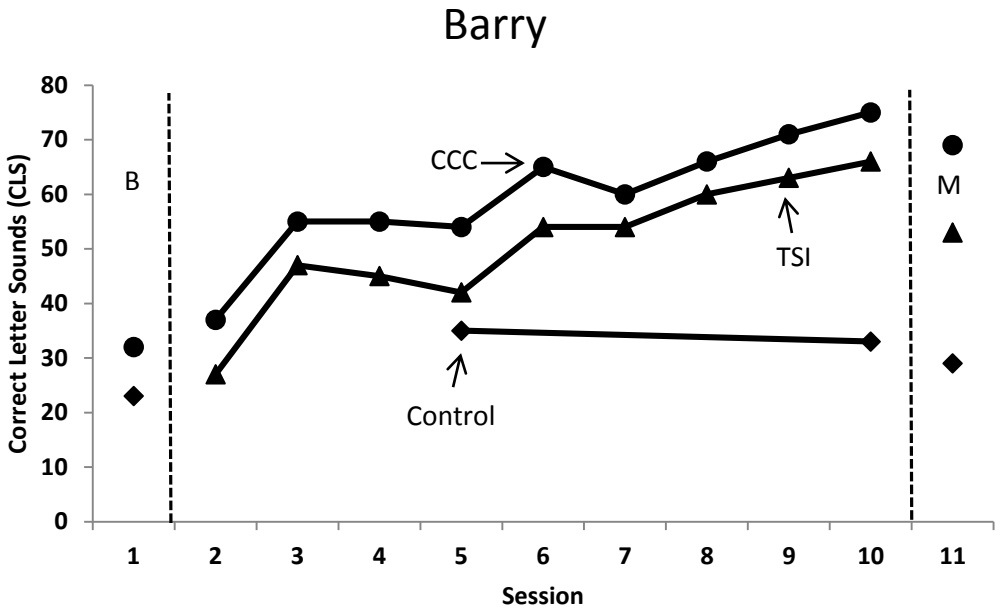

Figure 8. Correct Letter Sequences (CLS) across Baseline (B), Intervention, and Maintenance (M) Phases for Barry

Learning Rate

Research question 3

Will Cover, Copy, and Compare (CCC) or the Taped Spelling Intervention (TSI) result in a greater learning efficiency rate?

The time spent on the TSI was constant throughout the study at 406 seconds per student per session. As the procedure dictated, students progressed at their own rate when engaged in the CCC intervention (See Table 2). The time spent on the interventions was recorded in order to determine the rate of learning for each of the students. Learning rate was calculated for each student in order to determine the most efficient intervention (See Table 3). The learning rate was calculated by determining average TWC and CLS in each condition given the average time a student was engaged in that condition. To find the learning rate for each student, the mean TWC or mean CLS was divided by the mean amount of time in seconds that the student was engaged

in each respective intervention multiplied by 60. For example, the following depicts the formula to determine Nick's TSI learning rate for TWC: 7.5 (mean TWC) / 406 (average time in seconds engaged in TSI) X 60 (seconds) = 1.11. The results showed that CCC led to higher learning rates for all students when compared to TSI in all instances except one. David's learning rate for TWC in the TSI condition was slightly higher than the CCC condition. In terms of TWC, the highest learning rate was achieved by Gary in the CCC condition as he scored 2.18 TWC per minute of intervention time. The next highest learning rate was observed from Nick as he scored 2.00 TWC also during CCC. David's CCC and TSI learning rate for TWC was observed to be nearly equivalent. To show that the TSI condition was slightly more efficient for David, his respective learning rate values were expanded to the ten-thousandths decimal place (see Table 3).

In terms of CLS, the CCC intervention was found to be the most efficient as all four students scored higher on the words from the CCC list. Similar to the results above, the highest learning rate in terms of CLS was observed to be from Gary (18.98) during the CCC condition, followed by Nick who scored 17.02 CLS also during CCC. The highest learning rate in terms of CLS during the TSI condition was observed to be from Nick (9.46), followed by Gary (8.15).

Table 2

Mean Time to Completion (in seconds) for Cover, Copy, and Compare (CCC) and Taped Spelling Intervention (TSI)

Participant	CCC	TSI
Nick	209.70	406
Gary	203.50	406
David	416.88	406
Barry	293.10	406

Table 3

Learning Rate by Intervention per Student

Participant	TWC		CLS	
	CCC	TSI	CCC	TSI
Nick	2.00	1.11	17.02	9.46
Gary	2.18	0.68	18.98	8.15
David	0.3065	0.3147	4.41	4.19
Barry	1.23	0.53	11.67	7.24

Maintenance Assessment

A maintenance assessment was administered to the students to determine if gains that were made during the intervention phase would be maintained up to 2 weeks after the final intervention day (See Table 4). The maintenance assessment was administered 14 days after the final intervention day for Nick and David, 15 days later for Barry, and finally, 16 days later for Gary.

Table 4

Maintenance Assessment TWC and CLS by Condition per Student

	Total Words Correct			Correct Letter Sequences		
Student	CCC	TSI	Control	CCC	TSI	Control
Nick	9 (0)	10 (0)	0 (0)	72 (21)	75 (31)	27 (38)
Gary	8 (1)	5 (2)	0 (NB)	71 (42)	56 (42)	34 (NB)
Barry	8 (1)	5 (0)	0 (0)	69 (32)	53 (32)	29 (23)
David	4 (0)	6 (0)	0 (NB)	42 (7)	46 (6)	9 (NB)

Note. Value in ( ) indicates baseline score. "NB" indicates no baseline score.

Nick continued to display mastery on the maintenance assessment as he scored 100% TWC on words from the TSI list and 90% TWC on words from the CCC list. He did not spell any of the control list words correctly on the maintenance assessment and neither did any of the other students. David's TWC actually increased on the words from the TSI list when his

performance on the maintenance assessment (TWC= 6) was compared to his performance on the final daily spelling probe (TWC= 5). However, his CCC TWC decreased (from 6 TWC to 4 TWC). Gary's TWC decreased on words from the intervention lists (TSI: from 8 to 5 TWC; CCC: from 9 to 8 TWC) when comparing his maintenance assessment score to his performance on the daily spelling probe on the final intervention day. It should be noted that, due to a school absence, he experienced the longest break between the final intervention day and the maintenance assessment at 16 days. Similar to Gary, Barry's TWC decreased on words from the intervention lists (TSI: from 8 to 5 TWC; CCC: from 10 to 8 TWC) when comparing his maintenance assessment score to his score on the spelling probe on the final intervention day.

Nick's performance on CLS remained high during the maintenance assessment for words from the CCC (72 CLS) and TSI (75 CLS) lists. His control list CLS (27) on the maintenance assessment decreased when compared to his three intervention phase control list spelling probes (38, 30, 31). For Barry and Gary, who experienced the longest break between the final intervention day and the maintenance assessment, their CLS decreased on words from both intervention lists. Barry's CLS during the CCC condition decreased by six when his final daily spelling probe was compared to the maintenance assessment. His CLS during the TSI condition decreased by 13 when his final daily spelling probe was compared to the maintenance assessment. Gary's CLS score decreased by two CLS during the CCC condition from the final daily spelling probe to the maintenance assessment. His CLS score decreased by 11 CLS during the TSI condition from the final daily spelling probe to the maintenance assessment. Barry's control list CLS decreased (from 33 to 29 CLS) while Gary's control list CLS remained the same (34 CLS) from the final daily spelling probe to the maintenance assessment. When the maintenance assessment was compared to the final daily spelling probe, David experienced a

slight increase in CLS on the TSI list (from 44 to 46 CLS) and a decrease in CLS on words from the CCC list (from 51 to 42 CLS). His control list CLS (9 CLS) on the maintenance assessment was the same as he scored on the final intervention day.

Student Acceptability

Research question 4

Will Cover, Copy, and Compare (CCC) or the Taped Spelling Intervention (TSI) have a higher student acceptability rating?

Student acceptability data were gathered regarding CCC and the TSI (See Table 5). A student acceptability form was developed and written at a readability level that was appropriate for the participants, and the form was read aloud to the students. All four students indicated that they preferred CCC over the TSI, which differed from this researcher's hypothesis. One of the four students acknowledged that both interventions helped him learn to spell words, but all four indicated that they would continue to use the CCC intervention over the TSI. Three of the four students indicated that, as a result of participating in the study, they spell more words right than they did before. All four students agreed that learning to spell using CCC was fun, but none indicated that learning to spell using the TSI was fun. All four students indicated that they believe they learned to spell more words using CCC. All four students reported that they would continue to use CCC when learning to spell, while three of the four stated that they would not continue to use the TSI when learning to spell. When asked if they would recommend the use of the TSI to their friends, two students reported that they would not, one student indicated that he would, and the fourth student stated "maybe." Refer to the discussion section for further exploration of the students' experiences with both interventions.

Table 5

Student Acceptability Responses

	Nick	Gary	David	Barry
1. I believe that I spell more words right now than before.	T	F	T	T
2. Learning to spell using the TSI was fun.	F	F	F	F
3. Learning to spell using CCC was fun.	T	T	T	T
4. I will continue using CCC when learning to spell.	T	T	T	T
5. I will continue using the TSI when learning to spell.	M	F	F	F
6. I believe that I learned to spell more words using CCC.	T	T	T	T
7. I believe that I learned to spell more words using the TSI.	M	F	F	F
8. I would recommend using CCC to my friends.	T	T	T	T
9. I would recommend using the TSI to my friends.	M	T	F	F

Note. T = True F = False M= Maybe

Treatment integrity

A treatment integrity worksheet (See Appendix B) was implemented that included a checklist consisting of the procedural steps needed to implement the interventions as intended. An independent observer completed the treatment integrity worksheet for 20% of the study's intervention sessions. Treatment integrity was observed to be 100% over the course of the study indicating that the procedures of the study were followed as intended.

Interscorer agreement

An independent observer reviewed 25% of the spelling probes that were administered over the course of the study. Interscorer agreement for TWC and CLS respectively was calculated by dividing the number of agreements by the number of agreements plus disagreements multiplied by 100. Across the spelling probe assessments, interscorer agreement was observed to be 100% for TWC and 100% for CLS.

CHAPTER V

Discussion

For those educators who teach struggling spellers, identifying spelling interventions that are practical and effective is important. As discussed in more detail earlier, traditional methods of spelling instruction are not effective for all learners (Johnson, 1998; Schlagal, 2002). Traditional spelling instruction tends to be phonics-based with little focus on students evaluating their own work. Students diagnosed with learning disabilities in reading and writing are likely to struggle more than their non-disabled peers when learning to spell. These students may need spelling interventions other than or in addition to traditional spelling instruction. Developing and identifying academic interventions that are effective for the majority of learners including students with disabilities is a worthwhile endeavor.

The current study compared the Taped Spelling Intervention (TSI) and Cover, Copy, and Compare (CCC), two behavioral spelling interventions that share more similarities than differences. Both interventions can be self-managed by students meaning that they can be implemented with minimal teacher prompting. Additionally, TSI and CCC contain built-in error correction procedures where students correct their own mistakes immediately upon making the mistake. Each intervention includes high levels of opportunities to respond and positive reinforcement. These components, along with the simplicity of use, are believed to contribute to the effectiveness of the interventions.

This study included four male fifth-grade students receiving special education services due to identified learning disabilities in reading and writing. Their teachers indicated that these students had extensive spelling weaknesses and could benefit from additional spelling intervention. Traditional spelling methods have not been very successful for these students.

Many past studies have shown the effectiveness of CCC as an academic intervention, most often in the area of spelling, but also in other academic areas such as math, geography, and foreign language. Taped-problems studies, which the TSI has been adapted from, have also been found to be effective in the area of math fact fluency. Both interventions were compared in the current study to determine which of the two would be most effective for improving the spelling of these students with disabilities.

The Effectiveness of CCC and the TSI

The results of the current study found both CCC and TSI to be effective spelling interventions. In general, CCC was found to be more effective than TSI in terms of mean TWC and mean CLS. Additionally, rate of learning was faster for the students by way of CCC. Barry and Gary had higher mean TWC in the CCC condition, Nick scored higher in the TSI condition, and David scored the same between both conditions. Nick, who scored highest in the TSI condition, happened to also be the student with the highest overall cognitive ability (although still in the average range) among the four students. Future researchers may want to investigate if cognitive ability level, including an examination of the individual indices that make up overall IQ, is related to how well a student performs on either of the two interventions. In the current study, two of the students with average overall cognitive ability levels performed significantly better in the CCC condition. The student with borderline overall cognitive ability level scored low on both interventions, with neither intervention proving to be significantly more effective than the other. Future researchers may find that students with better developed cognitive ability levels would benefit from TSI more so than CCC, as was the case for Nick in the current study. It may be that the effectiveness of TSI is more pronounced for students with higher cognitive ability levels. If so, TSI may be an effective intervention for those students with specific

learning disabilities who tend to have cognitive ability levels in the upper limits of the average range or even in the high average range. This hypothesis warrants further exploration.

During the initial records review prior to the start of the study, as indicated above, the participants' overall cognitive ability scores were documented. This was done to determine if any relationship existed between the students' cognitive ability and their performance on each respective intervention. At the conclusion of the study, a subsequent records review was completed to identify the individual index scores that made up the participants' overall cognitive ability scores. This would give a more detailed picture of whether some aspect of the participants' cognitive ability, more so than what could be gleaned from the overall cognitive score, was related to their performance on the interventions.

A more comprehensive review of Nick's cognitive ability showed that his visual short-term memory skills were average and his verbal short-term memory skills were not as well developed. Interestingly, Nick scored higher on the intervention with the arguably stronger auditory component (TSI) when compared to his performance on the intervention with the arguably stronger visual component (CCC). Additionally, his visual analysis and synthesis skills were described as being above average, which would make sense considering his strong performance on the TSI. David's lowest cognitive ability index score was in the area of working memory, which might have been a contributing factor to his well below average performance on the daily spelling probes. However, his processing speed score was found to fall within the upper limits of the below average range (a personal strength for David), which seems to suggest that his depressed performance was not necessarily related to processing speed deficits. It should be noted that David received occupational therapy to address fine motor deficits, which could be a significant factor that contributed to his lower than average scores on the daily spelling probes.

Similar to David, Barry's working memory score was also observed to be the lowest when compared to his other cognitive ability index scores. It may be worthwhile to investigate if working memory skills are related to how well students perform on CCC and TSI. A review of Gary's individual index scores revealed average skills across the indices.

Regarding CLS, similar to the findings regarding TWC, Nick scored more CLS in the TSI condition, but the remaining three students' CLS was higher in the CCC condition. By the final intervention session (prior to the maintenance assessment), Nick and Barry scored 100% TWC and Gary scored 90% TWC in the CCC condition. David, who had the most extensive spelling deficits during baseline, scored 60% TWC in the CCC condition. While obtaining a 60% on a spelling test would still be considered as needing improvement in most classrooms, the rate of improvement this student showed from the first few days of the study to the last day was quite impressive. David presented with the lowest cognitive ability level among the four students, but was still able to benefit from the implementation of both interventions.

The students' TWC and CLS remained low in the Control condition over the course of the study, suggesting that the increase in spelling performance in the intervention conditions was due to the implementation of the interventions. None of the students spelled more than one word correct (out of 10) when probed on the control list.

Visual Examination of the Data: TWC

When examining the visual displays of the data, there was a definite increasing trend from baseline through the intervention and maintenance phases for each of the students between both CCC and TSI conditions. The baseline performance was extremely low as none of the students scored more than three words correct within any condition. Quite clear was that the students did not know how to spell the target words prior to the study. As mentioned earlier, the

study's procedures made sure to examine all of the fifth grade words that the students were exposed to as part of their spelling curriculum during the current school year, none of which were included in the study. A visual examination of the line graphs revealed that Nick experienced greater success faster in the TSI condition, but by session 6 of the study, his performance in the CCC condition was comparable. The visual depiction of Gary's spelling performance showed that he consistently performed better in the CCC condition. Both interventions showed an increasing trend, but the CCC intervention resulted in a steeper trend line when compared to the TSI, and Gary's CCC performance remained consistently high for most of the study. David's trend lines between the TSI and CCC were the most similar among the four students, and while there was an increasing trend, his performance was consistently lower than the other three students. Similar to Gary, Barry's performance via CCC resulted in a steeper trend line when compared to TSI, and he consistently performed better in the CCC condition. By intervention session 3, there was a sharp increase in Barry's CCC TWC, while his spelling performance in the TSI condition remained low. It was not until session 7 that Barry's TSI performance approached his CCC performance level. In summary, the implementation of the interventions resulted in increasing trend lines for each of the students, but there was some variability in terms of how quickly the students experienced gains and which of the two interventions was most effective for the students. For two of the students (Gary and Barry), CCC led to greater and faster improvements in terms of TWC when compared to TSI.

Visual Examination of the Data: CLS

In terms of CLS, Nick's results were comparable between the two interventions, but he experienced slightly greater performance gains in the TSI condition. His performance on the control list of words remained low throughout the study.. Gary experienced a sharper increase in

the CCC condition whereas his TSI performance was more of a gradual increase over the course of the study. His control list performance was low, but relatively consistent throughout the study. Similar to his performance on TWC, an examination of David's visual display of CLS data revealed comparable results between CCC and the TSI. He experienced a slow but steady increase in CLS in both intervention conditions. Due to motivational factors and school absences, David was only administered the control list of words twice, once during the final intervention day and then one final time during the maintenance assessment. His control list CLS was low on both administrations. An examination of Barry's CLS results showed similar trends between the two interventions, with his CCC performance somewhat stronger than his TSI performance. His CLS results on the control list of words first showed an increasing trend, but that was followed by a slight decrease in performance over the last two control list probes. In summary, a visual examination of the CLS data showed increasing trends in both intervention conditions, but for three of the four students, CCC led to slightly higher performance gains.

Learning Rate

In determining the effectiveness of an intervention, the rate at which students learn while engaged in an intervention is an important consideration. Interventions that lead to quick learning are more efficient than those that take longer to produce similar results. As such, learning rates were calculated for each intervention. In the current study, three of the four students spent significantly more time engaged in TSI when compared to CCC. As mentioned earlier, all students spent the same exact amount of time participating in TSI (406 seconds). Students progressed at a consistent rate that was set by the length of the audio recording. During the CCC condition, students progressed at their own rates and most finished with the intervention at a much faster rate than that of TSI (with the exception of David). It should be noted that during the first intervention session, the students spent an average of 565.5 seconds engaged in

the CCC intervention. By the final intervention session, the students spent an average of 182 seconds engaged in the CCC intervention. Of course, there was not an opportunity during TSI for the students to progress at a faster rate than what was predetermined by the audio recording. In addition to completing the CCC intervention at a faster rate than TSI, two of the students performed better in terms of TWC in the CCC condition when compared to TSI. Again, when CCC and TSI were compared, three of the four students performed better in terms of CLS. As such, the learning rates for CCC were found to be much higher than what was observed in the TSI condition. Considering the fact that the students were engaged in the procedures of the CCC condition for much less time than the TSI condition, coupled with the fact that higher performance gains were observed for the majority of the students under CCC, it is easy to understand why learning rates were higher for students under the CCC condition. This researcher hypothesized that learning rates would be higher in the TSI condition because he believed that the students would take longer to complete the steps of the CCC condition, and that higher performance gains would be observed in the TSI condition. Because this was not the case, the opposite result was observed. For Nick, who performed better in terms of TWC and CLS under the TSI condition, his learning rates under TSI were low when compared to CCC due to the amount of time Nick was engaged in each respective intervention.

At times, as will be discussed later, students made errors during the CCC condition that went unnoticed by them and resulted in the students not completing the required rewriting component of CCC, which would have extended the amount of time the students were engaged in the intervention. As such, the students at times did not complete all of the required steps of CCC, however, higher performance gains were still observed under CCC. It is possible that even higher performance gains would have been observed during CCC than what was found during

the current study if the students would have never failed to recognize instances when the required rewriting component should have been initiated. So even though the amount of time the students would have been engaged in the CCC condition may have increased, it is possible that learning rates would not have necessarily decreased because there is the potential that increased performance gains would have been observed. Future researchers should monitor students' progress during the CCC intervention to make sure that all required steps of the intervention are completed as indicated. It should be noted, however, that failing to recognize when an error was made during CCC was not a frequent occurrence and cannot be considered as a significant reason why learning rates were more pronounced during the CCC condition.

Treatment Integrity and Interscorer Agreement

An independent observer found that treatment integrity was 100% for the 20% of the study's intervention sessions that were observed. Procedures were conducted as intended and as indicated on a treatment integrity checklist that was developed by the examiner. It was the independent observer who indicated during a session where treatment integrity was being examined that the TSI procedure in the current study differed slightly from the McCallum et al. study. She indicated that the students in the McCallum study had approximately one or two more seconds to produce their self-responses during TSI than what was provided to the participants in the current study. This was due to the fact that in the McCallum study, after hearing the word provided by the audio recording and following the 8-second pause, the word was repeated before it was dictated letter-by-letter and then it was repeated again. In the current study, the word was not repeated before it was dictated by the audio recording letter-by-letter, nor was it repeated again following the correct spelling of the word. This is an important difference that future researchers may want to take note of when designing similar studies,

because the students' TSI performance may have been higher if not for this slight difference between the two studies.

Regarding interscorer agreement, an independent scorer reviewed 25% of the spelling probes that were administered over the course of the study and found there to be 100% agreement with the scoring conducted by this researcher. Scoring of CLS requires some training and more time than the scoring of TWC in order to obtain accurate results. Also, when administering the daily spelling probes to the students, researchers will want to write down each word that is being presented to the students so that researchers will not have difficulty with figuring out which words students are attempting to spell. Because index cards containing the spelling words were shuffled to determine the word order presented to the students on the spelling probes, a different word order was presented each time a student was probed so the resultant word order should be noted and referred to when scoring the spelling probes.

The TSI Technology Factor

A major difference between CCC and TSI was the materials needed to implement the interventions. The TSI incorporated the use of technology through the use of "smartphones" or other audio devices, while CCC was implemented with just paper and pencil. During the current study, the researcher used the voice memo feature of an *iPhone* in order to implement TSI. The "beat the clock" component of TSI where the student had to spell the word before it was provided by the audio recording may be a significant factor in the intervention's effectiveness. However, the students in the current study made it clear that they did not believe they had enough time to respond during pauses in TSI. Adding one or two more seconds of response time may have resulted in greater performance from the students than what was observed. Some consideration should be given to this "beat the clock" factor when using TSI. It is possible that

students with only minor spelling deficits could do well on TSI with a shorter time interval to record their responses. Students with more moderate to severe spelling deficits, and/or those with processing speed limitations, would likely benefit from affording them a few more seconds of response time.

Another difference between TSI and CCC was that, during TSI, students heard the spelling words presented by the *iPhone* prior to their attempts at spelling the words. During CCC, the students relied on their own ability to "sound-out" the words, if they decided to "sound-out" the words at all, presented to them on the "follow-along" sheets. Of course, the students could have chosen to not "sound-out" the words during CCC, or could have even "sounded-out" the words incorrectly prior to attempting to spell the words. As described earlier, Mann et al. (2010) found that using CCC in combination with a "sound-out" strategy resulted in higher posttest spelling accuracy for typically developing students when compared with traditional CCC. It became clear that when using CCC, the students attempted to visualize the word when the model word was covered. The students only needed to keep the visual of the model word in their working memory for a few seconds in order to reproduce the correct spelling of the word in written form on the CCC "follow along" sheet. The students seemed to experience success using this visualization technique during CCC. While mistakes were made early during the study, review of the CCC "follow along" sheets revealed that the students generally made fewer mistakes on the CCC "follow along" sheets as the study progressed. More mistakes were generally made on the TSI "follow along" sheets, and again, this could have been a function of not having enough time to write their responses.

To summarize, TSI in essence audibly provides spelling words for students prior to their initial spelling attempts, which may be an important factor. However, teachers "sound out"

spelling words for students each week when administering traditional spelling tests and this does not necessarily lead to improved spelling from their students. Maybe students with better developed phonological processing skills would benefit from the verbal component of TSI. Also, students with well-developed visual memory might benefit from the visual component of CCC. Nonetheless, it may be interesting for future researchers to compare CCC using a "sound out" procedure versus TSI to determine the most effective intervention component for different students.

Student Acceptability

Over the course of the study, the students anecdotally expressed their preference for CCC over the TSI to the researcher. It became clear while observing the intervention sessions that the students felt less stressed during CCC, and were more successful on their initial spelling attempts when compared to TSI. During CCC, a student with average to well-developed short-term visual memory likely has the ability to hold the image of the correct spelling of the word in mind while subsequently transferring the correct spelling of the word to paper. Even David, who averaged just over two words spelled correctly on probes over the course of the study, averaged 17 words spelled correctly (out of 20) on his initial attempts during the CCC intervention while using the "follow along" sheets. The "follow along" sheets for both interventions were examined to determine the percentage of time that the students' initial responses were spelled correctly.

Students were also observed to overlook or neglect the fact that they spelled their initial self-attempt on the CCC intervention incorrectly, yet the students continued to progress as if they spelled the word correctly. The same phenomenon was also observed on a few occasions during TSI, but not to the same extent. More often than not, this appeared to be not due to willful neglect, but due to not realizing that their attempt was spelled incorrectly. During these

instances, the students did not engage in the required rewriting component of the CCC intervention. The students were reminded on subsequent days to pay close attention to the accuracy of their initial spellings. The students realized that they were being timed when completing the CCC "follow-along" sheets, which may have caused them to work faster than they may have otherwise, and could have contributed to careless mistakes.

The Benefit of Opportunities to Respond (OTR)

Students that are provided with high rates of OTR are known to experience improved academic performance and a reduction in disruptive behaviors (Haydon et al, 2009; Sutherland et al, 2003). A high rate of OTR is an important component of both CCC and TSI. From the moment each intervention session started, the students were actively engaged in the procedures of the interventions from the first spelling word through the last on the "follow-along" sheets. The structure of the interventions was such that there were not a lot of opportunities for students to become off-task as they were expected to provide a response (in the form of a written spelling word) every few seconds during both procedures.

Frequent and consistent repetition of academic material is an effective strategy when teaching students with and without disabilities (Burns, 2007; Haydon et al., 2009; Sutherland et al., 2003). During both interventions, students were taught to copy correct answers while referencing models. The CCC procedure had the student copying the model word three times after an initial error was made. If an error was not made on a word during CCC, the student did not engage in the self-correction procedure. Instead, the student provided herself with reinforcement usually in the form of a "checkmark" and attempted the next word. The TSI procedure had the student copying the correct spelling of the word following her own attempt while hearing the correct spelling presented letter-by-letter on the audio recording. After the

student transcribed the correct spelling of the word during TSI, the student compared it against the word that she produced on her own. As such, during the TSI procedure, students copied the correct spelling of the model word one time even if the student spelled the word correctly on the initial attempt. Therefore, the maximum amount of times that a student may have written a particular spelling word varied between the two interventions: a maximum of four times per word during CCC and a maximum of two times per word during TSI. While past research has found that increasing the amount of times a word is copied does not necessarily lead to better spelling (Erion et al., 2009), this difference between the two interventions cannot be ruled out as an important factor influencing the results.

Immediate Self-Correction

A major benefit of error self-correction procedures is that errors are caught early and students do not spend time practicing errors. Students immediately self-corrected errors during CCC and the TSI. A study described earlier found that self-correcting after each word proved to be more effective than self-correcting after an entire list of words (Alber & Walshe, 2004). As in the Alber and Walshe study, students self-corrected errors immediately after each word during TSI and CCC. By finding out if they spelled each word correctly prior to spelling the next word, the student could direct her entire focus on the word that she was currently spelling. Otherwise, she may still have been thinking about her response on the previous word while actively spelling the next new word.

Practical Implementation of CCC and TSI in Classrooms

A benefit of CCC is the simplicity of the intervention, especially in terms of the few materials needed. Once the spelling words are selected, the intervention only requires paper and a pencil. The student could decide whether she would like to cover the model word with her

hand or use some other item such as an index card or a folded column of the "follow-along" sheet. While TSI is also simple, more effort was needed in terms of time and materials. Audio files needed to be created and a media device (with or without headphones/ear buds) was needed to play the audio files. That being said, the creation of the audio files did not take very long. When the spelling words were selected, the actual time needed to create each audio file took no more than a few minutes depending on the number of words to be added. Both interventions and the procedures involved were easy to understand and implement for the teachers and students, which increased the likelihood of acceptable levels of treatment fidelity and integrity. As mentioned earlier, once the students were taught the procedures involved for each intervention, the students could implement the interventions without teacher prompting. The only caveat to consider is that some students who may have a tendency to become off-task may need an adult nearby to make sure they are progressing effectively through the steps of each intervention.

Limitations

Only four male students (3 Caucasian and 1 African-American) participated in the study, which limited the external validity of the results to other populations. This study included fifth-grade students who were diagnosed with specific learning disabilities in both reading and writing. With the exception of participants who had comorbid speech or language impairments, students with other disability types (i.e., autism, emotional disturbance, etc.) were not included in the study. Also, students who had spelling deficits, but were not identified as having a disability were not included in the study. Future researchers should investigate the effectiveness of both interventions on a wide range of students of varying ages and disability status.

Another limitation is that some students may have studied the words outside of the intervention procedures even though they were specifically instructed not to do so, which could

have resulted in multiple treatment interference. Multiple treatment interference can occur when the administration of more than one treatment to one individual could lead to error variance in the data (McGonigle, Rojahn, Dixon, & Strain, 1987). In this case, it would be difficult to establish a cause and effect relationship between the intended variables. As such, it is possible that the improvement in spelling the students experienced may have been the result of their studying the words at home, and not necessarily due to the interventions.

An additional limitation was the fact that David was not administered the control list spelling probe until the final intervention day of the study. Optimally, he should have been assessed on the control list of words on the first day of the study prior to the interventions. David showed visible signs of frustration while attempting to spell the 20 words from the intervention lists during the first spelling probe of the study. Instead of having David continue to experience frustration by probing him on the 10 control list words, this researcher determined that there would be little benefit in asking him to spell these words at that time.

Future Considerations

Some students may have difficulty following the required procedures of the interventions without supervision. For example, the procedure for the CCC intervention requires the student to cover the model word before she attempts to spell the word. For some students, they may attempt to simply write the word while looking at the correct prompt. This was observed to be the case on at least a few occasions during the initial training sessions. While the self-management component of both interventions is one of the most attractive features of the procedures, at least some level of staff oversight is likely needed to ensure treatment fidelity. Some students were observed leaving a tiny fraction of the top of the word exposed, which prompted this researcher to remind the students to cover the entire word. Also, in order to avoid

the rewriting component of CCC, some students may have been tempted to look at the word while composing their self-attempt. The students were also reminded that following the procedures exactly as intended would most effectively help the students improve their spelling. A similar problem may arise during TSI if the student simply copies the correct spelling of the word as it is dictated letter-by-letter from the audio device, rather than making an attempt to spell the word independently prior to the audio feedback. However, it should be noted that this was rarely, if ever, observed during the current study. As indicated earlier, some students might need more time to respond during the TSI as 8-seconds might not be enough especially for students who have great difficulty writing. Future researchers may want to administer a sample TSI in order to gain information regarding the students' ability to provide an adequate response within a given period of time.

Administering the daily spelling probes to the students followed by the interventions may fatigue the students and result in lower student acceptability ratings. Future research should consider whether daily spelling probes should be administered on separate days from the interventions. On days when the control condition was assessed during the daily spelling probes, the students were tested on 30 total spelling words. Following the daily spelling probes, students were then expected to attempt 40 spelling words on their own as part of the CCC (10 words on front page, same 10 words on back page) and TSI (10 words on front page, same 10 words on back page). When mistakes were made, students could have ended up writing a maximum of 80 additional words. This procedure may be too tedious for students who are already identified as having specific learning disabilities in reading and writing. Some consideration may be warranted to reduce the amount of writing that is required especially during CCC, as students are required to copy words three times per mistake that is made. It is possible that two rewrites

would accomplish the same intervention effects as CCC procedures requiring three rewrites. However, it should be noted that by the second half of the study, students rarely made mistakes on the CCC "follow-along" sheets; therefore, they infrequently engaged in the three rewrites component of CCC.

Rather than comparing the interventions with a control condition, future investigations may wish to compare CCC and/or TSI with a traditional spelling approach. Additional conclusions could be made regarding the effectiveness of the interventions if the results were compared with a traditional spelling approach where some type of instruction was taking place. When comparing CCC and TSI with a traditional spelling approach rather than with a control condition, more meaningful conclusions can be reached regarding the need for alternative approaches to traditional methods of spelling instruction.

During the current study, the participants indicated that they liked being able to see the word for a few seconds before attempting their self-attempt when engaged in the CCC intervention. A slight modification to the TSI where a visual component would be added could make the intervention more socially acceptable to the students and it may result in greater performance gains. In addition to the standard TSI procedure, the modification could include a brief one or two second visual of the word being displayed on the media device at the same time that the word is audibly presented to the student. The remainder of the procedure would remain the same. Of course, the media device would need to be equipped with video capability. Future studies could compare TSI with a visual component to standard TSI or with CCC. It would be interesting to learn whether or not the addition of the visual component increases the students' performance gains and leads to greater social acceptability.

When determining the length of the pause to be used during TSI, future researchers may want to take students' cognitive ability including processing speed skills into account. It is possible that a longer pause may have reduced the level of anxiety that the students experienced during TSI, which could have resulted in greater spelling performance. The students had less time to write during the current study than was the case during the McCallum et al. (2014) study. In the McCallum study, after the 8-second pause, the audio recording repeated the word prior to dictating the correct spelling letter by letter, and then repeated the word once more. The current study did not include the additional two repetitions of the words. By repeating the word two times, the students in the McCallum study in essence had approximately two extra seconds to provide their written responses. In addition, repeating the word prior to dictating the correct spelling letter by letter, likely prompted the students to finish up their self-attempt and to move to the second line where they knew to copy the correct spelling letter by letter. Replicating the exact procedures used in the McCallum study could have resulted in higher mean TWC and CLS during the TSI condition in the current study.

All of the students made gains during the course of the study. However, Nick and Gary performed significantly better than Barry and David. While Barry will likely continue to make great progress with continued intervention, David may need more remediation in order to reach mastery. Certainly, the pause interval during TSI where the student is required to provide a self-attempt would need to be lengthened for David. While his processing speed index score was found to be just below the average range when a records review was completed, the eight second fixed time interval did not seem to be enough time for David to formulate adequate responses.

Future researchers should consider the benefit of developing additional academic interventions that include components of self-management, immediate error correction, high

levels of opportunities to respond, and positive reinforcement. The TSI and CCC include each of these components. Teaching students to progress through the steps of an intervention with minimal prompting needed from teachers may increase the students' sense of self-efficacy and self-esteem. Simply increasing a student's opportunities to respond to academic prompts has been shown to increase academic achievement and on-task behavior (Burns, 2007; Haydon et al., 2009; Sutherland et al., 2003). This was found to be the case during the current study as the students increased their spelling skills and complied with all directives. When students are not actively engaged in academic tasks, they are more apt to become inattentive and disinterested in the content being delivered in the classroom. In the current study, each student was prompted to make a response on his own prior to observing the correct response. As such, the students were not tasked with mindlessly copying the correct answer without first attempting to provide a correct response on their own. While rehearsal strategies are important when learning new content, teaching students to be active participants in their learning can help the material become more meaningful and therefore more memorable. The participants in the current study showed visible signs of satisfaction when they learned that responses they produced were correct. This was especially true on words that they deemed to be very difficult, which was the case with the word "frequency," for example. If the students were never asked to spell the words on their own, they would not have had the opportunity to experience the amount of success that they did throughout the current study.

Conclusions

The academic interventions compared in this study were found to improve the spelling skills of students with learning disabilities in reading and writing. This is significant because students with disabilities are more likely to struggle with academic tasks and require more

intensive academic interventions than their non-disabled peers. Prior to the study, these students were identified by their teachers as having extensive spelling deficits. Expanding the menu of effective academic interventions offers teachers more options when determining how to address their students' academic needs.

Previous research has shown the effectiveness of CCC as a spelling intervention. Similar to the McCallum et al. (2014) study, the results from the current study indicate that TSI leads to increased spelling performance from students. While CCC was found to be the most effective when comparing the two interventions, both led to significant spelling gains for the study's participants. The student who spelled the most words correctly over the course of the study learned more words via the TSI. As mentioned earlier, it is possible that students with higher cognitive ability find more success with the TSI when compared to CCC.

The ability to spell effectively increases an individual's ability to communicate and interact with the world around her. An effective speller can complete job and college applications, and stands a better chance of being successful in school and the workplace. Hopefully, research will continue in this area and more interventions will be developed that can help students find success with spelling.

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APPENDIX A

SPELLING LISTS AND CORRECT LETTER SEQUENCES (CLS) PER WORD

List A	*CLS*	*List B*	*CLS*	*List C*	*CLS*
stomach	8	bravery	8	adventure	10
anybody	8	trotting	9	habit	6
critic	7	citizen	8	cocoa	6
decisive	9	barefoot	9	radiant	8
grumble	8	chose	6	backward	9
apply	6	frequency	10	unknown	8
suffix	7	sewn	5	swept	6
worthless	10	heavier	8	term	5
dwell	6	insist	7	portion	8
boats	6	pump	5	disposal	9
Total CLS	75		75		75

List A: CCC
List B: TSI
List C: Control

APPENDIX B

TREATMENT INTEGRITY CHECKLIST

Cover, Copy, and Compare (CCC)

1. ____ Provide students with pencils and index cards.
2. ____ Provide students with CCC "follow along" sheets.
3. ____ Read the CCC script/directions to the students.
4. ____ Instruct students to begin the procedure.
5. ____ Begin timing the students.
6. ____ Prompt students to continue working, if needed.
7. ____ As each student finishes, stop timing and record time of completion.
8. ____ Collect CCC "follow along" sheets and index cards.

Taped Spelling Intervention (TSI)

1. ____ Provide students with pencils.
2. ____ Provide students with TSI "follow along" sheets.
3. ____ Read the TSI script/directions to the students.
4. ____ Inform students that the procedure will now begin. Press "play" on the intervention audio file on the *iPhone*.
5. ____ When the audio playlist ends and all students are finished writing, collect TSI "follow along" sheets.

APPENDIX C

STUDENT ACCEPTABILITY QUESTIONNAIRE

1.	I believe that my spelling improved during this experience.	T	F
2.	Learning to spell using the TSI was fun.	T	F
3.	Learning to spell using CCC was fun.	T	F
4.	I will continue using CCC when learning to spell.	T	F
5.	I will continue using the TSI when learning to spell.	T	F
6.	I believe that I learned to spell more words using CCC.	T	F
7.	I believe that I learned to spell more words using the TSI.	T	F
8.	I would recommend using CCC to my friends.	T	F
9.	I would recommend using the TSI to my friends.	T	F

APPENDIX D

SPELLING PROBE AND INTERVENTION SCRIPTS

Spelling Probe Script:

I have provided you with a sheet of paper. Write your name and today's date on the lines provided at the top of the page. Today's date is (provide current date). You will be asked to write a series of spelling words that I will present to you orally one at a time. I will say the number of the word, followed by the word, and then I will repeat the word once more. Do your best to spell each word correctly even if you are not sure of the correct spelling. This procedure will be repeated until all of the spelling words have been presented. Today, you will write (20 or 30 words). Do you have any questions? Let's begin.

Note: Thirty words will be assessed when the control list of words is given. Twenty words will be assessed when the control list of words is not given.

Cover, Copy, and Compare (CCC) Script:

I have provided you with a worksheet with spelling words on the front and back. At the top of the page, write your name and today's date. I want you to use cover, copy, and compare to write the spelling words. Remember, use the index card I provided you with to cover the word you are working on. Then attempt to spell the word on your own on the first line. When you are finished spelling the word, uncover the word and compare it to what you have written. If you spelled the word correctly, give yourself a checkmark. If you did not spell the word correctly, rewrite the correct spelling of the word three times using the additional blank lines. When you complete the front of the page, turn the worksheet over and continue on the back page until you have finished with the last word. Let me know when you have finished. Do you have any questions? Begin.

Taped Spelling Intervention (TSI) Script:

I have provided you with a worksheet that you will use to spell words. At the top of the page, write your name and today's date. When I press play on the *iPhone*, a list of spelling words will be read to you one at a time. After a word is presented to you on the *iPhone*, try to write the correct spelling of the word on the first line next to the number given. You will only have a limited amount of time to write the word, so work as quickly as you can. When you hear the correct spelling of the word read aloud letter-by-letter from the *iPhone*, use the second line to copy the correct spelling. Compare the word you spelled with the word you copied letter-by-letter. If you find that you spelled the word correctly, give yourself a checkmark next to the word you first wrote. If you find that you spelled the word incorrectly, give yourself a checkmark after the word that you copied letter-by-letter. Do you have any questions? Ready? Begin.

APPENDIX E

INTERVENTION SCHEDULE

Session 1: *Collect child assent 1. Probe A 2. Probe B 3. Probe C 4. CCC A 5. TSI B	Session 2: 1. Probe B 2. Probe A 3. TSI A 4. CCC B	Session 3: *Treatment Integrity 1. Probe A 2. Probe B 3. CCC A 4. TSI B	Session 4: 1. Probe B 2. Probe A 3. TSI A 4. CCC B	Session 5: 1. Probe A 2. Probe C 3. Probe B 4. CCC A 5. TSI B
Session 6: 1. Probe B 2. Probe A 3. TSI A 4. CCC B	Session 7: 1. Probe A 2. Probe B 3. CCC A 4. TSI B	Session 8: *Treatment Integrity 1. Probe B 2. Probe A 3. TSI A 4. CCC B	Session 9: 1. Probe A 2. Probe B 3. Probe C 4. CCC A 5. TSI B	Session 10: 1. Probe B 2. Probe A 3. TSI A 4. CCC B *Student Acceptability Form *End of Intervention
Session 11: Maintenance 1. Probe A 2. Probe C 3. Probe B				

Probe A = CCC
Probe B = TSI
Probe C = Control

APPENDIX F

Daily Spelling Probe (w/Control set)

Name_____ **Date**_____

1. _____ 16. _____
2. _____ 17. _____
3. _____ 18. _____
4. _____ 19. _____
5. _____ 20. _____
6. _____ 21. _____
7. _____ 22. _____
8. _____ 23. _____
9. _____ 24. _____
10. _____ 25. _____
11. _____ 26. _____
12. _____ 27. _____
13. _____ 28. _____
14. _____ 29. _____
15. _____ 30. _____

	CCC	TSI	CNTL	Total
TWC				
CLS				

Cover, Copy, and Compare (CCC)
Follow-Along Sheet: Version A

Name _____ **Date** _____ **Session** _____ **of 10**

1.	decisive	_____ :	_____	_____	_____
2.	dwell	_____ :	_____	_____	_____
3.	stomach	_____ :	_____	_____	_____
4.	boats	_____ :	_____	_____	_____
5.	anybody	_____ :	_____	_____	_____
6.	apply	_____ :	_____	_____	_____
7.	worthless	_____ :	_____	_____	_____
8.	critic	_____ :	_____	_____	_____
9.	grumble	_____ :	_____	_____	_____
10.	suffix	_____ :	_____	_____	_____

APPENDIX H

Taped-Spelling Intervention (TSI)
Follow-Along Sheet: Version A

Name _____ **Date** _____ **Session** _____ **of 10**

1. _____ _____
2. _____ _____
3. _____ _____
4. _____ _____
5. _____ _____
6. _____ _____
7. _____ _____
8. _____ _____
9. _____ _____
10. _____ _____

APPENDIX I

DUQUESNE UNIVERSITY
600 FORBES AVENUE ♦ PITTSBURGH, PA 15282

December 2, 2014

Dear Parent or Guardian,

My name is Elizabeth McCallum and I am a professor within the School of Education at Duquesne University. My colleague Mr. Menas Zannikos and I will be conducting a research study in your child's school in which your child is eligible to participate. Mr. Zannikos is a Pennsylvania Certified School Psychologist who is employed as a Special Education Supervisor within your child's school district, as well as a candidate for the doctoral degree in School Psychology at Duquesne.

The purpose of the project is to analyze and compare the effects of two evidence-based instructional techniques for teaching spelling. If your child participates, he or she will be included in up to 11 brief spelling instructional sessions on consecutive school days. To compensate your child for participation, we will provide each student with a $25 Barnes and Noble gift card at the conclusion of the study. Your child is under no obligation to participate and you or your child may withdraw from participation at any time during the study procedures.

The attached form outlines the specifics of the study procedures. If you decide to allow your child to participate, please sign and return the enclosed form to your child's teacher.

Thank you for your consideration. Please feel free to contact me if you have questions or require further information.

Elizabeth McCallum, PhD
102 B Canevin Hall
Duquesne University
Pittsburgh, PA 15282
mccallume@duq.edu
(412) 722-6410

APPENDIX J

DUQUESNE UNIVERSITY
600 FORBES AVENUE ♦ PITTSBURGH, PA 15282

PARENT PERMISSION FOR CHILD TO PARTICIPATE IN A RESEARCH STUDY

TITLE: **COMPARING TWO INTERVENTIONS FOR INCREASING SPELLING ACHIEVEMENT IN SCHOOL-AGED CHILDREN**

INVESTIGATORS:

Elizabeth McCallum, Ph.D.
Duquesne University
102B Canevin Hall
412-396-1874

Menas Zannikos, M.S.Ed.
902 Stevendale Drive
Pittsburgh, PA 15221
412-337-3921

SOURCE OF SUPPORT: This study is being performed in partial fulfillment of the requirements for the doctoral degree in School Psychology at Duquesne University.

PURPOSE: Your child has the opportunity to take part in two spelling procedures that aim to improve his or her spelling skills. The Taped Spelling Intervention (TSI) is a procedure that involves students listening to audio recordings of spelling words followed by pauses, and then the words' correct spellings. Students are given follow-along sheets and asked to try to "beat the recording" by writing the correct spelling to each word before it is heard on the recording. Cover, Copy, and Compare (CCC) is a procedure that involves students looking at a spelling word, covering each word and trying to copy it in a blank space, and then comparing the two spellings. We are asking your permission to allow your child to participate in this study that will help us to compare the effectiveness of TSI and CCC at improving the spelling performance of students.

PROCEDURES: Your child's participation in this study will involve the following:

1. Completing an assent form giving his/her permission to participate in this study.
2. Participate in up to 11 sessions of group spelling instruction, each lasting approximately 20 minutes. We will work with your child's teacher to choose times for the spelling sessions that are least disruptive to your child's school activities.
3. Complete a brief questionnaire giving his/her opinions about the two spelling techniques.

Beyond providing written permission on this form, additional parent participation is not needed.

If you decide to provide permission for your child's participation in this study, we will also ask you to allow us to access your child's cumulative and special education files to obtain background information (e.g., gender and racial/ethnic identity) and previous educational test results in order to determine the effectiveness of the procedures with students with varied demographic and educational backgrounds.

RISKS AND BENEFITS:

Benefits of the current study include comparing the effectiveness of these two established spelling instructional techniques. This knowledge will allow educators to make informed decisions when choosing instructional strategies.

The risks associated with this type of study are minimal and no greater than every day school activities. If however, your child experiences uneasiness during participation in this study, your child's teacher will be notified and supportive counseling will be made available by the researchers.

COMPENSATION:

Students who participate in this study will receive a $25 gift card to a local book store. If your child withdraws early from the study, he or she will still receive the compensation.

CONFIDENTIALITY:

All information learned in this study will be kept confidential. If you grant us permission for your child to participate in this study and to use your child's spelling performance data, we will keep all documented information, like how well your child did on the spelling sheets, stored in a locked file in the researcher's office. Your child's performance will be marked down with that of everyone else who participated in the study. When we have all of the spelling information collected, we will blacken your child's name off of all materials and replace your child's name with a number. No identifying information will be included in data analyses or any publications of this research. All written materials and permission/assent forms will be stored in a locked file in the researcher's office. When we are completely done with the study, we will destroy all these materials.

RIGHT TO WITHDRAW:

Your child is under no obligation to participate in this study. Your child may withdraw from the study at any time simply by letting the

researcher or teacher know he or she is no longer willing to participate.

SUMMARY OF RESULTS: A summary of the results of this research will be supplied to you, at no cost, at your request.

VOLUNTARY CONSENT: I have read the above statements and understand what is being requested of me. I also understand that my child's participation is voluntary and he or she can stop participating at any time. On these terms, I certify that I am willing to allow my child to participate in this study and for the researchers to use his or her spelling performance data within this research project.

I understand that, should I have any further questions, about my participation in this study, I may call the Principal Investigator, Dr. Liz McCallum (412-722-6410) or Dr. Linda Goodfellow, Chair of the Duquesne University Institutional Review Board (412-396-6548).

_____ _____

Parent's signature Date

_____ _____

Researcher's signature Date

APPENDIX K

DUQUESNE UNIVERSITY

600 FORBES AVENUE ♦ PITTSBURGH, PA 15282

CHILD ASSENT TO PARTICIPATE IN A RESEARCH STUDY

TITLE: **COMPARING TWO INTERVENTIONS FOR INCREASING SPELLING ACHIEVEMENT IN SCHOOL-AGED CHILDREN**

INVESTIGATORS:

Elizabeth McCallum, Ph.D.
Duquesne University
102B Canevin Hall
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Menas Zannikos, M.S.Ed.
902 Stevendale Drive
Pittsburgh, PA 15221
412-337-3921

SOURCE OF SUPPORT: This study is being performed in partial fulfillment of the requirements for the doctoral degree in School Psychology at Duquesne University.

PURPOSE: We are asking you to participate in a project that will use two new ways of teaching spelling. The first method involves you listening to audio recordings with spelling words and their correct spellings. You will be asked to try to write the correct spellings before they are spoken on the recordings. For the second method, you will be asked to look at spelling words, cover them up, then try and write the correct spellings without looking. Then you will compare your spelling to the original spelling and make corrections if needed. Signing this paper means that you are agreeing to participate in this study and to let us use your spelling scores to find out if these ways of teaching spelling help students learn better.

You are being asked to do the following:

1. Participate in two methods of spelling instruction. The spelling instruction will take place for about 20 minutes a day for up to 11 school days. You will be receiving instruction in a small group (no more than 10 students) during each session. Your teacher will help us find a time for the sessions that will be least disruptive to your school activities.
2. Let us use your scores on spelling tests to see if these new ways of teaching spelling work and to compare them to each other.
3. Complete a short questionnaire giving us your opinions of these two spelling instructional methods.
4. Also, we are asking if we can access your educational records from your teachers in order to tell us more information about you.

DUQUESNE UNIVERSITY
600 FORBES AVENUE ♦ PITTSBURGH, PA 15282

RISKS AND BENEFITS: If you participate in this study, you could help us learn if using spelling recordings and spelling worksheets help students learn spelling. If at any time you change your mind about participating in the study or feel uneasy, you can choose to stop participating.

COMPENSATION: If you participate in this study, you will receive a $25 gift card to be used at a local book store. If you withdraw early from the study, you will still receive the gift card to the bookstore.

CONFIDENTIALITY: If you participate in the study, we will keep all information, like how well you did on the spelling sheets and this form, stored in a locked file in our office at work. When we have all of the spelling scores collected, we will mark your name off of the spelling sheets and replace it with a number. When we are completely done with the study, we will destroy all the materials.

RIGHT TO WITHDRAW: You do not have to help with this study and you are free to change your mind at any time. Should you decide at a later time that you do not want to do this anymore, you can tell your teacher or the researcher, and you will not have to participate any longer. If you change your mind, it will not affect your grades and no one will be upset with you. If you do change your mind, your spelling worksheets and scores will not be included in the study.

SUMMARY OF RESULTS: A summary of the results of this research will be supplied to you, at no cost, at your request.

VOLUNTARY CONSENT: When you sign this paper, it means that you understand what is being asked of you. For example, you know that you have decided to participate in the spelling instructional methods, and that you are free to change your mind at any time, for any reason. Also, you understand that your parent/guardian agrees that you can participate in this study.

I agree that I am willing to participate in the study and to allow the researchers to use my spelling scores in evaluating the spelling teaching methods.

_____ _____

Student's signature Date

_____ _____

Researcher's signature Date