The Dissertation Committee for Farah El Zein certifies that this is the approved version of the following dissertation:

An Examination of Collaborative Strategic Reading-High School (CSR-HS) Intervention for Students with ASD

Committee:

Sharon Vaughn, Supervisor

Mark O'Reilly, Co-supervisor

Terry Falcomata

Colleen Reutebuch

Russell Lang

An Examination of Collaborative Strategic Reading-High School (CSR-HS) Intervention for Students with ASD

by

Farah El Zein, B.S.; M.Ed.

Dissertation

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

DOCTOR OF PHILOSOPHY

The University of Texas at Austin

August, 2014

Dedication

I dedicate this dissertation to my husband, for his endless love and support, to my son, the most important person in my life, to my parents, for everything they have done to make me the person I am today, and to my parents-in-law for their continuous help and support.

ACKNOWLEDGMENTS

I would like to thank and acknowledge several people who have played key roles in helping me complete my dissertation. First, I would like to thank my advisors, Drs. Sharon Vaughn and Mark O'Reilly. I was extremely honored to have been their student and have learned from their expertise in conducting special education research. I was fortunate to have worked with them on several research projects and was honored to receive their precious feedback throughout my years at the University of Texas at Austin.

I would like to thank my parents for their unconditional love and support and for always believing in me and raising me to be a lady who believes she is capable of making a difference in children's lives. My parents have set an example for me to be a student and an employee with the highest level possible of professionalism and work ethics. My mother's dedication as an educator for students who come from low-income families in a developing country has inspired me to become the scholar I am today.

Finally, I would like to thank the supportive staff and graduate students at the Meadows Center for Preventing Educational Risk for everything they have done to help my journey at UT go by smoothly. I would like to acknowledge my supervisor, Dr. Colleen Reutebuch for the guidance and encouragement she always had to offer me and for believing in my capabilities as a young researcher. I would also like to acknowledge my colleague Dr. Michael Solis who has played a very influential role in my growth as a researcher and a writer. I would also like to thank Dr. Terry Falcomata for helping me become a critical thinker when it comes to designing and evaluating single subject research. Last but not least, I would like to acknowledge the influence my mentor, Dr. Russell Lang has had on my work, and I would like to thank him for believing in my capabilities.

An Examination of Collaborative Strategic Reading-High School (CSR-HS) Intervention for Students with ASD

Farah El Zein, Ph.D.

The University of Texas at Austin, 2014

Supervisor: Sharon Vaughn

Co-Supervisor: Mark O'Reilly

This study investigates the effects of implementing Collaborative Strategic Reading–High School (CSR–HS) on reading comprehension and challenging behavior outcomes for three high school students with Autism Spectrum Disorder (ASD). Using a combined single subject research design consisting of a delayed, concurrent multiple-baseline and an alternating treatments with reversal, three high school students with ASD were paired with neurotypical reading partners to learn and use reading strategies with informational text two to three times per week. The alternating treatment conditions were CSR-HS with choice of text (i.e., CSR-HS-C) and CSR-HS without the opportunity to choose the reading text (i.e., CSR-HS-NC). Daily comprehension checks were collected and visually inspected along with data on occurrences of various challenging behaviors exhibited by each participant during intervention. Fidelity of implementation was also measured. Increased reading comprehension scores and decreased incidences of challenges behaviors were detected for the three participants upon implementation of intervention conditions. As for the influence of the choice component on the measured outcomes, no clear differentiation between conditions was observed in terms of reading comprehension gains and reduction in challenging behavior across the three participants,

suggesting that the addition of choice did not show an added value to CSR-HS intervention.

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CHAPTER 1: INTRODUCTION

Students with ASD and Reading Comprehension Difficulties: Statement and Significance of the Problem

The importance of acquiring reading skills is reflected in legislative acts (No Child Left Behind Act, 2001; Individuals with Disabilities Educational Act, 2004), both of which emphasize the requirement of practitioners to use evidence-based instructional strategies and curricula when teaching students with or without disabilities. Both legislative acts require school personnel to provide students with disabilities access to the general education curriculum and interventions to address deficits in core academic areas such as reading. Consequently, an increasing number of students with disabilities are partially or fully included in the general educational setting (Ramdoss et al., 2012). However, the educational community is still faced with the challenge of finding targeted reading interventions to meet the needs of students who are not responding to current evidence-based practices, including students with low-incidence disabilities (Vaughn & Fletcher, 2012). Previous research has indicated that the number of teachers well-equipped to teach students with autism spectrum disorders (ASD) in the inclusive setting can be described as insufficient (Lang, O'Reilly, Sigafoos et al., 2010; Ramdoss et al., 2011; Scheuermann, Webber, & Goodwin, 2003). More specifically, general education teachers are often uncertain how to effectively provide reading comprehension interventions for students with autism spectrum disorders (ASD) to address their unique difficulties in this area (Chiang & Lin, 2007).

Many students with ASD have profiles of reading performance demonstrating strengths in basic reading skills (i.e. word reading) coupled with difficulties in reading comprehension (Asberg, Kopp, Berg-Kelly, & Gillberg, 2010; Chiang & Lin, 2007; Nation, Clarke, Wright, &

Williams, 2006; Smith-Myles et al., 2002; Goldberg, 1987). Even those who can read accurately, levels of reading comprehension are generally poor (Frith & Snowling, 1983; Minshew et al., 1994; O'Connor & Klein, 2004; Snowling & Frith, 1986).

Interventions provided for students with ASD historically have focused primarily on improving behavior and communication outcomes, leaving academic achievement of students with ASD an understudied outcome.

Researchers have previously suggested that students with ASD show very little interest in academic tasks and are often described by their teachers as lacking the "motivation" needed for desired academic outcomes (Koegel, Singh, & Koegel, 2010). Along the same line, some researchers suspect that the challenging behaviors exhibited by many students with ASD hinder their success in academic tasks (Ramdoss et al., 2011). Research has also suggested that the poor academic performance of many of these students may lead to problematic behaviors often described in the literature as escape-maintained challenging behaviors (Koegel et al., 2010; Taylor & Seltzer, 2011).

Whether in the special education or the inclusive educational setting, students with ASD often have difficulties acquiring a variety of academic skills (e.g., literacy or arithmetic related skills) due to difficulties engaging in classroom activities (Jones, Happe, Golden, Simonoff, Pickles, Baird, & Charman, 2009). These difficulties may be augmented by the challenging behaviors many of these students display including their repetitive behaviors and interests (Browder & Spooner, 2006; Fox, Dunlap, & Buschbacher, 2000; Machalicek, O'Reilly, Beretvas, Sigafoos, & Lancioni, 2007) and to the difficulties in forming appropriate relationships with their teachers and peers (Machalicek, O'Reilly, Beretevas et al., 2008; Ramdoss et al., 2011). Additionally, the academic demands, especially those presented in the general education

setting, may be particularly difficult for students with ASD and thus may exacerbate their challenging behaviors (Koegel, Sing, & Koegel, 2010). This dilemma suggests a high need for interventions designed to target academic needs (e.g., reading comprehension), engagement, and challenging behaviors simultaneously.

Providing Choice Opportunities as an Intervention for Students with ASD

One proposed method to improve motivation and decrease challenging behavior is the use of choice. Some research has found that giving students a choice related to academic and/or behavioral expectations may be a promising component to improve motivation and academic performance (Tiger, Toussaint, & Roath, 2010), as well as engagement in academic tasks (Ulke-Kurkcuoglu, & Kirkaali-Iftar, G., 2010), while also reducing challenging behaviors during academic tasks (Ramaniuk, & Miltenberger, 2001). Academic demands, especially those presented in the general education setting, where this population receives the majority of their instruction (Taylor & Seltzer, 2011), may be particularly difficult for students with ASD and thus may exacerbate their challenging behaviors (Koegel et al., 2010). This dilemma suggests a high need for interventions designed to target academic needs (e.g., reading comprehension), engagement, and challenging behaviors simultaneously. A noteworthy solution for addressing the motivational and behavioral challenges exhibited by students with ASD may require integrating strategies within curricular activities to maximize academic benefits in the general education setting (Moes, 1998).

The National Autism Center's National Standards Project (NSP, 2009) identified treatments based on the science of Applied Behavior Analysis (ABA) as strategies with the strongest research support at this time for teaching new skills and reducing challenging behavior in individuals with ASD. Interventions based on ABA techniques can be categorized as

antecedent-based strategies (i.e., modification of events that occur before targeted behavior), instructional strategies (i.e., strategies used to build new skill repertoires), and consequence-based strategies (i.e., modification of events that follow the targeted behavior immediately) (Boutot & Hume, 2009). An antecedent-based intervention garnering increased attention by researchers involves incorporating choice within academic tasks (Odom et al., 2003). In examining single subject studies that supported effective intervention with students with ASD, Odom and his colleagues (2003) found that incorporating students' choice within learning tasks is a encouraging educational practice that deserves further investigation by researchers.

Whether in the form of an antecedent-based intervention (e.g., providing students with opportunities to make choice, modifying academic tasks to include topics of the student's interest, etc.) or through a consequence-based intervention (e.g., using reinforcers identified through preference assessments), many researchers have been investigating the effectiveness of embedding student's preference within academic tasks. Even though choice is most often based on an individual's preference, recent literature has distinguished between the two (i.e., choice and preference) as separate variables. Preference refers to the subjective liking or disliking of a particular item, person, or activity (Kearney & McKnight, 1997), while choice represents what he/she prefers at the moment (Canella, O'Reilly, & Lancioni, 2005).

A separate line of research examining the effects of providing students with disabilities the opportunities to make choices has been conducted (e.g., Romaniuk & Miltenberger, 2001). Researchers have only recently started to systematically examine the influence of embedding choice and interest of students with ASD within learning tasks (Baker, 2000; Carter, 2001). Choice, as an independent variable, has been studied primarily with populations identified with disabilities other than ASD (e.g., emotional and behavioral disorders, learning disabilities,

severe/multiple disabilities, and intellectual disabilities (Cannella et al., 2005; Carr & Carlson, 1993; Lancioni, O'Reilly, & Emerson, 1996; Watanabe & Sturmey, 2003).

Findings from Cannella's et al., (2005) review of the literature revealed that choice interventions can be successful in reducing the rates of problem behavior for individuals with severe to profound developmental disabilities. Shogren and associates (2004) also noted the positive influence of choice making on the reduction of problem behaviors for individuals with a variety of disabilities (i.e., emotional disturbance, autism, developmental, attention deficit, and mental retardation). Such findings are consistent with the effects of providing choice of academic activities on the disruptive behavior of students with emotional and behavioral disorders (Cooper et al., 1992; Dyer, Dunlap, & Winterling, 1990; Dunlap et al., 1994).

Researchers have begun to attend to the problem of reinforcers losing their reinforcing value for students with ASD as a result of the reinforcer being repeatedly presented (i.e., abolishing operation; satiation) (Murphy, McSweeney, Smith, & McComas, 2003; O'Reilly et al., 2008). Opportunities to make choices regarding the reinforcer presented during an intervention have started to emerge as a replacement for the use of a reinforcer predetermined through systematic procedures, such as preference assessments (Mechling, Gast, & Cronin, 2006; Tiger, Toussaint, & Roath, 2010). The effects of including choice within interventions that allow students with ASD to choose among various academic activities, response types, setting, instructional arrangement, or materials used during the activity have been documented as over the past two decades as a promising approach to instructional strategies with this population.

Modifying CSR to Meet the Needs of Students with ASD

Through a series of studies conducted over 15 years, Collaborative Strategic Reading (CSR), a multicomponent intervention, has been developed, implemented, and evaluated through

quasi-experimental, descriptive, and randomized controlled trial research designs (Vaughn et al., 2011). However, the efficacy of CSR has not previously been determined with high school students with ASD and reading comprehension difficulties. The purpose of this study is to determine the efficacy of an adapted version of CSR, CSR-High School (CSR–HS), for three adolescents in high school peer-directed intervention sessions.

In the same synthesis of studies examining interventions with students with ASD, Odom and his colleagues (2003) investigated the scientific evidence provided by the reviewed studies and found that self-monitoring and the use of visuals are two emerging and effective antecedent-based strategies that may enhance learning. Additionally, the authors found that modifying academic tasks is a promising (i.e., probably efficacious) antecedent-based strategy that deserves further investigation by researchers. From here, the adaptations made to the typical CSR intervention consisted of visual supports (e.g., pictures, videos, demonstrations, graphic organizers, charts), self-monitoring (e.g., using a checklist to monitor behavior and task completion), and modifying the academic task (e,g., providing choice opportunities, incorporating student interests, breaking task into simpler units through the use of a task analysis) as well as providing students with opportunities to make choices (e.g., choice of text during the CSR-HS-Choice condition).

Another adaptation that was proposed to CSR implementation was modifying the cooperative learning feature of typical CSR. Small cooperative learning groups were replaced with peer pairs that resembled peer tutoring. Given the fact that deficits in social interaction is one of the core diagnostic characteristic of ASD, simplifying the social demands required in a typical CSR session (e.g., cooperative learning groups with assigned roles) to a form of peer tutoring (e.g., pairing the target student with a general education peer, taking turns reading,

providing corrective feedback, discussing questions, reciprocal roles in sharing answers etc.) was hypothesized to maximize the benefits of CSR-HS. Nonetheless, student grouping practices that have been previously investigated as a means to improving reading skills in students with ASD involved pairing with typically developing peers as opposed to larger groups of students (Kamps et al., 1989; Kamps et al., 1994; Kamps et al., 1995).

Reading Comprehension Intervention for Students with ASD

Strategy instruction has been studied extensively as a reading comprehension intervention component with students identified as struggling readers without an ASD diagnosis (e.g., learning disabilities, English language learners). Syntheses of research on reading comprehension intervention for students with ASD indicate that modifying instructional interventions associated with improved comprehension for students with reading difficulties in general may improve reading comprehension in students with ASD (Chiang & Lin, 2007; El Zein et al., 2013; Whalon & Hanline, 2008). The majority of the studies included in the mentioned synthesis employed interventions that fall under the category of strategy instruction (Asberg & Sandberg, 2010; Stringfield et al., 2011; Van Riper, 2010; Whalon & Hanline, 2008). Almost half of the reviewed studies employed student grouping practices as a major component of their reading comprehension interventions (Asberg & Sandberg, 2010; Kamps et al., 1989; Kamps etal., 1994; Kamps et al., 1995; Whalon and Hanline; 2008).

In addition to strategy instruction as the primary component of the intervention, student grouping practices, such as cooperative learning groups and peer tutoring have also been identified as promising intervention approaches that may enhance reading comprehension in students with ASD (El Zein et al., 2013). According to the synthesis conducted by El Zein and colleagues (2013), three studies examined the use of different student grouping practices (e.g.,

cooperative learning groups and classwide peer tutoring) as a means to improve reading comprehension for students with ASD (Kamps et al., 1989; Kamps et al., 1994; Kamps et al., 1995). Results from the three studies reported positive outcomes on the researcher-developed reading comprehension measures utilized, indicating that student grouping is a promising approach to improving academic outcomes in this population.

Purpose Statement

Even though reading comprehension was identified as the most prevalent area of academic weakness for students with ASD, studies that investigated word reading interventions with this population outnumbers those that aimed to enhance reading comprehension in this population (Chiang & Lin, 2007; El Zein et al., 2013; Whalon & Hanline, 2008). From here, investigating interventions that target primarily reading comprehension of students with ASD is warranted. Additionally, no studies that targeted reading comprehension and behavioral outcomes as dependent variables of a reading intervention were located; hence, a study of this kind is needed. Even though this intervention does not directly target behavioral outcomes, we hypothesize that implementation of CSR-HS may be associated with a reduction in the challenging behaviors these students generally exhibit during "business as usual" reading instruction.

This study was driven by the hypothesis that the implementation of the CSR-HS will enhance reading comprehension and reduce challenging behaviors simultaneously in three high school students with ASD. Hence, one purpose of this investigation is to examine the effects of CSR-HS on reading and behavioral outcomes of high school students with ASD. Additionally, this study aims to compare the effects of CSR-HS with choice of text to those of CSR-HS without choice of text on reading comprehension and behavior outcomes of three high students

with ASD. A secondary purpose of this study is to assess students' perspective about their reading abilities and experiences as measured by a student questionnaire conducted pre- and post- intervention.

CHAPTER 2: LITERATURE REVIEW

Reading Comprehension Intervention for Students with ASD

The most recent synthesis of reading comprehension intervention research categorized nine treatment conditions, which included strategy instruction, anaphoric cueing, explicit instruction, and student grouping practices (El Zein et al., 2013).

Strategy instruction. Four studies utilized strategy instruction interventions with students with ASD (Asberg & Sandberg, 2010; Stringfield et al., 2011; Van Riper, 2010; Whalon & Hanline, 2008). Asberg and Sandberg (2010) examined the influence of Question-Answer-Relation (QAR) on reading comprehension performance of students with ASD ages 10 to 15 years. The interventionists were trained to use scaffolded instruction, a gradual release of responsibility from teacher to students (Franzen et al., 1996). Interventionists would model and scaffold strategies involved in developing questions about text and then classify the question type (i.e., "right there", "reflect and search", or "on my own" question). A pre-post design compared the decoding and reading comprehension performance of 12 students with ASD to a group of students without disabilities who served as a normative group. A standardized language measure, the Discourse Comprehension Test (DCT), assessed improvements in reading comprehension. A within-group comparison of pre and post scores on the DCT showed improvements in reading comprehension (ES = 0.35) after students with ASD received the QAR strategy.

Whalon and Hanline (2008) investigated a reciprocal questioning intervention in a single-subject multiple baseline across subjects design. Participants in this study were three elementary students with ASD ages 7.5 to 8.7 years and nine general education peers. For the pre-baseline phase, a student with ASD and a typically developing peer took turns reading a story out loud,

and the teacher reminded them to ask each other questions related to the story without providing them with any prompts or guidance related to question generation. Pre-baseline was followed by elements of a story instruction to ensure that the participants had a preliminary understanding of what setting, characters, events, problem, and solution meant. Following story elements instruction and preceding baseline, the SCORE (i.e, share, compliment, offer, recommend, and exercise) curriculum was introduced. SCORE represents the following five social skills: (a) share ideas, (b) compliment others, (c) offer help or encouragement, (d) recommend changes nicely, and (e) exercise self-control (Vernon, Schumaker, & Deshler, 1996). Baseline condition was the same as pre-baseline except that baseline followed story elements instruction and the researchers filled out the SCORES chart with stickers when cooperative behaviors were noticed.

During the intervention phase, the researchers provided question generation instruction by "walking" them through the mental process. During this phase, participants used a self-monitoring checklist, story element cards, question word cards, and storyboards with Velcro as a manipulative. The researchers used scaffolding instruction to teach question generation and responding. Scaffolding procedures included modeling, verbal prompting, and corrective feedback. The dependent measure was the frequency of student-generated questions as well as correct responses to these questions. The authors reported reading comprehension gains in all the participants indicating that question generation may be an effective instructional strategy for students with ASD.

Van Riper (2010) examined the effects of Directed Reading Thinking Activity (DRTA) on reading comprehension outcomes of students with ASD in grades 6-8 through a single-subject study with an ABAB design. The baseline phase consisted of students reading a narrative text, discussing unfamiliar words with the teacher, and answering multiple choice comprehension

questions. The intervention phase consisted of scaffolded, explicit instruction of DRTA, which consists of activating background knowledge through the use of graphic organizers, clarification of unfamiliar words, making predictions, and ongoing discussions throughout reading. Through the Qualitative Reading Inventory- 4 (QRI-4), and a 10-question researcher-developed comprehension, the researchers found that DRTA (a program that embeds strategy instruction such as the use of graphic organizers, making predictions, and clarification of unfamiliar words and ideas) may be effective in enhancing reading comprehension outcomes in students with ASD.

Stringfield, Luscre, and Gast (2011) investigated the effects of a story map graphic organizer on the reading comprehension of three elementary students with ASD in a multiple baseline across participants design. In this study, the story map is a graphic organizer utilized to assist students to visually arrange story grammar elements (e.g., characters, time, place, beginning, middle, and end). Outcomes were measured with Accelerated Reading (AR) story quizzes. During the baseline phase, each participant individually read a story from the *Accelerated Reader program* and completed an AR quiz following every story. The AR quizzes were orally presented to the participants. During the choice condition, participants were given the opportunity to choose which story they wanted to read and were also given the choice to use the Story Map. Additionally, maintenance data were collected after choice condition criterion was met (i.e., 100% on AR quizzes with or without story map). Maintenance procedures were identical to those followed during baseline except that participants were allowed to use the story map if students chose to do so. Data from this study revealed that percentage of correct responses on AR quizzes improved only after story map procedures were introduced across the three participants. All participants met criterion (i.e., three consecutive days of 80% story map

completion and 100% on AR quizzes) during story map condition and maintained this level of performance during choice and maintenance conditions. According to the authors, the use of graphic organizers was found to be effective in improving reading comprehension performance of the students participating in the study.

Anaphoric cueing. Anaphoric cueing is a facilitation method that aids reading comprehension through identifying referents within text. Two studies investigated the effects of anaphoric cueing instruction on reading comprehension of students with ASD (Campbell, 2010; O'Connor & Klein, 2004). O'Conner and Klein (2004) investigated the effects of three different facilitation conditions (i.e., anaphoric cueing, prereading questions, and cloze completion) on reading comprehension in 20 adolescents with ASD. The researchers employed a within-subjects design to conduct their investigation. For each session throughout the investigation, participants read five stories, one modified version for each of the conditions, and two control stories that were left unaltered. The sequence of the interventions was randomized and counterbalanced across participants (e.g., four read passage A first, four read passage B first, and so forth). In the prereading condition, the researcher asked the participants questions prior to reading the passage, and the participants responded verbally. During the anaphoric cueing condition, some referent words (such as pronouns) were underlined, and the participant had to identify which noun each referent stood for by circling one of the two options provided under each identified referent. During the cloze completion condition, the participants were asked to read an altered passage and fill in the blanks as they read by writing a word on each line to complete the sentence. To minimize the effect of the idiosyncratic writing abilities among participants, after each passage, the researcher asked a series of oral questions and the participants responded verbally. Participants did not have access to the text while answering the

postreading questions. Answers for every participant were transcribed and scored by two raters (interrater reliability = .95) following a rubric adapted from the work of Lovett et al. (1996). The possible score for each item ranged from zero to three points based on the information provided in the rubric, and the total possible score for the probe was 25 points. The repeated measures analysis of variance with post hoc calculations demonstrated that the effects of anaphoric cueing were statistically significant; whereas the effects of prereading questions and cloze completion were not statistically significant.

Campbell (2010) investigated a pronoun identification intervention based on the hypothesis that providing anaphoric cueing for students with ASD ages 7 to 12 years may enhance their reading comprehension. The researchers employed a pretest-posttest matched control group design to conduct their investigation. During baseline phase, students were asked to read ten pairs of sentences, and after each pair was read, a "wh" question was asked. Student responses were recorded as correct or incorrect for the control and the intervention groups. During intervention, the investigator read a paragraph that explained what referents are and gave examples of identifying the correct referents for pronouns within text. After the introductory paragraph, the student read a sentence without a pronoun then followed by a sentence with an underline pronoun (i.e., written prompt), and was asked by the experimenter to identify what the pronoun referred to (i.e., verbal prompt). After the anaphoric cueing exercise, the student was asked a "wh" question about the two sentences, and responses were recorded as correct or incorrect. Anaphoric cueing was gradually decreased throughout the intervention until no anaphoric cues were provided by the tenth week of instruction. Two weeks after the intervention was completed, the Woodcock Johnson- Third Edition (WJ-III) achievement Letter-Word Identification and Passage Comprehension subtests were administered to all participants. In

addition, the ability to identify pronouns was measured using the Grammatical Comprehension subtest of the Test of Language Development- Intermediate- Third Edition (TOLD-I:3). Reading comprehension was also measured by the number of correct responses to ten "wh" questions presented after each reading session.

Based on results from the Grammatical Comprehension subtest of the TOLD-I:3, post-intervention scores revealed no significant differences between the control and the experimental groups (ES = 0.21). The WJ-III Passage Comprehension subtest yielded a statistically significant difference between the two groups favoring the experimental group (ES = 1.78).

Explicit instruction. Three studies implemented interventions based on explicit instruction to improve reading comprehension of students with ASD (Flores & Ganz, 2007; 2009; Knight, 2010). In both of their studies, Flores and Ganz (2007; 2009) examined the effects of specific instructional strands of a direct instruction (DI) program, *Corrective Reading Thinking Basic: Comprehension Level A* on the reading comprehension performance of students identified with ASD, intellectual disabilities, and ADHD in grades 5 and 6. Both studies employed single-subject multiple probe design across behaviors. Flores and Ganz (2007) used the statement inferences, using facts, and analogies instructional strands. Flores and Ganz (2009) used the picture analogies, deductions, inductions, and opposites instructional strands. In both studies, interventionists followed a set of structured procedures and behaviors outlined by the DI program. These procedures consisted of (a) directions given in a form of a script; (b) students responding in a choral fashion; (c) using an explicit signal to elicit student responding; (d) correction of inaccurate individual student responses; and (e) modeling, guiding, and providing independent practice. The baseline condition was collected prior to beginning instruction with the DI program and consisted of reading and completing strand-specific probes. Daily

instruction began with one strand. Once a student reached criterion of three consecutive data points at 100%, instruction in that strand was reduced to 2-3 sessions per week, and another strand began. Flores and Ganz (2007; 2009) used researcher-developed probes based on the skills targeted by the specific strands of the DI program. Findings indicated gains by students the researcher-developed probes for each strand. Probes were highly proximal to each instructional strand. Additionally, results from both studies demonstrate maintenance of performance by students after one month (2007) and 6 months (2009) of not receiving intervention. In both studies, strand-specific researcher-developed probes yielded PND scores of 100% across strands and across participants, which was interpreted as being in the highly effective treatment range based on the predetermined standards. Both Flores and Ganz (2007; 2009) studies met the criteria set for certainty of evidence evaluation and were found to be conclusive.

Knight (2010) implemented a computer-based intervention along with explicit instruction and prompting techniques to students with ASD in grades 6-8 in a single-subject multiple probe across participants design. During baseline, students read electronic texts with support resources of text to speech and illustrations. The electronic texts were created by Book Builder- a computer program designed to generate electronic text and assessment activities and allows to the addition of visuals, audio files, and other enhancements. Three different treatment conditions included (a) supported electronic text (i.e., using Book Builder text generator); (b) supported electronic text with explicit prompting; and (c) supported electronic text, explicit prompting of, and definitions for unfamiliar words. Supported electronic text included explanatory resources, illustrative resources, translations, summaries, enrichment, and instructional resources. Dependent measures included researcher-developed digital quizzes that included seven

questions: three about vocabulary, three literal questions, and one application question. Results from this study revealed mixed findings regarding reading comprehension gains, yet the authors reported enough gains to classify the use of digital text and prompting via computer-based instruction as a promising approach to improving reading comprehension in students with ASD.

Student grouping practices. Three studies examined the use of different student grouping practices (e.g., cooperative learning groups and classwide peer tutoring) as a means to improve reading comprehension for students with ASD (Kamps et al., 1989; Kamps et al., 1994; Kamps et al., 1995). Kamps et al. (1989) investigated the effectiveness of peer tutoring with typically developing peers on the acquisition of designated academic tasks (including a reading comprehension task), for two students with ASD ages 9 and 11 years. Kamps et al. (1989) used a single-subject multiple baseline design across tasks study. During baseline, no changes were made in the classroom instructional routines, and no instruction was provided on tasks selected for tutoring. During peer tutoring condition, typically developing peers provided one-on-one tutoring sessions on designated academic tasks followed by 10-minute free play activities with the tutees. Peer tutoring consisted of providing task directions, modeling, and prompting. During oral reading sessions, the tutor asked the tutee to read aloud a passage, recorded the number of correct and incorrect words per minute, and asked the tutee factual recall questions related to the passage. Tutors were trained to provide positive reinforcement and corrective feedback to the tutees. Investigators collected acquisition data by recording the number of correct responses on researcher-developed reading comprehension probes (i.e., factual recall questions).

Kamps et al. (1994) investigated the effects of a class-wide peer tutoring (CWPT) intervention on reading skills of students with high-functioning autism ages 8 to 9 years and their

typically developing peers. The study design was a single-subject multiple baseline across participants with a reversal. Reading comprehension outcomes were measured through a researcher-developed comprehension probe following a 2-minute read aloud. The probes consisted of who, what, where, when, and why questions asked by the experimenter, and percent correct was determined after recording the number of accurate responses. Baseline consisted of teacher-directed instruction based the usual instructional routines from the grade-level basal series. The CWPT condition consisted of peer-mediated instruction as a supplement to baseline reading instruction. Instruction during CWPT included passages read by students, feedback from peers for oral reading, correction of errors, and public posting. Following reading with feedback, the tutor asked three minutes of reading comprehension questions (who, what, when, where, why). Tutor-tutee roles were reciprocal, and thus the reading procedure was repeated in a reversed manner. Reading comprehension probes after CWPT yielded PND scores of 20%, 80%, and 0% for the three participants.

The same first author, Kamps and another group of colleagues (1995) examined the effects of Cooperative Learning Groups (CLGs) on reading performance of three students with ASD ages 8 to 13 years and their typically developing peers using single-subject reversal (ABAB) design. In two separate but similar experiments, baseline consisted of teacher-directed reading instruction in a form of whole class instruction and independent activities. During baseline, reading instruction focused on vocabulary presentation, story concepts and main idea, and sequencing. During CLGs in both experiments, students were assigned to perform 3 structured activities: (a) peer tutoring on vocabulary words; (b) practice on who, what, where, when, and why comprehension questions; and (c) an academic game on factual information from the story read. CLGs activities were supplemental to the usual teacher-led reading instruction. Experiment 2

was very similar to the first one except for the following variations: (a) there was no direct teaching and practice of social skills, (b) students with ASD were given independent tasks during teacher lecture, and (c) a reward system based on earning points was put in place to facilitate transitions. Fifteen-item researcher-developed pre- and posttest probes were administered each week to measure reading comprehension. Most of the probe questions were factual in nature, and some inferential questions were included. Findings from the three studies (Kamp et al., 1989; Kamps et al., 1994; Kamps et al., 1995) revealed that instructional arrangements that involved student grouping (e.g., peer tutoring, CWPT, and CL groups) were associated with improved reading comprehension and social outcomes for both, students with ASD and their typically developing peers.

In summary, findings from the most recent synthesis on reading comprehension intervention for students with ASD (El Zein et al., 2013) suggest that the following three approaches show that most promise in improving reading comprehension outcomes for this population: 1) strategy instruction, 2) explicit instruction, and 3) student grouping practices.

Effectiveness of CSR with Struggling Readers

Collaborative Strategic Reading (CSR) combines strategy instruction and cooperative learning (Klinger & Vaughn, 1996). It is a fully developed evidence-based instructional approach to reading comprehension with experimental and quasi-experimental validation (e.g., Vaughn, Klingner, Swanson, Boardman, Roberts, Mohammed, Stillman-Spisak, 2011). Collaborative Strategic Reading includes elements identified as critical for enhancing the performance of students with learning difficulties, such as: (a) making instruction visible and explicit, (b) implementing procedural strategies to facilitate learning, (c) using interactive groups and/or partners, and (d) providing opportunities for interactive dialogue among students and between

teachers and students (Fuchs, Fuchs, Mathes, & Lipsey, 2000; Gersten, Fuchs, Williams, & Baker, 2001; Swanson, Hoskyn, & Lee, 1999; Vaughn, Gersten, & Chard, 2000).

Early studies of CSR focused on evaluating effectiveness within science and social studies content area instruction in the elementary setting (Klingner, Vaughn, & Schumm, 1998; Klinger & Vaughn, 2000; Klingner, Vaughn, Argu¨elles, Hughes, & Ahwee, 2004). In one of the earliest studies (Klinger et al., 1998), CSR was taught to intact, heterogeneous fourth-grade classes for 45 minutes per day during an 11-day Florida history unit. The comparison group of intact classes received instruction reflective of the school's typical practice. Students in the CSR group made greater gains in reading comprehension and equal gains in content knowledge.

To determine whether these findings were consistent for science instruction, fifth-graders were provided CSR instruction for 30 to 40 minutes per day, 2 to 3 days per week, over a 4-week period during science classes (Klingner & Vaughn, 2000). Students frequently engaged in verbal discourse that supported vocabulary and content knowledge development. Students made gains in target vocabulary over time.

In a subsequent quasi-experimental study, fourth-grade teachers in the treatment condition were provided CSR training and in-class demonstrations. A comparison group of teachers continued typical-practice instruction. On a norm-referenced measure of reading comprehension, students in the CSR group outperformed students in the comparison group (Klingner, Vaughn, Argüelles, Hughes, & Ahwee, 2004). Likewise, students of third-grade teachers who received either CSR or partner reading training performed well on tests of oral reading rate, accuracy, and reading comprehension (Vaughn, Chard et al., 2000), providing additional evidence for the use of CSR with upper-elementary students.

Three studies have tested CSR at the middle school level. In one study, researchers developed a computer-adapted version of CSR (Kim et al., 2006) and used it with sixth- through eighth-grade students with learning disabilities. Students were randomly assigned to either the computer-based CSR intervention or a typical-practice comparison group. On a norm-referenced measure of passage comprehension, students in the CSR group outperformed students in the comparison group. In another middle school study, CSR was one of several intervention practices to enhance school-wide reading comprehension (Bryant et al., 2000). Students demonstrated gains on word identification but not reading comprehension. In the latest experimental study investigating the effects of CSR on reading comprehension in middle school English Language Arts classes, findings showed that the treatment group outperformed the comparison group on the reading comprehension measure but not on the reading fluency outcome (Vaughn et al., 2011).

Given that recent syntheses of reading comprehension interventions for students with ASD have recommended adapting multi-component interventions that have been shown effective with struggling readers who do not have an ASD (El Zein, 2013), modifying CSR to fit the needs of high school students with ASD may be a promising practice and, as previously mentioned, is an area of research that is highly warranted for this particular population.

Choice as an Intervention Component for Students with ASD

One proposed method to improve motivation and decrease challenging behavior in students with ASD is the use of choice. Some research has found choice to be a promising component to improve motivation, academic performance (Tiger, Toussaint, & Roath, 2010), and engagement in academic tasks (Ulke-Kurkcuoglu, & Kirkaali-Iftar, G., 2010), while also reducing challenging behaviors during academic tasks (Ramaniuk, & Miltenberger, 2001).

Academic demands, especially those presented in the general education setting, where this population receives the majority of their instruction (Taylor & Seltzer, 2011), may be particularly difficult for students with ASD and thus may exacerbate their challenging behaviors (Koegel et al., 2010). This dilemma suggests a high need for interventions designed to target academic needs (e.g., reading comprehension), engagement, and challenging behaviors simultaneously. A noteworthy solution for addressing the motivational and behavioral challenges exhibited by students with ASD may require integrating strategies within curricular activities to maximize academic benefits in the general education setting (Moes, 1998).

Choice has recently received some attention from the research community as a potentially effective antecedent-based intervention with students with ASD. Studies that investigated choice as the sole element of intervention or as a major feature of a multicomponent intervention reported findings in terms of the following dependent variables: (a) work completion, (b) appropriate and inappropriate behaviors, and (c) affect and interest. For the purpose of the present literature review of choice interventions, work completion was identified to include the dependent variables of time to begin a task (i.e., latency), task duration, task completion, homework completion, correct responding, total number of correct responding, percent of correct responses, and responses per minute. Appropriate and inappropriate behaviors included dependent variables of on-task behavior, disruptive behavior, competing behaviors, challenging behaviors, and problem behaviors. Affect and interest included two researcher-designed dependent measures of affect and interest.

Work completion. Six studies involved at least one dependent variable that addressed work completion (Koegel et al., 2010; Mechling et al., 2006; Moes, 1998; Newman et al., 2002; Smeltzer et al, 2009; Tiger et al., 2010). The dependent variables within this group were divided

into two categories of: (a) rate, accuracy, and frequency of work trials completed and (b) latency and task duration.

Rate. Four studies investigated the effects of choice on the rate of trials completed over five dependent variables (Koegel et al., 2010; Moes, 1998; Newman et al., 2002; Tiger et al., 2010). Of these five dependent variables, three had a baseline phase included in the design (i.e., withdrawal or multiple baseline design). During the intervention phase of these studies all the participants had: (a) higher levels, (b) more positive trends, and (c) an immediacy of effect as compared to baseline. The pooled overlap of data points was 11 out of 92 (12%; 8 data points of overlap were from one participant). Two of the 5 dependent variables used alternating treatment design with one using a two treatment conditions and one using a choice vs. no choice condition. Neither of these variables had any clear differentiation between conditions.

Accuracy. Two studies investigated the effects of choice on the accuracy of academic responses. One study used a withdrawal design (Moes, 1998). This study's results favored the treatment condition for all participants on level and trend, an immediacy of effect between phases, with no differentiation on variability. The pooled number of overlapping data points was 3 out of 30 (10%). The other study used an alternating treatment design with two treatment conditions (Newman et al., 2002). The authors did find differentiation between conditions on level or trend and there was no immediacy of effect.

Work trials completed. In this study a progressive ratio of reinforcement was used (Tiger et al., 2010). Results were mixed on level, trend, and variability. Overall, these findings were inconclusive.

Latency and task duration. Three studies included at least one dependent variable that addressed latency to start a task and task duration (Koegel et al., 2010; Mechling et al., 2006;

Smeltzer et al, 2009). The dependent variables within this group were divided into two categories: (a) latency which was defined as the number of minutes passed from the presentation of the task stimulus and the student initiation to respond, and (b) duration which was defined as the number of minutes that passed from the moment the student initiates the response until task completion.

Latency. One study investigated the effects of choice on latency to begin a task using a multiple baseline design (Koegel, et al, 2010). All participants showed positive effects on level, trend, variability, and an immediacy of effect, when comparing the intervention phase to the baseline phase. The number of pooled overlapping data points was 1 out of 28 (4%).

Task duration. Two studies investigated task duration. Both studies used an alternating treatment design. Mechling and colleagues (2006) used a choice and no choice conditions (i.e., choice of video and access to tangible reinforcer) with results suggesting positive effects in level, trend, and immediacy of effect when the participants' were given the no choice condition (tangible reinforcement). In the study by Smeltzer and colleagues (2009), results were either mixed or showed no differentiation across level, trend, and variability.

Desired and challenging behavior. Six studies included at least one dependent variable that addressed desired and challenging behaviors (Koegel 2010; Moes, 1998; Newman et al., 2002; Rispoli et al., 2013; Smeltzer et al, 2009; Ulke-Kurkcuoglu & Kircaali-Iftar, 2010). The dependent variables within this group were divided into two categories of: (a) Problem behavior (e.g., challenging behavior, disruptive behavior) and (b) on-task behavior.

Challenging behavior. Five studies investigated problem behavior with the use of choice. One study used a withdrawal design (Moes, 1998) one study used a multiple baseline design (Koegel et al., 2010), two studies used an alternating treatment design Newman et al., 2002;

Smeltzer et al., 2009) and one study used an alternating treatment with baseline and withdrawal phases (Rispoli et al, 2013). Out of six dependent variables measured, five of them compared a choice condition to a no choice condition. In four of the six dependent variables, the choice condition had positive effects on level with an immediacy of effect between phases. Trends were either neutral or favorable towards the intervention condition. Pooled overlap of data points was 15 out of 154 (10%; 10 data points of overlap were from one participant).

The additional two dependent variables of problem behaviors both used alternating treatments. One study had three alternating treatments (i.e., choice, no choice with a yoked reinforcer from choice, or no choice without a yoked reinforcer; Smeltzer et al., 2009) and the other compared two different choice conditions (Rispoli, et al., 2013) The results comparing level, trend, variability, and immediacy of effect across treatments was either mixed or resulted in differentiation between treatments.

On-task behavior. Two studies investigated on-task behavior with the use of choice (Smeltzer et al., 2009, Ulke-Kurkcuoglu & Kircaali-Iftar, 2010). Smeltzer et al. (2009) used an alternating treatment design with the participant-selected reinforcer resulting in the higher levels of on-task behavior. Immediacy of effect was visible in the researcher-selected condition resulting in a decrease in on-task behavior. No differentiation was observed in trend and variability, with mixed results in the level of the on-task behavior. When Ulke-Kurkcuoglu and Kircaali-Iftar (2010) compared an activity-choice and material choice to the baseline phase in an ABACA design, they found higher levels of on-task behavior and lower variability for the choice conditions and an immediacy of effect between phases. Pooled overlap of data points was 1 out of 32 (3%). This same study found no differentiation on level, trend, variability or immediacy of effect when comparing the two treatment conditions against each other.

Affect and interest. Two studies investigated the effect of choice on affect and interest (Koegel et al, 2010; Moes, 1998). Both of these studies found higher levels of affect or interest during the intervention condition as compared to baseline and an immediacy of effect during phase changes. The pooled overlap of data points was 15 out of 48 (31%) with one participant accounting for nine of the overlapping data points.

From the brief review of choice literature in students with ASD, few studies have investigated the influence of choice as an antecedent-based intervention that aims to improve accuracy of responding to reading comprehension tasks. In other words, the studies that examined the influence of choice on academic outcomes measured task completion, latency to start/complete academic tasks, task engagement, levels of challenging behaviors during academic tasks, and interest in academic tasks. Nonetheless, only two studies investigated choice as an intervention to improve accuracy of responding on academic tasks (Moes 1998; Newman et al., 2002). Additionally, we were unable to locate any studies that examined the influence of integrating choice of text on reading comprehension outcomes of student swith ASD (Reutebuch et al., in review). From here, there appears to be a high need for conducting a study that examines the differential effect of choice on academic outcomes in students with ASD. Since reading comprehension was identified as a critical yet understudied area of academic performance for students with ASD (El Zein et al., 2013; Chiang & Lin, 2008), this study aimed to investigate the potential influence of adding a choice component to one of the intervention conditions (e.g., CSR-HS-C) on reading comprehension outcomes of three secondary students with ASD.

Rationale for an Exploratory Study

This study is considered an exploratory study for three reasons. First, through a series of studies conducted over 15 years, CSR has been developed, implemented, and evaluated through quasi-experimental, descriptive, and randomized controlled trial research designs with students identified as struggling readers (Vaughn et al., 2011). However, the efficacy of CSR has not been previously investigated with high school students with ASD who are identified as struggling readers. Nonetheless, students diagnosed with ASD were often excluded from the series of studies previously mentioned. Second, improving reading comprehension outcomes in students with ASD is an area that has been described as understudied by recent reviews (El Zein et al., 2013). Third, all the studies that examined interventions to improve academic outcomes in students with ASD were conducted with lower and upper elementary students, and no studies conducted with secondary students with ASD were located (Fleury et al., 2014). For the above three reasons, the multi-component intervention being investigated in this dissertation study can be best described as exploratory (i.e., based on a scarce body of empirical literature targeting a similar research inquiry).

Within the limited yet diverse body of research examining academic interventions for adolescents with ASD, and based on the nature of each intervention, treatment conditions were analyzed in terms of their most critical features. Interventions fell under one or more of the following categories: (a) mode of instructional delivery, (b) motivational variables, (c) positive reinforcement, (d) prompting techniques, (e) assessment-based interventions, (f) peer-mediated intervention, and (g) student response. The described classification of academic intervention is illustrated in *Figure 1*.

Mode of Instructional Delivery

Manipulating variables pertaining to the way instruction is delivered to students is one way to improve academic performance. For instance, some researchers have found that utilizing computer-assisted instruction may increase accuracy of responding to spelling and sight word reading tasks in students with ASD (Basil & Reyes, 2003; Coleman-Martin et al., 2005; Delano, Yaw et al., 2011 Heimann et al., 1995; Tjus et al., 1998; Tjus et al., 2004). Manipulating instructional materials is another method to enhance academic performance in this population. Camahan and colleagues (2009) found that the use of interactive materials as visual cues paired with relevant music may increase engagement of students with ASD during reading activities. Additionally, several studies in this line of research demonstrated that explicit instruction is a promising instructional delivery technique for teaching students with ASD academic skills (Flores & Ganz, 2007; Flores & Ganz, 2009; Mims et al., 2012).

Intervention Based on Motivational Variables

Embedding motivational variables within academic tasks is another approach that has been proven effective in enhancing academic performance and/or on-task behavior of students with ASD during the academic task. Examples of such variables are including student interest within the academic task, providing opportunities for students to make choices, interspersal of maintenance tasks, and implementing the high preference-low preference technique (Banda & Kubina, 2010; Koegel et al., 2010).

Self-Monitoring Intervention

Self-monitoring is an intervention that is commonly used and has been demonstrated effective in reducing challenging behavior in individuals with ASD. Similarly, researchers have found that self-monitoring, whether through using traditional checklists or computer software, may be effective for increasing accuracy of academic responding and on-task behavior of

students with ASD (Holifield et al., 2010; Legge et al., 2010). Pairing self-monitoring approach with differential reinforcement is a promising treatment package that may enhance academic skill acquisition in this subgroup of students (Soares et al., 2009).

Prompting-Based Intervention

Prompting and prompt fading are instructional techniques that have been widely for skill acquisition in individuals with various developmental disabilities including ASD. Previous researchers differentiated between stimulus prompting and response prompting and listed them under evidence-based practices (Browder et al., 2009; Odom et al., 2003). Examples of stimulus prompting that have been found promising for enhancing academic performance of students with ASD are verbal and visual cues, video-modeling (Camahan et al., 2009; Delano, 2007; Hart & Whalon, 2012; Rosenbaum & Breiling, 1976). Some prompting techniques that involve student responses (i.e., response prompts) that may improve academic performance in this population are the use graphic organizers as a response tool, time delay techniques (e.g., constant or progressive time delay), and the use of computers and touch screen tablets as an alternative to student responding (Blakeley-Smith et al., 2009; Clark & Green, 2004).

Peer-Mediated Intervention

In addition to the promising effects of peer-mediated instruction on acquiring and maintaining social skills, this instructional arrangement approach to intervention was found effective in improving accuracy of responding to academic tasks in students with ASD. Several studies examined the influence of various peer-mediated interventions with students with ASD across content areas and found cooperative learning groups, peer-tutoring, and classwide peer-tutoring to be promising practices in enhancing academic skill acquisition in this subgroup of learners (Kamps et al., 1989; Kamps et al., 1994; Kamps et al., 1995).

Assessment-Based Intervention

Assessment-based intervention has long been established as an evidence-based approach to educating learners with ASD. However, examining the effectiveness of this type of intervention has been commonly investigated in a systematic fashion when targeting challenging behavior rather than skill acquisition. The use of functional analysis as an assessment tool to inform intervention is widely employed to reduce challenging behavior, and in some studies to increase on-task behavior during academic tasks (O'Reilly et al., 2005). Additionally, some researchers included assessment-based component within their intervention package and found such treatment effective in increasing academic task completion in students with ASD (Blakeley-Smith et al., 2009).

The multi-component feature of CSR includes many of the intervention elements described above. This multi-component intervention was chosen for examination based on the existing evidence from previous studies that investigated academic intervention for students with ASD. Two critical features of CSR are: 1) reading comprehension strategy instruction, and 2) peer-mediated instruction (e.g., cooperative learning). These two intervention features have been identified as promising approaches to improving reading comprehension outcomes in students with ASD (El Zein et al., 2013). Additionally, the explicit and structured manner in which students are required to record their responses (e.g., through the learning log attached in Appendix B) is an additional feature of typical CSR; not to mention that the log was slightly modified for CSR-HS to include graphic organizers and lined spaces for written responses. Additionally, the adaptations applied to CSR (i.e., CSR-HS) were also based on the promising findings reported in the limited body of research on academic intervention for students with ASD. Adaptations included modifying the academic task, self-monitoring (e.g., tasks checklist),

the use of visuals (e.g., graphic organizers, pictures, charts, etc.), selecting text based on students' interests, and prompting (e.g., verbal prompts to provide feedback for partner, make eye contact, and ask for clarifications). Another consideration taken to make the intervention assessment-based was conducting standardized reading assessment (e.g, WJ-III) to identify the instructional reading level for each participant. Conducting a preference assessment to inform the selection of texts and assure that all the passages utilized are based on some level of student preference (i.e., interest) was also a decision that followed the premise of assessment-based intervention. The decision to add choice as an antecedent-based component during one of the intervention conditions (i.e., CSR-HS-C) was also influenced by a careful review of academic intervention studies in students with ASD (Odom et al., 2003).

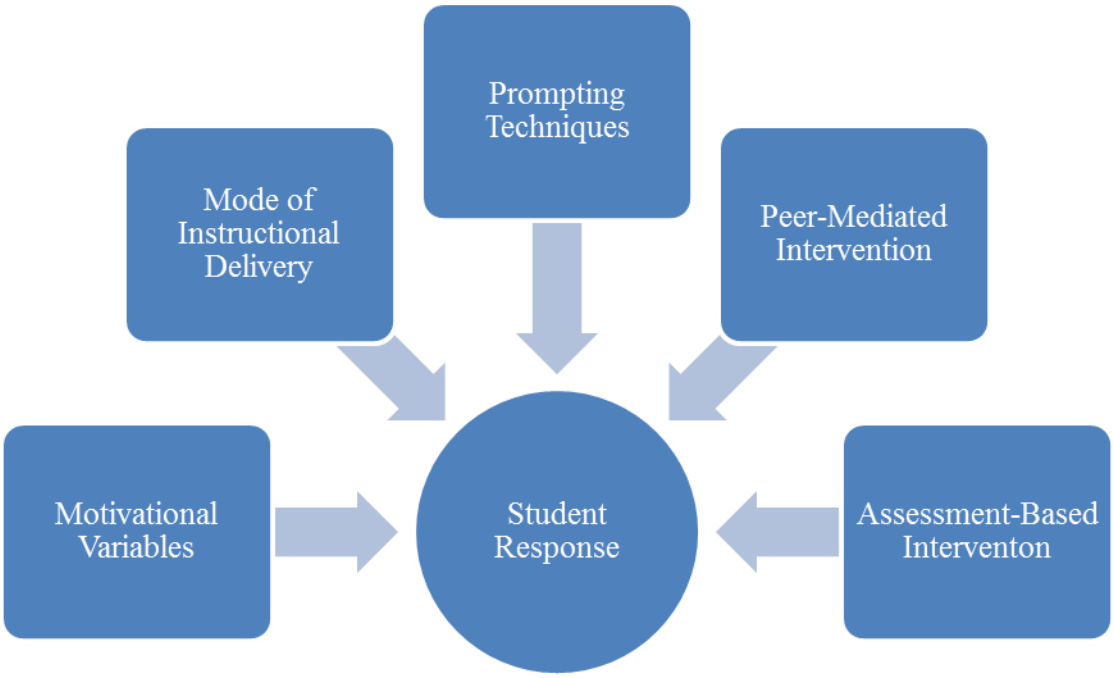


Figure 1. Classification of academic interventions for students with ASD

CHAPTER 3: METHOD

Overview

This study examined the effects of CSR-HS on reading comprehension and behavioral outcomes of high school students with ASD. A secondary purpose of this study was to compare two different CSR-HS treatment conditions: 1) CSR-HS with providing students the choice of the session's text, and 2) CSR-HS without providing the students choice of text. The following section provides a description of the rationale and a list of the research questions that drove the methodology of this study.

Many students with ASD have unique profiles of reading performance which exhibit strengths in word reading coupled with difficulties in reading comprehension (Chiang & Lin, 2007; Nation et al., 2006). Even among the group who can read accurately, levels of reading comprehension are generally poor (O'Connor & Klein, 2004; Snowling & Frith, 1986). Thus, interventions that aim to improve reading comprehension skills in this population are warranted. Previous syntheses on reading comprehension intervention for students with ASD have found that strategy instruction, the use of graphic organizers, and peer-mediated instruction such as cooperative learning groups are promising practices for enhancing reading comprehension performance in this population (Chiang & Lin, 2007; El Zein et al., 2013). Additionally, task analysis and visual aids have been identified as evidence-based practices for teaching students with ASD and other developmental disabilities (Odom et al., 2003). Collaborative Strategic Reading (CSR) is an established evidence-based multicomponent reading comprehension intervention proven effective for teaching struggling readers to read for meaning. This study will expand the existing literature on CSR through investigating the effectiveness of CSR-HS (with and without choice of text) in improving reading comprehension and behavioral outcomes in

high school students with ASD. Since CSR is based on strategy instruction and cooperative learning, a hypothesis emerges that adapting this intervention (i.e., CSR-HS) to meet the specific needs of students with ASD may enhance their reading comprehension and decrease their challenging behavior while engaged in CSR-HS tasks. This single subject study was intended to add to the limited research on interventions targeting reading comprehension for students with ASD.

The investigator, who has extensive experience working with students with ASD in general and with implementing CSR-HS in particular, carried out the sessions throughout the course of evaluation. A delayed concurrent multiple-baseline across participants with alternating treatments design was employed to examine the effects of CSR-HS and compare its effectiveness with choice of text versus the absence of the choice component.

Research Questions

1. What are the effects of implementing CSR–HS on reading comprehension outcome and challenging behaviors of three adolescents with ASD and deficits in reading comprehension?
2. What are the effects of implementing CSR–HS with choice of text in comparison to implementing CSR–HS without choice to adolescents with ASD and deficits in reading comprehension?
3. How do students' perspectives about reading change after implementation of CSR-HS as measured by a researcher-developed social validity student questionnaire?

Research Design

A combined single subject research design consisting of a delayed, concurrent multiple-baseline (Heward, 1978 as cited in Cooper, Heron, & Heward, 2007; White & Bailey, 1990), and

an alternating treatments with reversal was employed (Kennedy, 2005). The multiple-baseline design is suited to the practical requirements of reading intervention research (Neuman & McCormick, 1995). The comparison of data obtained during baseline to those from CSR–HS sessions that commenced at different points in time across participants allowed for an analysis of the effects of CSR–HS. Additionally, the alternating treatments phase allowed for evaluating potential relative effects of CSR–HS with student choice of text and CSR–HS without choice on reading comprehension and behavioral outcomes. The "return to baseline" phase was intended to assess for the generalization of outcomes (i.e., assess whether the change in behavior and in probe scores is detected even after intervention is withdrawn).

The baseline condition consisted of "business as usual" reading instruction. The participants' primary teacher had reported to the investigator that this group of students received reading instruction through one-on-one sessions, in which they read passages and answered reading comprehension questions with a teacher or paraprofessional who provided unsystematic prompting.

After a negative or stable trend of failing probe grades in baseline (e.g., five consecutive grades lower than 70% on daily probes) was observed, treatment began for student 1. While Student 1 received intervention, the other two remained in baseline and were given similar probes after each baseline session. When Student 1 demonstrated a positive trend of at least five improved grades on daily probes (e.g., two grades of 70% or higher) with no overlapping data points between baseline and treatment, an experimental effect was considered established (Kennedy, 2005) and Student 2 began treatment. The same pattern was followed until the three students were receiving treatment.

The intervention phase consisted of two different treatment conditions. During one treatment condition (i.e., CSR-HS-With Choice; CSR-HS-C), the student was presented with three text choices, and he/she was given the opportunity to choose the day's reading topic.. The second treatment condition (i.e., CSR-HS-No Choice; CSR-HS-NC) followed identical procedures as the formerly described condition with the exception that during this condition the student was not provided with a choice of text. The selection of text during the CSR-HS-NC sessions was determined by randomly picking a text from a pile of passages on each student's instructional reading level. For all participants, the order of treatment condition sessions was randomly assigned based on results from flipping a coin for every pair of sessions.

Setting and Materials

The study took place in a diverse rural school district in Central Texas. Sixty-five percent of the school population was economically disadvantaged and fifty percent of the students were of Hispanic/Latino origin. The district had two high schools, middle schools, and intermediate schools and six elementary schools that serve over 9,000 students. Implementation of the intervention occurred in one of the high schools with enrollment of 1,741 pupils. The high school site served students identified with ASD in a variety of educational settings: self-contained, partially included with some resource, life skills, or functional support, and fully included within the general education setting.

Materials used during the study sessions consisted of text at an instructional reading level (See Appendix A for a sample lesson plan with text), along with supplemental student materials which include topic related visuals (e.g., picture, short video, demonstration), a reading log that includes two graphic organizers (See Appendix B), questions stems sheet (See Appendix C), and a checklist for self-monitoring task unit completion (See Appendix D). Each target student

completed one reading log and one checklist per session. A graphic representation of CSR–HS was also be used to remind the participants with the steps for each strategy (See Appendix E).

Participants and Selection Process

Three adolescents with ASD from one high school participated in this study. In order to qualify for participation in the study, students had to be (a) high school students between the ages of 13 and 22, (b) receiving special education support under an educational or psychiatric diagnosis of an autism spectrum disorder (autism, pervasive developmental delay-not otherwise specified, or Asperger's syndrome), (c) reading on a least a second grade level with an IQ in the low average to above average range (80 and above) and (d) primarily receiving instruction in academic content throughout the school day. After meeting with a district special education staff member to review criteria for inclusion and discuss potential participants, including the review of district records (all identifying information redacted), we selected candidates for participation. The district representative made initial contact with parents and school personnel, describe the study, and obtained informed parental and participant consent for the selected students to be involved in the study.

Selecting the participants' reading partners was determined by the school administrator contact after following a set of criteria. In order to be identified as a potentially appropriate match with the target student, the peer had to: 1) demonstrate availability to work with the participant on a daily basis, 2) express interest in working with the participant as a reading partner in a research study, 3) receive approval from the school principal that he is able to miss part of his core instruction schedule in order to be available for participation, and 4) the participant has to express interest in working with this particular partner.

Victor. "Victor" was a sixteen-year old Hispanic/Latino male in 10th grade that read at a third grade instructional level. At the age of three, he had received a primary diagnosis of autism and a secondary diagnosis of Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS) from a neurologist. The instructional staff, including a behavioral specialist reported that Hector fell easily off task, sought attention in inappropriate ways during class periods, and rocked in his chair when he felt anxious. A paraprofessional provided him with support during some of his classes that included reading assigned texts to him out loud.

*Roxana***.** "Roxana" was a seventeen-year old girl in the 12th grade and identified as Hispanic/Latina. She received a primary diagnosis at the age of seven of autism and secondary diagnoses of anxiety disorder and Attention Deficit Hyperactivity Disorder (ADHD) from a neurologist. Her instructional reading level was at the fifth grade. She did not receive any support from an assistant. According to her teachers, she did not generally participate in classroom reading activities. Although she did not speak to peers during class periods, she did contribute to class discussions without prompting.

*Maceo***.** "Maceo" was a seventeen-year old male in the 11th grade identified as both Hispanic/Latino and Caucasian. He read at a second grade instructional level. At the age of three, a psychiatrist had assigned him a primary diagnosis of autism and a secondary diagnosis of speech impairment. An assistant or student peer sometimes provided him with academic and behavioral support in his classes. According to school staff, he did not participate during class periods.

Table 1.

Participant Characteristics

Student	Age	Grade	Diagnoses (Prim. /Sec.)	IQ Full Scale (Assessment)	Instructional Reading Level (GE)	WJIII PC(GE)	Challenging Behavior/Recording Method
Victor	16	10th	Autism PDD-NOS	48 (WISC-IV)	3.0	2.0	Off Task Partial Interval Rec.
Roxana	17	12th	Autism Anxiety Dis. ADHD	79 (WASI)	5.0	4.8	Skin picking/rubbing Partial Interval Rec.
Maceo	16	11th	Autism Speech Impair.	77 (KABC-II)	2.0	K8	Non-compliance Event Rec.

Note: Prim. =Primary Diagnosis; Sec.=Secondary Diagnosis or Diagnoses; PDD-NOS=Pervasive Developmental Disorder Not Otherwise Specified; ADHD=Attention Deficit Hyperactivity Disorder; FS= full scale score; His.=Hispanic; KABC-II= Kaufman Assessment Battery for Children- second edition; Lat.=Latino/Latina; WASI= Wechsler Abbreviated Scale of Intelligence; WISC-IV= Wechsler intelligence Scales for Children – fourth edition; WJIII PC = Woodcock Johnson III Passage Comprehension subtest

Procedures

Measures

Daily curriculum-based measure (CBM) probes. A "cloze" procedure was administered following every baseline and intervention session as a measure of proximal reading comprehension outcome (i.e., the primary dependent variable in this investigation). The bulk of evidence supports the administration of the "cloze" procedure as a reading comprehension measure, with coefficients between cloze scores and other widely accepted criterion measures typically over .80 when both assessments are derived from the same passage (Elley, 1976; Fuchs et al., 1988; Shanahan, Kamil, & Tobin, 1982). The rationale for utilizing the "cloze" procedure as a reading comprehension assessment is that correct replacements are generated by means of reasoning processes constituting comprehension, including the reader's (a) background information on the topic, (b) understanding of other pertinent textual information, (c) familiarity

with linguistic properties, and (d) reasoning skills (Fuchs, Fuchs, & Maxwell, 1988). In the "cloze" procedures, every 5^{th} word was omitted (excluding articles and pronouns) from a passage and replaced with a blank, and students were required to fill in the blanks to complete the meaning of the text read (See Appendix F). Exact words or semantically correct replacements were considered correct responses. All passages used for the "cloze" procedure (i.e., those used during baseline as well as intervention sessions) underwent a readability check using Microsoft Word. This way, we were able to hold the level of probe text difficulty constant across sessions in effort to minimize the influence of this potential confounding variable that may impact th e students' performance on the probes.

Challenging behavior measure. Challenging behavior was operationally defined on an individual basis depending on the behavior of interest for each student. Challenging behaviors were identified through direct observation and interviews with the target students, their teachers, and the behavior specialist who worked with them.

After classroom observations and unstructured interviews with Victor's special education teacher, paraprofessional, and behavior specialist, his challenging behavior was identified as exhibiting off-task behaviors, which was documented using 30-second partial interval recording during study sessions. Off-task behavior was defined as the occurrence of any of the following behaviors: (a) leaving the seat, (b) looking away from speaker (implementer or peer) or material for longer than 3 s, (c) engaging in an activity irrelevant to the assigned task, and/or (d) participating in a conversation or asking a question that irrelevant to the topic of the reading. Additionally, not responding to the implementer's directions within 5 s of delivering the task stimulus was considered an off-task behavior (e.g., implementer asks student to write the keyword, but student does not engage in this behavior within five seconds from the stimulus).

We documented this behavior through thirty-second partial interval recording. The interval was recorded as "off-task" if any of the previously mentioned behaviors occurs for at least one time during the interval.

Similarly, Roxana's observation in the classroom setting and interviewing her teacher and paraprofessional revealed that her challenging behavior was best described as skin picking. Skin picking was operationally defined as scratching, picking, rubbing, or squeezing any part of the skin (e.g., face, arm, neck, scalp etc.) using finger tips or finger nails for longer than two seconds. Thirty-second partial interval recording was used to measure the incidence of Roxana's skin picking.

After observations and unstructured interviews with his special education teacher and behavior specialist, Maceo's challenging behavior was identified as non-compliance. Non-compliance was measured using event recording, and was defined as refusal to engage in the task requested by the implementer within 5 s of delivering the stimulus. Task refusal was defined as vocal protest (e.g., "No", "I don't want to…", "This is hard" etc.) or simply not engaging in the requested task (i.e., nonresponse). Frequency of task refusal was then converted into percentage of task requests by dividing the total number of refusals by the total number of task requests made by the implementer.

Social validation. Social validity is traditionally defined as the social significance of behavioral goals, the social appropriateness of treatment procedures, the social importance of the resulting behavior change or treatment outcomes (Wolf, 1978), and the ease of integrating treatment components into the consumers' current life-style (Schwartz and Baer, 1991). An effective procedure that is not socially acceptable is more likely to be replaced by personnel with a less effective but more socially acceptable alternative (Langthorne and McGill, 2011). Best

practice suggests a combination of the two means of social validation, subjective evaluation (i.e., the use of questionnaires and interviews) and social comparison (i.e., comparing the behavior of a target child before and after treatment) (Gresham and Lopez, 1996; Gresham and Noell, 1993). Author-developed questionnaires and rating scales have been widely used by researchers to assess social validity of interventions with individuals with ASD and other developmental disabilities (Stahmer and Schreibman, 2006; Lancioni, O'Reilly, Singh, Pidala, Piazolla, Oliva, and Groeneweg, 2006; Lancioni, O'Reilly, Singh, Oliva, Marziani, and Groeneweg, 2002). In this study, an author-developed rating scale that focuses on the three dimensions of social validation (i.e., goals, procedures, and outcomes) was utilized to assess the students' perspective about their reading and the intervention they received pre- and post-implementation (See Appendix H)

Treatment fidelity. A CSR–HS fidelity of implementation form was used to collect treatment fidelity data for at least 30% of baseline and intervention conditions. The treatment fidelity form consisted of a Likert Scale evaluation (See Appendix I). The evaluater gave a score for each observed session that ranged from 1 being "less than adequate" and 7 being "highest quality". Scoring the session was based on seven sets of criteria, and the score was given depending on whether the implementer followed the critical steps of CSR-HS and to what extent did the implementation resemble the criteria described A doctoral student who was on the same research team attended extensive training on CSR-HS and on how to use the fidelity of implementation form. Treatment fidelity data collection required direct observation of video recordings of sessions and was reported in percentage of fidelity. Thirty percent of the video recordings were randomally selected for fidelity check, and thus, the implementer was unaware

in advance of which sessions were going to be checked for fidelity of implementation. Mean score for treatment fidelity was 97% across sessions conducted with the three participants.

Interobserver agreement (IOA). IOA data was gathered using the permanent product (i.e., "cloze" probes). Research members rescored 100% of the cloze probes and percentage of agreement will be calculated. Response agreement was based on item-by item comparison. It is critical to note that synonymous replacement words in the "cloze" blanks were considered correct responses (e.g., "trip" or "journey"). An independent observer rescored at least 40% of the researcher-developed social validity rating scale, and IOA was calculated using the same formula. Additionally, IOA for the behavior measure was collected using video recorded sessions. An independent observer recoded 40% of the sessions for each participant and used the same recording system. Data was compared across observers using item-by-item (for probes) and interval-by-interval (for on-task behavior) comparison. Mean IOA score for the reading comprehension measure was 100% across the three participants' probes. Mean IOA score for Victor's off-task behavior data was 92%. Mean score for Roxana's skin picking data was 98%. Finally, mean IOA score for Maceo's task refusal data collection was 96%.

Preference Assessment

Literature on preference assessments have illustrated several beneficial procedures for identifying tangible behavior contingent reinforcers for students with ASD (e.g., Carr, Nicolson, & Higbee, 2000; Cohen Almeida, Graff, & Ahearn, 2000; DeLeon, & Iwata, 1996; Hanley, Iwata, & Lindberg, 1999). This study conducted a two-step preference assessment for each participant to systematically identify highly preferred texts. First, each student was given a paired-stimulus preference assessment (Fisher et al., 1992) to rank order (i.e. 1^{st}, 2^{nd}, 3^{rd}, etc.) broader reading topics (e.g. cells, American pioneers, computers, sea creatures, etc.) and then

categorize these topics as high, moderate, and low preference (i.e. 1st- 6th place = high, 7th=12th place = moderate, and 13th-18th place = low). From the identified high preference topics, a multiple-stimulus without replacement preference assessment (MSWO; DeLeon & Iwata, 1996) was administered to identify the 3 highest-preference passages within each topic. Only passages identified as the 1st, 2nd, and 3rd highest preferred in a given topic were randomly selected and presented to the participants during all sessions (i.e., baseline, intervention, and return to baseline).

The purpose for this multistep assessment process was: (1) to ensure that the choice of text presented to each participant included only highly preferred text, and (2) to keep within-participants text preference constant across sessions and conditions in order to increase the likelihood that the impact of choice led to the possible changes in the outcomes of interest (i.e., reading comprehension and on-task behavior) during the choice and the no-choice treatment conditions, and not topic preference. In the present study, our primary interest was to investigate the influence of the two variables, CSR–HS intervention and choice, on reading comprehension and on-task outcomes of high school students with ASD.

Paired-Stimulus (PS). Stimuli during the paired-stimulus preference assessment consisted of flashcards. Each flashcard had the title of the passage with a picture clarifying the topic of the reading. The assessment procedures consisted of the following administration tasks: (a) 2 flashcards were placed on the table in front of the student and the experimenter asked him or her "which passage would you like to read?" then waited for 5 s. (b) If the student touched a stimulus, the non-chosen stimulus was removed immediately. (c) If the student did not approach both stimuli after 5 s, he or she was prompted by reposing the question and/or providing further clarifications about the topic then presented with the stimuli again. (d) If the student did not

approach both stimuli, again the stimuli were removed. (e) Data were recorded for each trial by writing the results on the score sheet provided. In each stimulus preference assessment session, each stimulus was paired once with every other stimulus. For the 18 big topics per reading level, there were a total of 324 trials.

Multiple-Stimulus without replacement (MSWR). For this assessment procedure, each session began with all stimuli sequenced randomly in a straight line on the table, about 5 cm apart (stimuli= flashcards with passage titles and pictures). The experimenter instructed the participant to select one passage title. After a selection was made, the selected stimulus was removed from the pool. Prior to the next trial, the sequencing of the remaining items was rotated by taking the stimulus at the left end of the line and moving it to the right end, then shifting the other stimuli so that they were again equally spaced on the table. The second trial then followed immediately. This procedure continued until all stimuli got selected or until a participant made no selection within 30 s from the beginning of a trial. In the latter case, the session ended and all remaining items are recorded as ‘‘not selected”.

Baseline

The baseline condition consisted of “business as usual” reading instruction. The participants’ primary teacher had reported to the investigator that during reading sessions, these students were pulled out by a paraprofessional for one-on-one sessions that consist of reading a passage and answering comprehension questions. Based on the information obtained for the teacher, the same procedure was followed during baseline. First, the student was asked to read a passage on his/her instructional level. After reading the passage, the student engaged in a reading comprehension activity that required answering four reading comprehension questions that follow each text. The implementer provided the students with praise statements upon following

directions and answering questions accurately. Every baseline session ended with a cloze procedure that was used to measure performance on the primary outcome (i.e., reading comprehension).

For Maceo, baseline consisted of the procedures described above in addition to a fixed schedule of reinforcement. The reinforcer was identified by his teacher as access to an iPad loaded with game Apps that he had expressed interest in. The schedule of reinforcement involved 5-minute access to the iPad games after completion of each task units. A task unit was identified as an activity with scripted directions given by the implementer (e.g., reading the passage, answering multiple choice questions, completing the cloze probe). A reinforcement schedule such as the one described above was not used with the other two participants since their typical reading instruction did not include such behavior management system.

Intervention

The multicomponent intervention consisted of adapted procedures of CSR, which we referred to as CSR-HS (i.e., CSR procedures modified to meet the needs of high school students with ASD). The general procedures of CSR-HS consisted of a number of "before reading, "during reading", and "after reading" activities that were performed in pairs. Each participant worked collaboratively with an assigned reading partner. Cooperative learning behavior were taught to the pairs in a training session and reinforced throughout the intervention sessions. Each pair was trained to take turns reading, complete the learning log tasks, ask for clarifications, share answers, provide corrective feedback, and engage in conversations related to the reading topic.

CSR-HS-NC Treatment Condition

Before reading phase. During each CSR-HS-NC session, the reading passage was randomly selected from the pool passages identified through the preference assessment as highly preferred topics. The *before reading phase* consisted of an implementer-led strategy used prior to reading a designated text. The before-reading strategy occurred only once during intervention- prior to reading the entire selection. Prior to reading the selection, the implementer followed four steps: (1) provided a brief statement about what purpose of the day's reading and the tasks to be completed by the students, (2) prompted students to scan the title, headings, pictures, and charts or tables in the selection, (3) introduced two to three key vocabulary terms from the selection, and (4) used a visual (e.g., picture, demonstration, short video clip, etc.) to further enhance activation of background knowledge.

During reading phase. The *during reading phase* required students to read the assigned text, stop at predetermined places, and answer one or two "Does it make sense?" questions. A "Does it make sense?" question is a type of comprehension monitoring that allows students to check for their understanding of the text they just read. True or false statements were created by the teachers and research staff, and were either posted on the board or written in on the students learning log. If the statement was false, students discussed why it was false and corrected it to make it a true statement.

After reading phase. The *after reading phase* required students to review the important ideas they have learned. This phase consisted of two strategies; first, generating questions and discussing them with a partner, and second, summarizing what they just read using a graphic organizer. As students read the selection, they generated questions in pairs using question stems (e.g., who, what, when, where, why, and how). Each student asked the question to his/her partner, and the latter provided an answer after looking back in the passage. The summarizing

strategy is an independent practice that required students to identify the most important "who" or "what" in the text they just read and record them in a graphic organizer which is used to generate a summary. Students then shared their summary statement with their reading partner and provided feedback. This phase ended with an implementer-led wrap-up that consisted of restating the purpose of the session's reading and the tasks completed by the students.

CSR-HS-C Treatment Condition

The same procedures described for the CSR-HS-NC condition were used during CSR-HS-C condition with the exception that with the latter condition, the student was presented with three passages on different topics to choose from. The text choice component was the only feature added to CSR-HS components for the purpose of examining the possible effects of choice on reading comprehension and behavioral outcomes in the three participants.

During the CSR-HS-C condition, texts presented for students to choose from were randomly selected from a predetermined pool of passages based on the results from a multi-step preference assessment. This way, passages used throughout the intervention sessions (i.e., CSR-HS-C and CSR-HS-NC sessions) were about topics that are highly preferred by each participant. Following each CSR-HS-C session, a cloze probe was administered for each student to measure possible changes in the reading comprehension outcome. Additionally, all sessions were videotaped to facilitate data collection for the challenging behavior dependent variable.

Return to Baseline

Following the CSR-HS intervention phase, three data points for each student were collected on the same dependent variables in a "return to baseline" phase. During this phase, treatment was withdrawn, and procedures identical to those followed during baseline were applied. Passages used during this phase were selected from the pool of passages that have been

previously identified as highly preferred through the preference assessment. The "return to baseline" phase allowed us to assess whether the reading comprehension and behavioral outcomes observed during the intervention phase continued to appear even after withdrawal of the treatment. In other words, adding a withdrawal phase to the design allowed us to detect evidence of possible generalized treatment effects. From a practical stand of point, evidence that the participants were applying the reading strategies taught even after withdrawal of the intervention procedures would be a desirable outcome. The ultimate goal for any reading comprehension strategy instruction is commonly to teach students to apply the strategy with some level of automaticity that makes it more of a reading habit as opposed to a reading task (e.g., stopping at important words that don't make sense and using a clarification strategy to fix up meaning should be an automatic part of the student's reading even when a learning log and a partner are not available).

Data Analysis

In single-subject research designs, a statistical approach may be paired with a visual analysis of the data to ensure a more comprehensive understanding of the treatment(s) effects (Olive & Franco, 2007). First, line graphs using Microsoft Excel were created for each student clustered based on the dependent variable being measured (See Figure 2 & 3). In both figures 2 and 3, sessions are represented on the x-axis. The y-axis represents percentage of correct responses on cloze probes (Figure 2), percentage of task refusal incidences (for Maceo), and of intervals during which skin picking (for Roxana) and off-task behavior (for Victor) occurred (See Figure 3). Figures 2 and 3 allowed for a visual inspection of performance on the probes and occurrences of challenging behavior, in order to observe an experimental effect for students after treatment begins, and to demonstrate experimental control through replication across different

students (Horner et al., 2005; Kratotchwill et al., 2013; Kennedy, 2005). The visual analysis involved interpretation of the level, trend, variability, immediacy of effect, as a means to estimate magnitude and consistency of performance and behavior changes observed between baseline and intervention as well as across both alternating treatments (Horner et al., 2012). Mean scores were used as a measure of central tendency to compare the level across phases and between conditions. The slope of the line that best fits the data during each phase and condition were used to describe the trend as ascending, descending, or neutral. For analyzing immediacy of treatment effect, the mean for the last three data points from baseline were compared to the mean for the first three data points from the treatment phase. The graphs were also be analyzed to determine the extent to which data patterns are consistent from phases with similar conditions (e.g., looking for consistency in data pattern between "Baseline" and "Return to Baseline").

Second, a procedure called "percentage of non-overlapping data" (PND) was conducted in order to quantitatively analyze and discuss the data. This technique requires identifying how many points of performance fall above the highest data point existing in the baseline condition. Next, the total number of treatment sessions was divided by the number of data points above the highest baseline point. This resulted in a PND score (Scruggs & Mastropieri, 1998). The interpretation of PND is as follows: (a) < 90 = very effective treatment, (b) 70 to 90 = effective treatment, (c) 50 to 70 = questionable treatment, and (d) below 50 = ineffective (Scruggs & Mastropieri, 1998). This procedure was selected because it can demonstrate the degree to which students did or did not maintain a constant level of improvement on the three measures (i.e., reading comprehension, challenging behavior, and social interaction) once engaged in the treatment, compared to baseline.

CHAPTER 4: RESULTS

Preference Assessment

Results from the multi-step preference assessment indicated that Victor's three highest preferred text topics, with number 1 being the most preferred were: 1) How groups of animals live together, 2) Volcanos, and 3) Day and night. Roxana's preference assessment results indicated that her three most preferred topics to read about were: 1) People coming to America, 2) Important people in American history, and 3) The American Civil War. As for Maceo's preference assessment results, his data demonstrated that his three most preferred topics to read about (number 1 being the most preferred) were: 1) Volcanos, 2) The Earth's moon, and 3) Energy from the wind and the sun.

Reading Comprehension

Victor. Victor's reading comprehension data are presented in Figure 2. During baseline, Victor's scores on reading comprehension probes ranged from 0% to 40% with a mean of 16%. Upon implementation of CSR-HS-C and CSR-HS-NC, Victor's level of correct responding on reading comprehension probes increased to means of 100% and 80% respectively. During both intervention conditions scores were consistently high relative to baseline. Victor's reading comprehension graph revealed 100% of data overlap between both conditions (i.e., CSR-HS-C and CSR-HS-NC) over the course of evaluation. However, some differentiation between the two conditions (i.e., CSR-HS-C and CSR-HS-NC) was noticeable during the first four intervention sessions. Victor scored 100% during the first two CSR-HS-C sessions (i.e., when choice of text

was provided) as opposed to 80% during the first two CSR-HS-NC sessions (i.e., no choice of text was provided). His mean score during the CSR-HS-C condition was 96%, and 89% during the CSR-HS-NC condition. Upon return to baseline, an immediate drop (from 100% to 80%) in performance with a mean of 80% was observed. However, the level of performance was noticeably higher during the "return to baseline" phase as compared to the initial baseline condition (M = 16%).

Roxana. Figure 2 shows Roxana's percentage of correct responses on reading comprehension cloze probes. During baseline, Roxana's scores on reading comprehension probes ranged from 0% to 40% with a mean of 15%. Upon implementation of CSR-HS-C and CSR-HS-NC, Roxana's level of correct responding on reading comprehension probes increased to 100% and 80% respectively. Roxana's reading comprehension scores were consistently higher during both intervention conditions relative to baseline. Some differentiation between the two conditions (i.e., CSR-HS-C and CSR-HS-NC) is noticeable during the first five intervention sessions. Roxana scored 100% during the first two CSR-HS-C sessions (i.e., when choice of text was provided) as opposed to 80% during the first three CSR-HS-NC sessions (i.e., no choice of text was provided). Roxana's mean score for CSR-HS-C was 100%, and that for CSR-HS-NC was 91%. During the "return to baseline" phase, Roxana's mean score on probes was 91%, which was comparable to her scores during the CSR-HS-NC. However, the level of performance was dramatically higher during the "return to baseline" phase as compared to the initial baseline (M = 15%) condition. Overall, upon implementation of CSR-HS intervention (i.e., both conditions) a steady increase in reading comprehension scores was detected in comparison to the constantly low scores obtained during baseline.

Maceo. Figure 2 illustrates Maceo's reading comprehension scores from the sessions conducted over the three phases of the study. During baseline, Maceo's scores on reading comprehension probes ranged from 0% to 40% with a mean of 16%. Maceos's level of correct responding on reading comprehension probes increased to 60% upon implementation of both treatment conditions. However, Maceo's data showed that his reading comprehension score reached 100% earlier in the treatment phase during CSR-HS-C condition in comparison to CSR-HS-NC condition. Eventually, towards the end of the intervention phase, Maceo's scores ranged from 80% to 100% during both treatment conditions. During intervention phase, Maceo's reading comprehension sores were consistently high relative to baseline. An immediate increase in performance was detected upon implementation of CSR-HS-C and CSR-HS-NC (from 0% during baseline to 60% during intervention). His scores continued to increase over the course of intervention to reach 100% for both conditions. Maceo's mean score for CSR-HS-C was 91%, and that for CSR-HS-NC was 82%. These mean scores indicated that the level of performance during CSR-HS-C was slightly higher in comparison to CSR-HS-NC condition. Upon return to baseline, graph reveals an immediate drop (from 100% to 60%) in performance with a mean of 67%. However, the level of performance was noticeably higher during the "return to baseline" phase as compared to the initial baseline condition (M = 16%).

For the reading comprehension measure, all three participants attained a PND score of 100%, suggesting that the treatment produced positive effects. Based on the PND criteria described by Scruggs and Mastropieri (1998), the present intervention falls under the very effective treatment (> 90%) for increasing reading comprehension probe scores.

Challenging Behavior

Victor. Figure 3 shows Victor's off-task behavior data. During baseline, Victor's incidences of off-task behavior ranged from 67% to 100% of session intervals, with a mean of 85%. His levels of off-task behavior dropped immediately during CSR-HS-C to range from 13% to 42% of session intervals. Throughout intervention sessions, levels of off-task behavior continued to decrease and reached 23% of intervals during the last intervention session. During CSR-HS-NC, his levels of off-task behavior also dropped immediately from baseline level varying from 20% to 56% of intervals. Differentiation between the two conditions (i.e., CSR-HS-C and CSR-HS-NC) was observed, as levels of Victor's off-task behavior were consistently lower during the CSR-HS-NC (M = 19%) in comparison to CSR-HS-C (M = 30%). However, during the last four intervention sessions, levels of off-task behavior were undifferentiated between intervention conditions. Additionally, Victor's challenging behavior immediately increased upon withdrawal of the intervention (from 20% to 57%), with a mean during "return to baseline" phase of 59%. However, the level of off-task behavior was noticeably lower during the "return to baseline" phase as compared to baseline (M = 85%).

Roxana. Figure 3 represents Roxana's skin picking behavior data. During baseline, Roxana's skin picking occurrences ranged from 73% to 100% of session intervals with a mean of 90%. Her levels of skin picking behavior dropped immediately during CSR-HS-C to range from 10% to 40% of session intervals. During CSR-HS-NC, her levels of skin picking behavior also dropped immediately from baseline level, ranging between 0% and 40% of intervals. Roxana's skin picking continued to decrease throughout the course of intervention and reached 12% of intervals during the CSR-HS session. No clear differentiation between the two conditions (i.e., CSR-HS-C and CSR-HS-NC) was observed, as levels of Roxana's skin picking behavior was higher the first three session of CSR-HS-NC (M = 17%), then lower during the following four

sessions in comparison to CSR-HS-C (M = 22%). Additionally, Roxana's graph reveals an immediate increase in skin picking behavior (from 12% to 87%), with a mean during "return to baseline" phase of 85%. This level of skin picking behavior during the "return to baseline" was consistent with that during baseline (M = 90%).

Maceo. Figure 3 shows Maceo's task refusal behavior data. During baseline, Maceo's incidences of task refusal ranged from 67% to 100% of session task requests with a mean of 93%. His levels of task refusal occurrences dropped immediately during CSR-HS-C to range from 0% to 12% of requests with a mean of 2%. Maceo's task refusal continued to drop over the course of intervention to reach 0% over the last six intervention sessions. During CSR-HS-NC, his levels of task refusal behavior also dropped immediately from baseline level varying from 0% to 40% of requests with a mean of 16%. For the first eight interventions sessions, differentiation between the two conditions (i.e., CSR-HS-C and CSR-HS-NC) is observed, as levels of Maceo's task refusal behavior were consistently lower during the CSR-HS-C in comparison to CSR-HS-NC. Additionally, Maceo's challenging behavior graph reveals an immediate increase in task refusal behavior (from 0% to 32%), with a mean during "return to baseline" phase of 24%. However, the level of task refusal behavior was noticeably lower during the "return to baseline" phase as compared to baseline (M = 93%).

In summary, occurrences of challenging behaviors (e.g., off-task behavior for Victor, skin-picking for Roxana, and task refusal for Maceo) decreased in the three participants upon implementation of CSR-HS. Additionally, upon "return to baseline", an increase in challenging behavior was observed for the three participants, even though the increase occurred at varying level for each participant. Additionally and generally speaking, incidences of challenging behaviors were more frequent during the CSR-HS-C condition in comparison to CSR-HS-NC

condition for Victor. On the other hand, occurrences of skin picking behavior were more frequent during the CSR-HS-NC condition for Maceo. However, no differentiation in challenging behavior data was observed between intervention conditions for Roxana. The mentioned findings are discussed in terms of practical implications for educators in chapter 5.

Similar to reading comprehension outcomes, all three participants attained a PND score of 100% on the challenging behavior measure, suggesting that the treatment produced positive effects. Based on the PND criteria described by Scruggs and Mastropieri (1998), CSR-HS (with and without choice) falls under the very effective treatment (> 90%) for decreasing challenging behaviors.

Social Validation

To ascertain participant information regarding perceived effectiveness of CSR-HS (with or without choice), a social validity questionnaire was administered to all participating students. The questionnaire was administered two times with each participant, one time before commencing the intervention and the other time on the last day of implementation. The questionnaire contained sixteen questions that asked whether the participant reads during his/her free time, enjoys reading, feels that he/she is good at reading, and perceives his/her reading performance in comparison to peers. Each aspect of the respondent's perception regarding reading was targeted by more than one item on the questionnaire to decrease the likelihood of "guessing" responses. The possible answers consisted of a graphic that demonstrates feelings (e.g., faces showing different types of emotions). The possible answer choices were "yes, definitely", "no, definitely", "closer to yes", or "closer to no". The answer that demonstrated the most positive perception on reading a pleasant activity/task is the "yes, definitely", follows "close to yes", "closer to no" is less positive, and the least positive is "no, definitely".

Prior to implementation of CSR-HS, Victor marked “yes, definitely” and “closer to yes” zero time, “closer to no” three times (23%), and “no, definitely” thirteen times (77%) out of the total items. However, his perception about reading in general and about his own experiences with reading tasks improved, as his scores on the post-intervention questionnaire increased for the positive responses and decreased for the negative responses. He responded “yes, definitely” 43% of the times, “closer to yes” 44%, and 13% “no, definitely”.

A similar change in Roxana’s perception about her reading experience was observed by comparing her scores on the pre-intervention and post-intervention administrations of the social validation questionnaire. Prior to receiving CSR-HS intervention conditions, Roxana’s responses to the social validation questionnaire demonstrated a negative perception about her reading abilities and experiences. More specifically, 62% of her responses were “no, definitely”, and 38% were “closer to no”. None of her responses indicated a positive attitude towards reading. On the other hand, her responses on the items post-intervention were much more positive. Particularly, she responded “yes, definitely” on 31% of the questionnaire items, “closer to yes” on 50% of the items, “closer to no” on 13% of the items, and “no, definitely” on 6% of the items.

Maceo’s responses on the social validation measures showed a negative perception about reading during pre-intervention administration compared to his responses post-intervention. Prior to receiving CSR-HS intervention conditions, Maceo’s responses to the social validation questionnaire demonstrated an unfavorable perception about his reading abilities and experiences. More specifically, 100% of his responses were “no, definitely. His responses on the items post-intervention, on the other hand, were more positive. Particularly, he responded “yes, definitely” on 63% of the questionnaire items, and “close to yes” on 37% of the items.

In summary, according to the responses to the social validation questionnaire obtained from the three participants, the way they perceived both their reading abilities and the reading-related experiences they encounter differed between pre-intervention and post-intervention administration of the questionnaire. The three participants reported negative perception of their reading abilities and experiences during pre-intervention administration of the questionnaire (e.g., their responses were either "No, definitely" or "Closer to No"). Responses obtained from the three participants changed to demonstrate positive perception of both their reading abilities and experiences after implementation of the intervention (e.g., their responses were either "Yes, definitely" or "Closer to Yes"). These results are discussed in terms of implications for instruction in chapter 5.

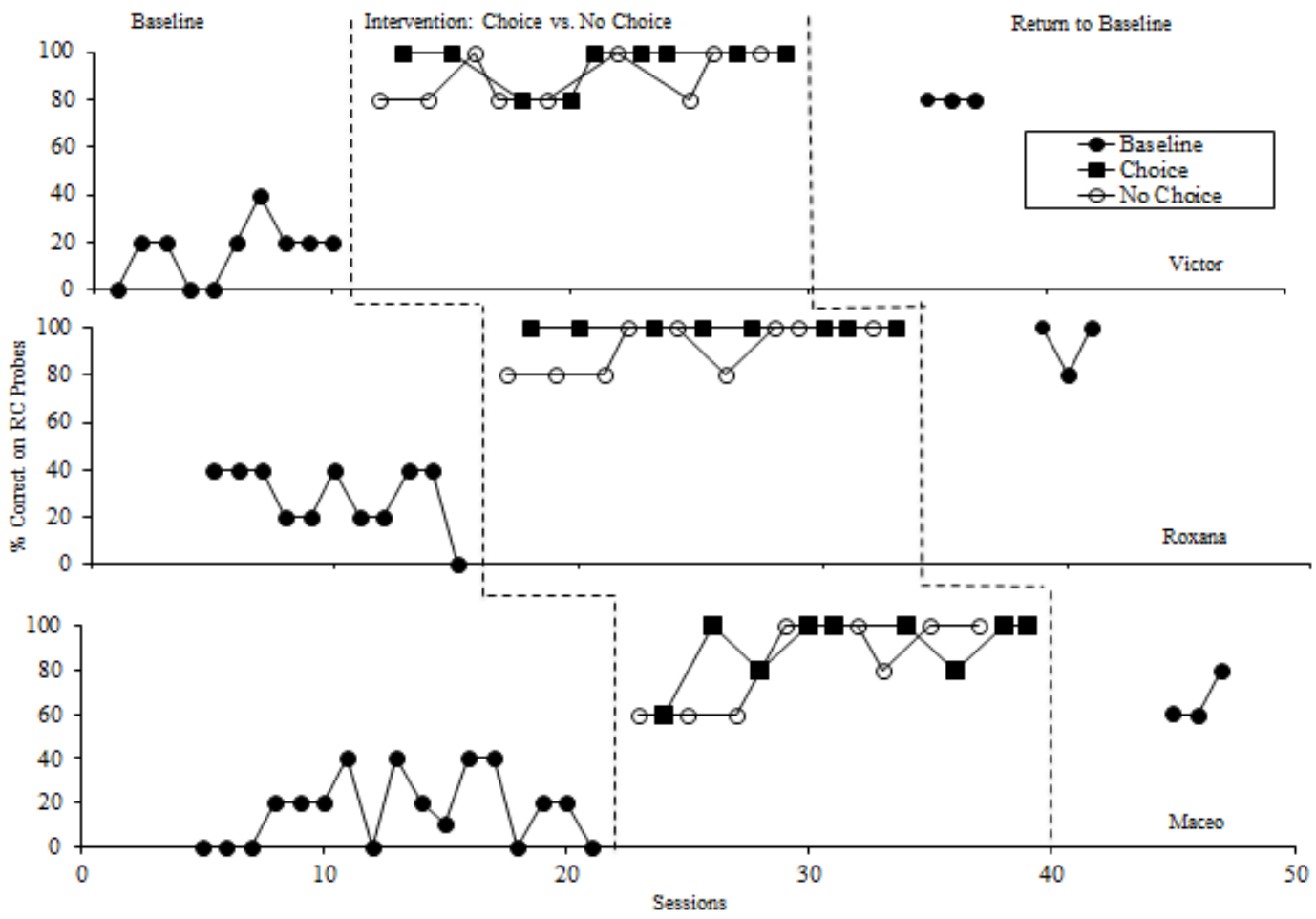


Figure 2. Reading comprehension probe scores reported as percentage of correct items.

Occurrences of Challenging Behaviors

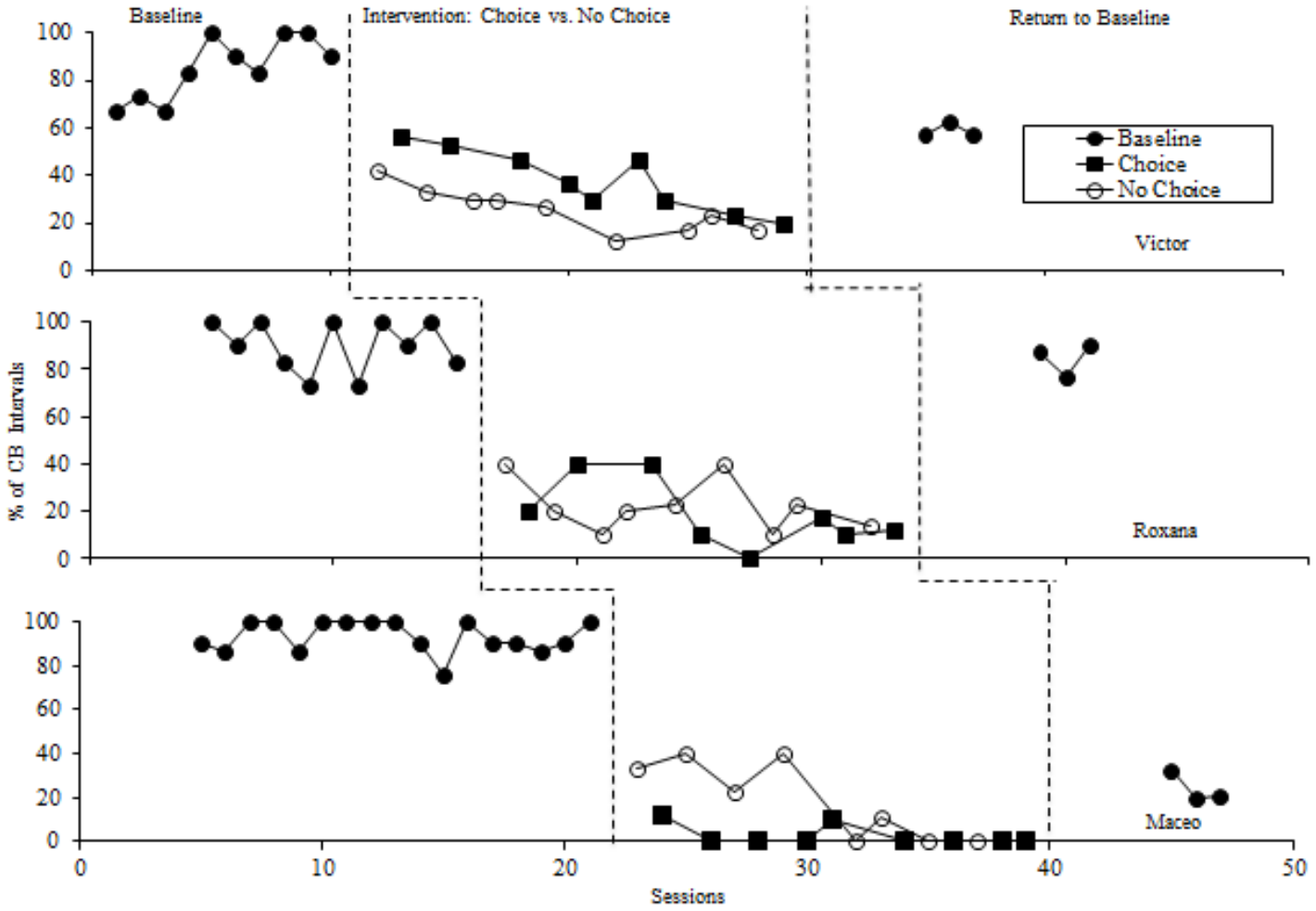


Figure 3. Challenging behavior occurrences reported as % of intervals for Victor and Roxana, and % of opportunities for Maceo.

Table 2

Mean Scores for Accuracy of Responding on Reading Comprehension Probes

Participant	Baseline (%)	CSR-HS-C (%)	CSR-HS-NC (%)	Return to baseline (%)
Victor	16	96	89	80
Roxana	15	100	91	91
Maceo	16	91	82	67

Note: Scores represent percent correct on reading comprehension probes.

Table 3

Mean Scores for Challenging Behaviors

Participant	Baseline (%)	CSR-HS-C (%)	CSR-HS-NC (%)	Return to baseline (%)
Victor	85	30	19	59
Roxana	90	22	17	85
Maceo	93	2	16	24

Note: Scores represent percent intervals of challenging behaviors

Figure 4. Victor's Social Validation Scores

Note. Examples of questionnaire items: *"It's fun to read", "I am a good reader". "Reading is exciting", Reading tests are usually easy for me", I'd rather do reading than any other kind of homework", "I enjoy reading to learn new information" etc.*

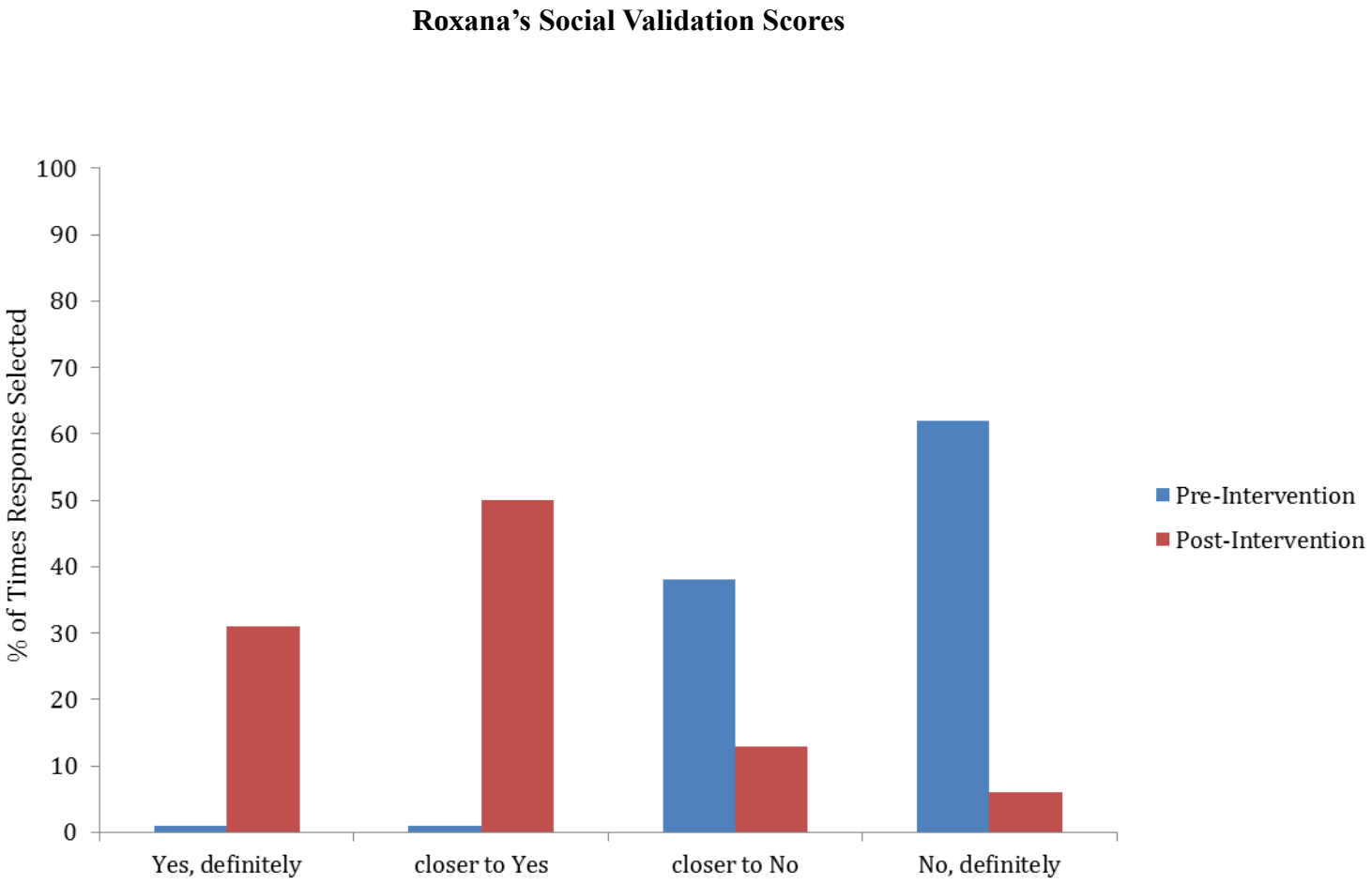


Figure 5. Roxana's Social Validation Scores

Note. Examples of questionnaire items: *"It's fun to read", "I am a good reader". "Reading is exciting", Reading tests are usually easy for me", I'd rather do reading than any other kind of homework", "I enjoy reading to learn new information" etc.*

Figure 6. Maceo's Social Validation Scores

Note. Examples of questionnaire items: *"It's fun to read", "I am a good reader". "Reading is exciting", Reading tests are usually easy for me", I'd rather do reading than any other kind of homework", "I enjoy reading to learn new information" etc.*

Chapter 5: Discussion

General Discussion

The academic emphasis in many high school settings is commonly on preparing students for improved performance on standardized assessments that usually provides them with an exit ticket to college. As a result, less attention is given to enhancing prerequisite skills for students who are struggling in areas such as reading comprehension. Many high school teachers and administrators often report the lack of time during the school day allocated for direct reading comprehension instruction. Secondary students rarely receive strategy instruction that aims to improve their ability to read for meaning. As is the case in the primary grades, many secondary students with ASD have reading comprehension deficits that prevent them from reading instructional level text for meaning (Chiang & Lin, 2008; Nation et al., 2006). These students struggle with other content as a result of the challenges they experience trying to comprehend text for various purposes (e.g., solving a math or a science word problem, carrying out a discussion based on a social studies passage, etc.). Despite the significance of this problem, we were unable to locate any intervention studies that aimed to improve reading comprehension in students with ASD on the secondary level (El Zein., 2013).

The purpose of this study was to evaluate the effectiveness of a multi-component reading intervention (i.e., CSR-HS) intended to increase reading comprehension of informational text f or secondary students with ASD while also decreasing challenging behaviors and increasing social interactions with their peer partners. This study was prompted by 1) the significance of the reading comprehension challenges students with ASD exhibit (Nation et al., 2006), and 2) the dearth of high quality studies investigating

reading comprehension interventions for students with ASD in general (El Zein et al., 2013; Chiang & Lin, 2008; Whalon et al., 2009), and 3) the lack of such studies conducted with high school students on the spectrum (El Zein, et al., 2013). Findings from the present study demonstrated that for all three participants, accuracy of responding on reading comprehension probes (cloze procedure) increased, while instances of challenging behaviors decreased during both conditions of CSR–HS intervention. Additionally, upon starting "return to baseline" phase, reading comprehension dropped slightly and levels of challenging increase to some extent in the three participant. These consistent findings were observed in all three participants at different points in time, demonstrating a functional relationship between the observed positive outcomes (e.g., reading comprehension gains, reduction in challenging behavior) and implementation of CSR-HS.

As for the influence of choice component in the CSR-HS-C condition, no clear differentiation between conditions was observed in terms of reading comprehension gains and reduction in challenging behaviors of the three participants. Most of the reading comprehension data points from both treatment conditions (i.e., CSR-HS-C and CSR-HS-NC) overlapped, and the minimal differentiation in challenging behavior data points between both conditions was inconsistent across participants. The repetitive overlap in data points between the conditions and the inconsistency of results across participants showed that no clear advantage was detected in favor of the choice condition. From here, we suggest that the multicomponent intervention CSR-HS was associated with gains in reading comprehension as well as reduction in challenging behaviors regardless of providing the participants opportunities to make choice of text.

Reading comprehension outcomes. Findings from this study indicate that CSR–HS had a positive effect on reading comprehension outcomes for the three participants. Specifically, mean scores for Victor, Roxana, and Maceo during CSR-HS-C were 96%, 100%, and 91%, respectively; while their mean scores during CSR-HS-NC were 89%, 91%, and 82%, respectively. The mentioned mean scores demonstrated some level of differentiation in reading comprehension performance across the three participants between CSR-HS-C and CSR-HS-NC, where levels of performance were consistently higher during the condition when choice of text was provided. Visual inspection of the graphs also indicated that there was evidence of improved performance in both conditions, until scores on reading comprehension probes seemed to be equally high during the last intervention sessions (i.e., with and without choice) in the three participants.

The sustained high scores on reading comprehension probes during the final intervention sessions (i.e., with or without choice) for the three participants support Carnahan and Williamson's assertion (2013) that "for this population, strategy development that facilitates access to content that is more sophisticated than their reading levels support is important to their academic and social success (p. 359)."

Challenging behavior outcomes. All three participants demonstrated a descending trend in their challenging behaviors when engaged in CSR–HS. The targeted challenging behaviors included off-task behavior, task refusal, and skin picking–all of which decreased dramatically over the course of intervention. Mean score of Victor's challenging behavior was 85% during baseline, 25% of the intervals during CSR-HS, and 59% during "return to baseline". Similarly, Roxana's challenging behavior was 90% during baseline, 20% of the intervals during CSR-HS, and 85% during "return to baseline". As for Maceo, his high

levels of task refusal during baseline was reflected in a 90% mean opportunities, which dropped to 9% during CSR-HS, and increased again to reach 24% during "return to baseline". This consistent pattern across the three participants demonstrated a functional relationship between the observed reduction in challenging behavior and implementation of CSR-HS (in both conditions). There was no differentiation between CSR-HS-C and CSR-HS-NC, as a consistent pattern was not noticed.

Effective delivery of instructions and requests is a key strategy for promoting appropriate behavior (Kern & Clemens, 2007). As mentioned in Chapter 1, students with ASD often exhibit challenging behaviors when academic tasks are presented, particularly those related to skill areas of deficit (e.g., reading comprehension). Because all three participants read below grade level, providing structured strategies and support to tackle an academic task like reading for meaning showed potential for reducing behaviors that interfere with learning and thus allowing for more academic engagement.

Social validation measure. The social validation questionnaire administered revealed that after implementation of CSR-HS, the three participants' perceptions and attitudes towards their own reading abilities and experiences changed from being improved dramatically. Prior to intervention, the three participants responded the majority of the questionnaire items in a very negative fashion, yet their answers to the same questions were much more positive after implementation. The mentioned finding suggests that implementation of CSR-HS is associated with improvement in the students' perceptions about their own reading experiences.

Conclusion

This study brings research on reading comprehension intervention for students with ASD into a secondary school setting, an area where little is known about what these students experience in high school classrooms (Seltzer, 2004). The consistent positive outcomes observed in the three participants upon implementation of CSR-HS demonstrated that reading comprehension can be positively affected when reading comprehension strategies adapted for individuals with ASD are introduced. Further, outcomes were achieved in decreasing instances of challenging behaviors of students with ASD who often engage in this type of behaviors when presented with academic tasks that target their deficit skills (e.g., reading comprehension). This is an important finding as research and instruction for students with ASD often focus on reducing challenging behaviors and teaching functional skills development (e.g., social interactions, adaptive behavior, and vocational skills) at the expense of academic performance. Findings from this study demonstrated that it is possible to target academic skills while attending to what are often identified as the areas of biggest need for this student population (i.e., addressing challenging behaviors).

Furthermore, the preliminary positive outcomes associated with the implementation of CSR-HS are consistent with the existing claim that peer-mediated intervention has garnered much attention and has been documented as effective in facilitating the educational inclusion of children with ASD (Harrower & Dunlap, 2001; Kamps et al, 1989; Kamps et al., 1994; Kamps et al., 1995). However, it is critical to note that "business as usual" was not a standardized protocol for all three participants. For instance, Maceo had a positive reinforcement schedule in place that we maintained and continued to deliver during the course of evaluation. The other two participants did not have a behavior

management in place; hence their "business as usual" was applied in a different fashion. The purpose of this investigation was to investigate the effects of CSR-HS as previously described on reading comprehension and challenging behaviors, and thus efforts were made to minimize the effects of confounding variables. As is true for all students with disabilities, and even more critical with students with ASD, a one-size-fits-all approach is not appropriate and careful identification of individual treatment history is beneficial.

Findings from this study were consistent with those from recent reading comprehension intervention research for students with ASD (El Zein et al., 2013; Chiang & Lin, 2008). As recent syntheses have demonstrated, strategy instruction, peer-mediated instruction, and the use of visuals are three intervention approaches that have a promising positive influence on reading comprehension outcomes of students with ASD. The present study adds to the existing literature that multi-component interventions that have been proven effective with struggling readers who do not have an ASD may be modified to fit the needs of individual students on the spectrum and produce desirable outcomes. Additionally, as mentioned in chapter 1, this study is an addition to the existing research in this area, as it simultaneously targets challenging behavior as a secondary measure of CSR-HS outcomes. This addition is particularly valuable for this population given that challenging behavior is a common problem that educators and family members often report as an area of high need for individuals with ASD.

The Connection to Previous Studies

This study examined a multicomponent intervention that included the use of strategy instruction, cooperative learning, choice, task analysis, graphic organizers, structured responding (e.g., learning log), visual support, and prompting. Going back to the

theoretical framework from which this intervention emerged, we notice that the adaptations made to the typical implementation of CSR were related to the following six approaches: 1) prompting techniques, 2) mode of instructional delivery, 3) motivational variables, 4) peer-mediated support, 5) student responding, and 6) assessment-based instruction.

A most-to-least prompting technique was utilized to help our target students follow the steps of CSR-HS (e.g., before, during, and after reading tasks) and the etiquette of working with a partner (e.g., making eye contact, turn taking, sharing, providing feedback, etc.). Additionally, the peers were trained to provide similar technique of prompting in order to facilitate shifting this role from the implementer to the peer and make the dynamics as close as possible to the natural environment (i.e., general education setting). Prompting is a commonly used technique when teaching students with ASD; however, this study is the first to investigate prompting as an element within a multicomponent intervention that aimed to improve reading comprehension performance of this population of students.

During CSR-HS, there was an adaptation in the mode of instructional delivery. This approach is reflected in the of various types of sources of information input (e.g., reading out loud, listening to partner reading, using pictures, including videos and PowerPoint slideshows to introduce topics of reading). Further, the structured fashion in which the information was presented to the participants (e.g., CSR-HS chart; modeled explicit steps with practice and feedback) was another example of changing the instructional delivery mode. Previous research has examined the influence of such variable (e.g., the use of E-text in place of traditional books) on reading comprehension of students with ASD (Knight, 2010). The use of explicit instruction techniques (Flores & Ganz, 2007;

2009; Knight, 2010) was also found to have positive reading comprehension outcomes for students with ASD. The present study modified the mode of instructional delivery to maximize structure, the use of visuals, and provide ample opportunities to practice and receive feedback.

The major addition in one of the alternating treatment conditions was providing our target students with opportunities to make choice of text. Embedding choice of text is an example of an antecedent intervention that aimed to improve the participants' motivation to complete the tasks and read for meaning. The use of choice has recently received some attention from researchers as a promising intervention for teaching students with ASD new skills and reducing their challenging behaviors; nonetheless, the present study is the first to investigate the influence of choice on a reading comprehension outcomes, which is a an area of research that is highly warranted.

Findings from this study were consistent with previous studies suggesting that peer-mediated instruction (e.g., cooperative learning groups and peer tutoring) may have a positive influence on reading comprehension outcomes of students with ASD (Campbell 2010; Kamps et al., 1989; Kamps et al., 1994; Kamps et al., 1995; Whalon & Hanline, 2008). In addition to the favorable reading comprehension and challenging behavior outcomes reported in the results section, anecdotal data from this study indicated that the three participants demonstrated improvements in social interaction (e.g., making eye contact, social initiations, responding to peer interactions). We speculate that this improvement in social interactions may be attributed to the peer-mediated instruction component that was paired with prompting to follow expected cooperative learning behavior.

Previous research that examined the effect of choice on academic performance and engagement in academic tasks favors choice as a promising antecedent-based intervention component (Reutebuch et al., in review; Ramaniuk, & Miltenberger, 2001). Findings from the present study demonstrated that the implementation of CSR-HS with and/or without choice was associated with improved reading comprehension outcome and reduced incidences of challenging behaviors in the three participants. However, data from this study is insufficient to draw the conclusion that the addition of the choice component had a superior influence on the outcomes of interest in comparison to implementing CSR-HS without opportunities to make choice of text. There was no clear differentiation in our results from CSR-HS-C and CSR-HS-NC across the three participants; thus, we are unable to recommend adding choice as an effective academic component that carries an added intervention value. This particular finding was inconsistent with the very few previous studies that investigated choice as an academic intervention for students with ASD and found that choice is effective in reducing challenging behavior and increasing accuracy of responding to academic tasks (Koegel, Sighn, & Koegel, 2010; Mechling et al., 2006; Rispoli et al., 2013; Ulke-Kurkcuoglu & Kircaali-Iftar, 2010). However, even though we were unable to detect differentiation between the choice and no choice conditions, reading comprehension data were consistently higher and challenging behavior data were consistently lower during intervention sessions (with or without choice) relative to the baseline phase, we cannot draw the conclusion that the addition of the choice component is ineffective. Future research is warranted to investigate the effects of choice as a single component intervention, or simply efforts to withdraw all intervention components and keep choice in a separate withdrawal phase in order to detect potential changes in

outcomes that can be attributed to the single component of choice. Without such withdrawal design (i.e., a separate intervention phase that consists of choice only), one cannot make any conclusions about the influence of choice as an intervention component.

A common limitation across most studies examining the effectiveness of reading comprehension interventions for students with ASD is the absence of assessment-based instruction (El Zein et al., 2013). The present study utilized instruction based upon assessment tools that have been validated by previous research (e.g., WJ-III; PS preference assessment; & MSWO preference assessment). Positive results from this study suggest that assessment-based instruction is an intervention component that may have positive influence on academic and behavioral outcomes of students with ASD.

Limitations

This dissertation study addresses an understudied area and emphasizes that further research efforts are warranted for adolescents with ASD and reading comprehension; however, there are several limitations to note. First, the small sample size limits the generalizability of the findings. Three participants are sufficient in a single subject design study since it allowed for three replications of findings at three different points in time. Nonetheless, without at least three replication efforts by different research teams (Horner et al., 2005), randomized control trials are considered the experimental studies that allow for drawing conclusions based on causality explanations in special education research (Stanovich & Stanovich, 2003).

One limitation of this study that is worth stating is that the participants received the intervention during an advisory period (i.e., in a special education setting) and it was implemented by a research team member. Similar positive findings are expected to be

observed when the intervention is implemented in the general education setting, where the students are exposed to challenging reading comprehension tasks. However, we did not conduct the study in a general education setting, and our implications for practice are based on some inference-making. From here, research is warranted to investigate the generalizability of this intervention in the general education setting, where students with ASD are usually exposed to text with challenging readability levels. In addition, data for the reading partners were not collected. Reciprocity is an important consideration for both partners and deserves attention. Future research is warranted to address the benefits of implementing CSR-HS on both students with ASD and their typically developing peers. Additionally, implementation of this intervention within a classroom setting may require much more careful consideration around pairing decisions to ensure all parties can benefit from the reading strategies and assigned comprehension activity.

Another limitation involves the use of standardized pre/post reading measures. Passage comprehension subtest of the WJ-III was administered, but pretest scores were used solely as a descriptive measure to students' reading comprehension grade equivalent as school records were dated and the instructional staff could only estimate about the reading levels of targeted students. While we did assess the students with the WJ-III again at the conclusion of the study and gains in passage comprehension were noted, we feel that the short timeframe of the study does not allow for valid and reliable evidence of growth than can be attributed specifically to our intervention. Even though the "cloze procedure" is a commonly used reading comprehension measure, it consisted of researcher-developed probes that have not been piloted prior to this study. Piloting the probes and conducting a

systematic item analysis before collecting data may have increased our level of confidence in the results.

Finally, CSR is a multicomponent reading comprehension intervention that involves teaching the students various strategies they can apply while reading challenging text as well as working with reading partners in cooperative learning groups to enhance the learning experience. Similarly, CSR-HS is a multicomponent intervention that includes the critical features typical CSR with modifications that were hypothesized to meet the needs of students with ASD. Consequently, it is difficult to attribute the positive findings detected upon implementation of CSR-HS to specific intervention components.

Implications for Practice and Research

This study suggests that a reading comprehension intervention targeting adolescents with ASD has the potential to extend benefits beyond improvement in reading for meaning to better target the many challenges associated with the disability. The peer component offers an increased opportunity to interact with classmates without the potential stigma of working with a paraprofessional thus promoting social acceptance by peers and general education personnel. The self-monitoring feature (student checklist) allows students with ASD to become actively involved in the intervention process and more involved in their instruction and knowledge acquisition. We further speculate that when the appropriate structure and supports are in place, greater engagement in academic tasks may be achieved. It is critical to restate that the addition of the choice component was not associated with added reading comprehension and behavior gains to that observed during the no choice condition. Hence, we encourage educators to utilize the components of CSR-HS while delivering reading comprehension instruction for their students with ASD, yet

our data do not allow us to recommend adding the choice component. We highly suggest that educators' efforts and resources be focused on adding the other components (e.g., strategy instruction, prompting, graphic organizers, visual support, peer pairing, self-monitoring, and task analysis) that were associated with the detected gains in reading comprehension with simultaneous reduction in challenging behaviors.

Even though this intervention has potential for class-wide use, more research is needed to assess the generalizability of the findings and to replicate these findings in different settings and when implemented by school staff under typical conditions. Because many students with ASD spend the majority of their instructional day in inclusive settings, it is worthwhile to investigate whether the CSR-HS intervention is effective and efficient for promoting academic achievement and social interactions of both students with ASD as well as their peers without ASD.

Furthermore, in this study, we ensured that reading materials used were at the focus students' instructional reading levels. Participating students read many grade levels below that of their actual grade (mean = 7). For class-wide implementation, it is likely that the reading level of material would have to be much higher, and it has yet to be determined whether the strategies included in CSR–HS are sufficient for the demands of reading more difficult text. We suggest that for students that are similar to those that participated in our study, implementing the intervention as we did is a good starting point for those with limited reading and social skills. Once students with ASD build a sufficient base in working with peers and apply reading strategies, class-wide implementation may have a much better chance of success.

Given that CSR-HS is a multicomponent intervention with various modifications to

the typical CSR implementation, further research that aims to analyze the effects of the single components of CSR-HS may be helpful in investigating which particular intervention components were responsible for the positive outcomes observed for the three participants. The positive outcomes detected at throughout the course of implementation are attributed to the combination of the multiple components and adaptation within CSR-HS. Future investigation that includes intervention component analysis may yield findings of further practical implications. As mentioned earlier, investigating the effect of choice as a single component intervention, or simply withdrawing all intervention components and keeping choice in a separate withdrawal phase are future research efforts warranted to detect possible changes in reading comprehension and challenging behavior outcomes that can be attributed to the single component of choice. Given the lack of differentiation in our data between CSR-HS-C and CSR-HS-NC, and without employing a withdrawal design (i.e., a separate intervention phase that consists of choice only), we cannot make any conclusions about the influence of choice as an intervention component on the outcomes of interest.

APPENDIX A: CSR-HS MODEL LESSON PLAN

3.5—Lesson 1 Atlantis–Found?

Teacher Introduction

2 to 3 minutes

- Tell students that it is time for the reading assignment, using CSR–HS.
- Check that pairs are seated next to one another and have their materials ready.
- Remind students that they will work with their assigned partner to use the before-, during-, and after-reading strategies, followed by a teacher-led wrap-up.
- Tell students that they will read and learn about the island called Atlantis.
- Ask students to have the text, learning log, question stems, writing utensil, and pair checklist in front of them.
- Remind students to refer to the CSR–HS graphic.

Before Reading

2 to 3 minutes

- Direct students to today's text, **Atlantis—Found?**
- Tell students to look at the title, any pictures in the text, and the key words: "legend," "structures," and "ruins."
- Highlight the image of Atlantis.
- Provide additional pictures, demonstrations, or short videos and ask students to visualize the topic in their mind.
- Explain that some people do not believe the stories about Atlantis, an island that is said to have vanished. Tell students that they will read to learn about what happened to make some people believe that the story might be true—that Atlantis really did exist.
- Tell students that the key words are important to understanding the story. Then, briefly review the key words and their meaning. Have students write the words in their log.

Remind students to complete the first column of the checklist.

During Reading

10 to 12 minutes

- Tell students that they will read **Atlantis—Found?** (or part of the passage, depending on difficulty level).
- Quickly review the expected student behaviors for **"fixing up" meaning**:
  - Students identify and record words, phrases, or sentences they do not understand.
  - Students fix up the difficult parts through rereading, using a dictionary, and/or discussing in groups.
  - In their learning logs, students record the meaning of the parts they identified as difficult to understand.
- Quickly review the expected student behaviors for the **true/false activity**:
  - Students stop reading at the predetermined place in the text.
  - Students briefly discuss the true/false statement and record the statement and answer in their learning log.
  - If an answer is "false," students discuss why it is false and rewrite the sentence on their log to make it true.
  - Students continue reading until the next stopping point and respond to the next true/false statement (if any).

- **Lesson suggestions**:
  - Fix-ups: "tsunami," "remnants," "looked like columns or an old temple"
  - Places to stop: After each highlighted sentence
  - True/false statements:
    - According to the legend, nothing was left of Atlantis after the tsunami hit. (True.)
    - In one place, explorers found a huge path made of lava rocks. (False: "Lava rocks" should read, "carved stones.")

Remind students to complete the second column of the checklist.

After Reading

10 to 12 minutes

- Tell students that they will collaborate to write and answer **two types of questions**, using their sentence stems:
  - "Why" or "how" questions
  - "What," "where," or "who" questions
- Work through a **"why" question** with students. For example: Why did the pilot's observation make some people believe that the legend of Atlantis was true? (He noticed a large, rectangular shape on the bottom of the sea. When explorers investigated, they found remains of old buildings.)
- Have students work together to write and answer a **"how" question**. For example:
  - How was Atlantis destroyed, according to the legend? (By a tsunami that washed over the island.)
  - How did the pilot discover the large rectangular shape? (By flying over the ocean near the Bahamas.)
- Have students write and answer a third question. Tell students that they can pick from **"what," "where," or "who."**
- Have students use the **graphic organizer** on their log to summarize the text:
  - Students determine and record the most important "who" or "what."
  - Students write three details about the "who" or "what."
  - Students generate a summary statement of at least three sentences.
  - Students write the summary individually. Initially, guide students to use their summary sentences to create a summary statement.

Remind students to complete the third column of the checklist.

Wrap-Up

Lead a wrap-up of the CSR–HS lesson. The purpose of the wrap-up is to highlight what was accomplished and to facilitate student connections among the day's reading, other readings, and the real world. Use the following procedure:

- Restate the purpose of the day's reading: Learning about the island of Atlantis and how it may have disappeared into the sea.
- Remind students of what they accomplished: Using CSR–HS, they worked together to read and learn about how a pilot and explorers found evidence that Atlantis, thought to be a legend, may have existed after all.
- Provide brief feedback about student performance and behavior during the lesson.
- If time allows, to monitor progress or to provide individual tutoring, have students answer the questions that accompany the reading passage.
- Complete the learning log rubric and plan for additional support and/or instruction to help students reach 100% proficiency.

Atlantis–Found?

Key Words

legend A *legend* is an old story that may or may not be true.
ruins *Ruins* are the parts of buildings or cities that are left after the rest has been destroyed.
structures *Structures* are things that have been made, like buildings, bridges, or houses.

Story

For thousands of years, people have been telling the story of Atlantis. They say Atlantis was once an island in the Atlantic Ocean. It had a royal city with beautiful buildings and gardens. The people of this kingdom were wealthy and wise.

Then, in one day and one night almost 12,000 years ago, great earthquakes and a huge tsunami destroyed the city. The sea washed over the island. Everything and everybody sank under the waves.

People said the story of Atlantis was just a **legend**. But then something happened that made them think the story might be true. In 1968, a pilot flying over the waters near the Bahama islands noticed a large rectangular shape on the bottom of the sea. When explorers examined the shape, they found stones that looked like the remnants of an old building! Soon, explorers found other mysterious **structures** nearby. Some of the **ruins** looked like columns or an old temple. In one place, explorers found a huge path made of carved stones. All of these stones were thousands of years old. Now some people believed that there really was an island of Atlantis. What else, they asked, could these stones be? What do you think?

Questions

1. What is the main idea of this story?
   a. Explorers found mysterious structures that some people believe were from Atlantis.
   b. Atlantis had a royal city with beautiful buildings and gardens.
   c. People said that the story of Atlantis was just a legend.

2. What did the pilot notice on the bottom of the sea in 1968?
   a. Columns and an old temple
   b. A path made of carved stones
   c. A large, rectangular shape

3. What does the word *tsunami* mean in this story?
   a. Ruins of a city
   b. Very large wave
   c. Great earthquakes

4. What must be true about the water near the Bahamas?
   a. It must be very cold.
   b. It must be very clear.
   c. It must be very old.

APPENDIX B: LEARNING LOG

Name: _____ Date: _____

Learning Log

Title of Text: _____

Before Reading

The key words are:

_____

_____

_____

_____

I have looked at the: ❑ Title ❑ Key words ❑ Pictures

I have visualized the: ❑ Pictures ❑ Demonstrations ❑ Video clips

During Reading

Fix Up Meanings

This does not make sense to me.	Now I get it!

True or False?

Write the statement.	Answer	If false, rewrite to make the statement true.
	T / F	
	T / F	
	T / F	

After Reading

Generate Questions

"Why" Question	Response

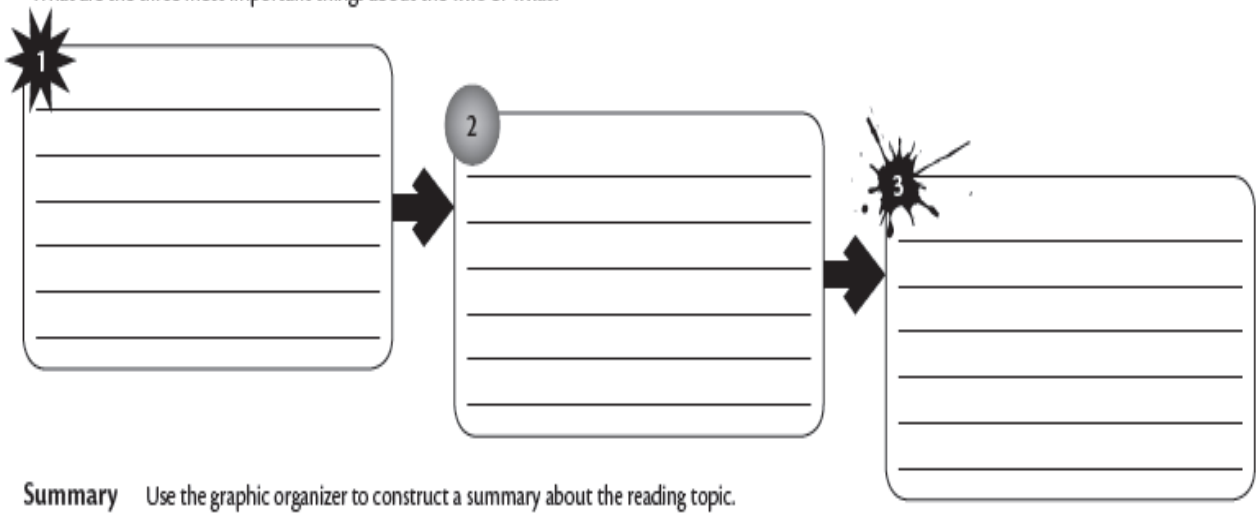
"How" Question	Response

"What," "Where," or "Who" Question	Response

Graphic Organizer

Who or **what** is the story is mainly about?

What are the three most important things about the **who** or **what**?



Summary Use the graphic organizer to construct a summary about the reading topic.

APPENDIX C: QUESTION STEMS

Question Stems

Why	How	What	Where	Who
Why are... Why did... Why is... Why was...	How are... How did... How much... How many...	What is... What are... What do you think will happen if... What is the reason that.... What is the difference between... What do you think caused... What would you do if... What is one...	Where are... Where did... Where is...	Who is... Who are... Who did...

Question Stems

Why	How	What	Where	Who
Why are... Why did... Why is... Why was...	How are... How did... How much... How many...	What is... What are... What do you think will happen if... What is the reason that.... What is the difference between... What do you think caused... What would you do if... What is one...	Where are... Where did... Where is...	Who is... Who are... Who did...

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APPENDIX D: SELF-MONITORING CHECKLIST

CSR–HS Checklist Names: _____ Date: _____

Before Reading	During Reading	After Reading
❑ **Read** the title. ❑ **Looked** at the pictures or other visuals. ❑ **Visualized** about the topic. ❑ **Wrote** key words. ❑ **Checked** with partner for help if needed.	❑ **Read** the text or followed along. ❑ **Wrote** parts of the text that did not make sense. ❑ **Worked** with partner to fix text that did not make sense. ❑ **Worked** with partner to complete true/false activity. ❑ **Checked** with partner for help if needed.	❑ **Created** one "how" or "why" question and one "what," "where," or "who" question with the answer. ❑ **Wrote** questions and answers. ❑ **Asked** questions with partner. ❑ **Completed** graphic organizer. ❑ **Wrote** summary. ❑ **Checked** with partner for help if needed.
Things to do: Make connections with the topic.	**Things to say if you are stuck:** • Can you help me figure this out? • I don't know what this means. • Do you agree or disagree? Why? • I agree/disagree, and this is why...	**Things to say if you are stuck:** • Can you answer this question? • What do you think is the most important "who" or "what"? Why? • What is an important thing about the "who" or "what"?

CSR–HS Checklist Names: _____ Date: _____

Before Reading	During Reading	After Reading
❑ **Read** the title. ❑ **Looked** at the pictures or other visuals. ❑ **Visualized** about the topic. ❑ **Wrote** key words. ❑ **Checked** with partner for help if needed.	❑ **Read** the text or followed along. ❑ **Wrote** parts of the text that did not make sense. ❑ **Worked** with partner to fix text that did not make sense. ❑ **Worked** with partner to complete true/false activity. ❑ **Checked** with partner for help if needed.	❑ **Created** one "how" or "why" question and one "what," "where," or "who" question with the answer. ❑ **Wrote** questions and answers. ❑ **Asked** questions with partner. ❑ **Completed** graphic organizer. ❑ **Wrote** summary. ❑ **Checked** with partner for help if needed.
Things to do: Make connections with the topic.	**Things to say if you are stuck:** • Can you help me figure this out? • I don't know what this means. • Do you agree or disagree? Why? • I agree/disagree, and this is why...	**Things to say if you are stuck:** • Can you answer this question? • What do you think is the most important "who" or "what"? Why? • What is an important thing about the "who" or "what"?

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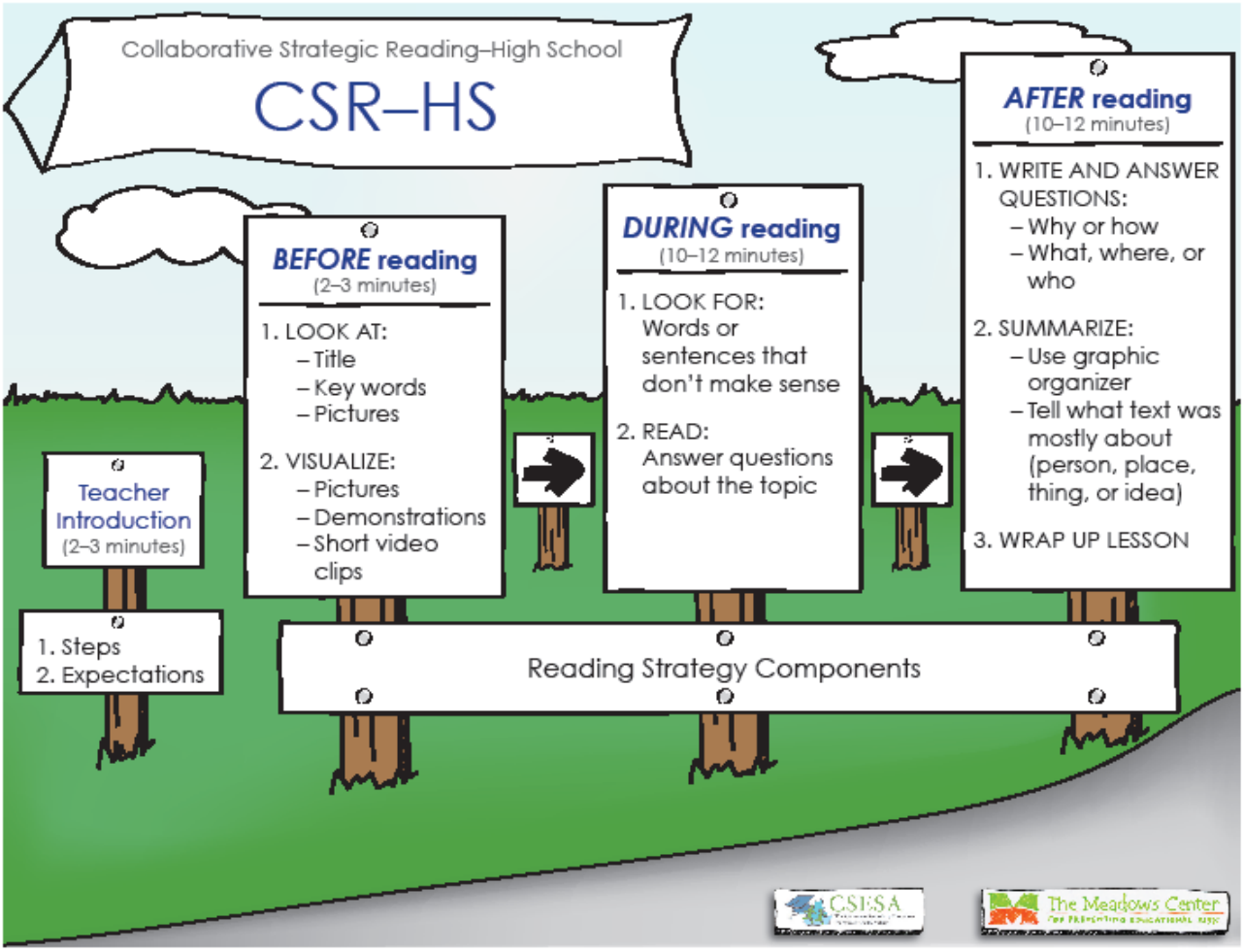
APPENDIX E: CSR-HS POSTER



APPENDIX F: CLOZE PROCEDURE EXAMPLE PROBE

Name: _____

Date: _____

Read each sentence and fill each blank with a word to complete the meaning of the sentence based on what you read in the passage "Atlantis Found":

Atlantis Found

For thousands of years, people have been telling the story of Atlantis. They say Atlantis was once an island in the _____ Ocean. It had a _____ city with beautiful buildings and gardens. The people of this city were wealthy and wise.

Then in one day and one night, almost 12,000 years ago, great _____ and a huge _____ destroyed the city. People said the story of Atlantis is a _____, but explorers discovered _____ of an old building under water which made them believe that there really was an island of Atlantis.

APPENDIX G: PARTIAL INTERVAL RECORDING DATA COLLECTION SHEET

Challenging Behavior Data Sheet

Partial Interval Recording

Observer: _____ Student: _____ Date: _____
Grade Level: _____ Teacher (class period): _____
Target Behavior: _____

Interval	+/-	Notes	Interval	+/-	Notes	Intervals	+/-	Notes
1			16			31		
2			17			32		
3			18			33		
4			19			34		
5			20			35		
6			21			36		
7			22			37		
8			23			38		
9			24			39		
10			25			40		
11			26			41		
12			27			42		
13			28			43		
14			29			44		
15			30			45		

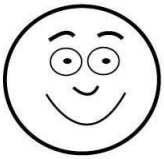
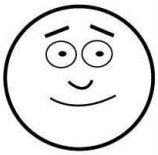
Codes: +Target behavior occurred during some portion of the 30s interval (i.e., at least once).
-Target behavior did not occur at all during the interval.
Rate of target behavior (total # of occurrences/total time) = _____

APPENDIX H: STUDENT QUESTIONNAIRE

Perspectives about Reading

DIRECTIONS: Mark an X in the box that is closest to the way you feel. There is no right or wrong answer. The person conducting the questionnaire may find it necessary to read the Items to the student and in some instances have the student dictate the responses.

If you would say, "Yes, definitely!" put an X in the first box.
If you would say, "No, definitely!" put an X in the last box.
If you would say, "Closer to Yes" put an X in the second box.
If you would say, "Closer to No" put an X in the third box.

				
Example 1. Spelling is easy for me.				
Example 2. I would rather go to the movies than play video games.				
1. It's fun to read.				
2. I am a good reader.				
3. I'm better at reading than most of my friends.				
4. Reading is interesting and exciting.				
5. Reading tests are usually easy for me.				
6. I'd rather do reading than any other kind of homework.				
7. I like reading at school more than other subjects (like Math, Physics, Arts, etc.)				
8. Someone who likes reading is cool.				
9. I enjoy reading books in school during free time.				
10. I read a lot outside of school.				
11. I've always liked reading.				
12. I enjoy reading for fun at home.				
13. I like to talk about the books or stories I read.				
14. My friends like reading more than I do.				
15. Working with a partner makes reading easier.				
16. Reading with a partner makes reading assignments more fun.				

APPENDIX I: TREATMENT FIDELITY CHECKLIST

CSR-HS Fidelity of Implementation Checklist

Overall, I consider this teacher's implementation of CSR-HS to be:	***Highest Quality***						***Less than Adequate***
	7	**6**	**5**	**4**	**3**	**2**	**1**

High Quality (6-7) = students are engaged actively in CSR-HS activities. The teacher provides models, explanations, and feedback that is appropriate to student needs and helps students gain proficiency at using CSR-HS and learning the material.

Average Quality (3-5) = Students understand what they are supposed to and are or are becoming familiar with CSR-HS yet they lack a high level of engagement in the strategies and activities. Students may become quickly off task if not closely monitored by the teacher. The teacher provides explanations and feedback but may be lacking in some areas such as tailoring feedback to meet specific student needs, pacing the lesson, reading materials at an appropriate level. The teacher may provide inconsistent or incorrect information about one or more strategy. Teacher may omit a strategy that should be present.

Below Average Quality (1-2) = Most students are not engaged and may not be familiar with or proficient at using the strategies. The teacher does not provide the needed modeling, explanation, or feedback needed. Class management may bring a score to low quality if the teacher can't maintain a positive group work environment. The teacher misses many opportunities to support students.

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Vita

Farah El Zein is a doctoral candidate in the Department of Special Education with a concentration in autism and developmental disabilities. El Zein earned her Bachelor of Science degree in early childhood education from the Lebanese University in Lebanon and her Master's degree in special education with concentrations in applied behavior analysis, positive behavior supports, and learning disabilities from Texas State University. She has more than 5 years of special education teaching experience in the general and special education settings both in Lebanon and the United States. El Zein also has clinical experience providing ABA therapy for children with ASD in the clinical and home environments. Her research interests include interventions that aim to enhance academic performance and decrease challenging behavior for children with autism spectrum disorders.

E-mail address: zein_farah@hotmail.com

This dissertation was typed by the author, Farah El Zein