Adapting the Question Answer Relationship Strategy for Middle School Students with Intellectual Disabilities

By

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For Stefan, my sunshine and inspiration…could not have done it without you buddy.

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CHAPTER I

INTRODUCTION

Success in school and future participation in college and workplace environments depend upon attaining proficiency in reading (National Governors Association Center for Best Practices [NGA], Council of Chief State School Officers, 2010). Proficient reading entails decoding printed words and comprehending their meaning (Hoover & Gough, 1990). Literacy instruction in the early grades often focuses on decoding and word recognition using simple narrative texts. As students progress in school, content is often provided in informational texts with increasingly complex structures and topics (Chall, 1983; Gajria, Jitendra, Sood, & Sacks, 2007). Following this shift, students with disabilities may fail to master content, as they employ ineffective reading strategies and struggle to understand and remember what they have read (Jitendra, Burgess, Gajria, 2011). Whereas competent readers monitor their understanding as they read and apply techniques to repair faulty comprehension, students with disabilities often require systematic, explicit reading comprehension instruction and supports.

Reading Comprehension Achievement

The National Assessment of Educational Progress (NAEP, 2015) regularly collects and reports reading achievement data for students in grades 4, 8, and 12. The NAEP Reading Framework evaluates a range of reading comprehension skills, such as locating, recalling, integrating, interpreting, evaluating, and critiquing information from written material. According to the latest NAEP (2015) report, only 37% of a nationally representative sample of 12th grade students performed at or above a proficient level in reading. Further, NAEP (2015) data indicate

only 12% of the students with disabilities who were tested met reading proficiency benchmarks. Notably, these data do not include students most at risk of performing poorly; individuals who qualify for alternate achievement assessment are excluded from participation in NAEP testing. Despite the passage of legislation mandating that all students receive research-based reading instruction (No Child Left Behind [NCLB], 2001; Individuals with Disabilities Education Act [IDEA], 2004), students with and without disabilities continue to exit high school unprepared to meet the literacy demands of post-secondary education and careers. In an attempt to rectify the disappointing trend in K – 12 reading achievement, a majority of states have adopted more rigorous standards for public school core reading curricula that are more in alignment with the NAEP framework.

Increased Reading Comprehension Expectations

The Common Core State Standards for English Language Arts and Literacy (CCSS-ELA) embed incremental goals for reading, writing, speaking, listening, and language throughout all content areas, and at every grade level (NGA, 2010). In order to attain the new benchmarks of the CCSS-ELA, students will need to engage in close, purposeful, and analytical reading and re-reading of complex texts starting in the earliest grades (NGA, 2010). In addition, students will be expected to demonstrate comprehension of key ideas by (1) answering and asking text-dependent questions (TDQ; i.e., questions that are linked directly to information provided in the text), (2) making logical inferences, and (3) citing textual evidence to support their responses (Fisher & Frey, 2012). The demands of these reading comprehension tasks will especially challenge students who are not decoding and reading text fluently. Slow and labored decoding interferes with comprehension, occupying working memory resources that would otherwise be devoted to understanding content (Chard, Vaughn, & Tyler, 2002; Stanovich, 1990).

Emphasizing close reading in the elementary grades may have the unintended consequence of reducing time devoted to direct instruction of the foundational reading skills (e.g., phonics, word study, fluency) that students with disabilities develop more slowly and with greater difficulty (Haager & Vaughn, 2013). Given that a majority of students across a range of ability levels do not attain adequate competence upon graduation, effective interventions need to be identified and implemented that can support reading comprehension, especially for the students most vulnerable to experiencing poor academic outcomes. The CCSS-ELA does not provide or advocate for particular instructional techniques or accommodations to ensure all students reach the new goals. Thus, it remains incumbent upon researchers to accrue evidence of effective literacy practices.

Challenges for Students with Intellectual Disabilities

Among disability categories, students with intellectual disabilities (ID) are most likely to exit school with minimal levels of reading proficiency (Wei, Blackorby, & Schiller, 2011) and encounter low rates of post-secondary education, employment, and independent living (Bouck, 2012; Grigal, Hart, & Migliore, 2011). Students with ID frequently have comorbid reading difficulties (Koritsas & Iacono, 2011), and may experience a protracted early stage of reading development (Roberts, Leko, & Wilkerson, 2013), which negatively impact their ability to fully participate in the general education curriculum. Traditionally, literacy goals for students with ID have focused on functional reading, sight word training, decoding, and vocabulary instruction, rather than advanced reading skills, such as reading comprehension (Karvonen, Wakeman, Browder, Rogers, & Flowers, 2011). Likewise, the majority of literacy research for students with ID has featured word-reading and decoding and has not incorporated the full range of skills recommended by the report of the National Reading Panel (Browder, Wakeman, Spooner,

Ahlgrim-Delzell, & Algozzine, 2006; Erickson, Hanser, Hatch & Sanders, 2009). Although researchers have begun to target text comprehension outcomes in literacy intervention studies for students with ID, additional research is needed (Spooner & Browder, 2015).

In addition to incorporating practices derived from literacy instruction research conducted with students with ID, appropriating reading comprehension research with positive results for students who have TD or LD may be a rewarding approach. Legislation (i.e., IDEA, 1997; NCLB, 2001) stipulates that students with disabilities receive access to the core curriculum in the least restrictive environment (LRE). Increasingly, LRE has been interpreted as educating students with ID in inclusive classroom settings (Roberts, Leko, & Wilkerson, 2013). Consequently, developing or adapting effective practices to teach reading comprehension that can be used in inclusive environments may be especially practical.

Definition of Terms

Anaphora- The use of a word referring to or replacing a word used earlier in a sentence or in a preceding sentence. For example, the pronouns, *he*, *she*, *it*, and *they* refer back to an antecedent noun (Halliday & Hasan, 1976, 2013).

Attending prompt- A prompt delivered to gain participant's attention and re-orient focus on the task (Wolery, Ault, & Doyle, 1992).

Completion prompt- A prompt wherein a portion of an answer is provided and the respondent writes in missing information to complete the answer (i.e., an answer stem). Completion prompts in the present study are printed in text and require written constructed responses.

Controlling prompt- A prompt that ensures the respondent will answer correctly (Wolery, Ault, & Doyle, 1992). For example, "This is the answer sentence."

Extra-textual explicit- The source of an answer is found outside the body of the main text but is explicitly stated in an ancillary text (i.e., "Think and Find" questions can be answered with factual information stated directly on Background Knowledge Fact Sheets [BKFS]).

F**unctional delay-** "A continuing significant disability in intellectual functioning and achievement which adversely affects the student's ability to progress in the general school program, but adaptive behavior in the home or community is not significantly impaired and is at or near a level appropriate to the student's chronological age."

General prompt- A prompt delivered in non-intervention conditions (i.e., baseline and maintenance) to provide feedback on incorrect performance and provide stimulus to initiate another attempt at the task (e.g., "That's not quite right, try again").

Intellectual disability- A disability characterized by significant limitations, both in intellectual functioning and in adaptive behavior, which covers many everyday social and practical skills. This disability originates before the age of 18 (American Association on Intellectual and Developmental Disabilities)

Procedural facilitator- "Questions, prompts, or simple outlines of important learning structures that teachers use on a daily basis to help students emulate the performance of more expert learners" (Baker, Gersten, & Scanlon, 2002, p. 68; Scardamalia & Bereiter,1986).

Task direction- A task direction is an initial prompt given to acquire the student's attention and deliver the expected task demand (e.g., "Read the question"). Task directions are not required if students learn the routine and respond before the direction is given (Wolery, Ault, & Doyle, 1992).

CHAPTER II

REVIEW OF THE LITERATURE

Broadly, the current literacy instruction research for students with ID can be conceptualized in terms of a two-strand framework proposed by Browder et al. (2008). In one strand, instruction focuses on adaptations and activities that increase access to literature. For example, listening comprehension, rather then reading comprehension, may be initially targeted. In the other strand, researchers concentrate on practices that augment reading independence. Activities to increase independence include continuing instruction in foundational reading skills as well as learning to use strategies to support self-regulated reading comprehension. In the following sections, I highlight reading comprehension research for students with ID from each of these strands and note gaps in the literature.

Increasing Access to Texts

Providing adaptations and modifications to the core reading curriculum can enable students with ID who are not independent readers to have greater access to and comprehension of grade-level content (Udvari-Solner, 1992). For example, the format of reading materials, mode of instruction delivery, and response options can be adjusted to further support text comprehension. A line of literacy research for students with ID has developed using shared reading of adapted texts with picture supports, systematic instruction, and peer tutoring to support listening comprehension (Hudson & Test, 2011). Though a different skill than reading comprehension, listening comprehension is closely related. According to the simple view of reading, reading comprehension is comprised of decoding and listening comprehension (Hoover

& Gough, 1990). Listening to texts read aloud mitigates the deleterious effects of inefficient decoding by presenting content through oral language. In the following section, I provide an overview of studies that evaluated different approaches to adapting texts and delivering instruction.

Shared reading. Evidence suggests shared reading promotes emergent literacy and allows students to access texts beyond their independent reading level (Hudson & Test, 2011). According to Hudson and Test, shared reading customarily involves (a) pairing controlled vocabulary with symbolic picture support, (b) repeating story lines, (c) providing props to elicit student engagement, (d) multiple readings, and (e) text summaries. Shared reading gives teachers the opportunity to model effective reading comprehension strategies (Fisher, Frey, & Lapp, 2008) and develop oral language and vocabulary, which are necessary components of reading comprehension (Allor et al., 2009).

In a multiple probe across students single case design (SCD) study, Mims, Hudson, and Browder (2012) used shared reading and a modified system of least prompts with middle school students who have ID to improve listening comprehension of adapted grade-level biographies with picture support. All four participants improved correct responses to "Wh" questions after instruction and one student demonstrated increased independent reading abilities after intervention. Similarly, Shurr and Taber-Doughty (2012) reported positive effects of combining shared reading with visual supports and discussion to foster comprehension of grade-level passages with middle school students with ID. At the conclusion of the multiple probe across participants study, the students with ID (n = 4) increased the number of correct responses to multiple choice listening comprehension questions. In both experimental studies, researchers

reported a functional relation between shared reading interventions and listening comprehension outcomes.

Adapted texts. Texts can be adapted by decreasing length, including plot summaries, and providing picture supports (Courtade, Test, & Cook, 2015). In two SCD studies (Browder, Mims, Spooner, Alghrim-Delzell, & Lee, 2008; Mims, Browder, Baker, Lee, & Spooner, 2009), elementary school picture books were adapted by decreasing the amount of text, incorporating students' names into the story, and adding repeated story lines. Researchers in both studies reported increased listening comprehension subsequent to intervention. Adapted texts can be combined with instructional procedures such as systematic instruction and shared reading, to further support comprehension (Fisher & Frey, 2001).

Task analysis. Text comprehension is a complex task that requires multiple steps to complete. Task analytic instruction is an evidence-based practice wherein a complex skill is broken into smaller components and presented in succession with systematic prompting and feedback (Spooner, Knight, Browder, and Smith, 2011). In a multiple probe across participants SCD study, researchers reported positive effects of teaching middle school teachers a task analysis to engage students with ID in shared readings of adapted grade-appropriate texts (Browder, Trela, & Jimenez, 2007). Student responses to each step of teachers' directions in the task analysis were recorded. Researchers reported a functional relation between the instruction and participants' mean correct responses to at baseline after treatment (. Systematic prompting (e.g., constant time delay, system of least prompts, progressive time delay, and most to least prompting) was incorporated in the study and has a strong corpus of research to teach a variety of behavioral and academic skills to individuals with ID (Ault, Wolery, Doyle, & Gast, 1989; Browder et al., 2006).

Peer tutors. A classmate who has received training to deliver reading comprehension instruction can serve as a peer tutor to a student with ID during instructional activities. Peer assisted instruction has strong evidence of academic, behavioral, and social benefits for students with and without ID (Browder, Wood, Thompson, & Ribuffo, 2014). Moreover, pairing students with peers is less stigmatizing and creates a more cohesive environment in general education classes (Copeland & Cosbey, 2009).

For example, in a multiple probe across participants SCD study, Hudson, Browder, and Jimenez (2014) effectively used peer tutors and a system of least prompts to support students with ID to comprehend adapted 4th grade level science texts in a general education setting. Hudson et al. reported that after intervention, all participants (n = 3) increased unprompted correct comprehension responses. Similarly, in a multiple probe across participants study conducted by Hudson and Browder (2014), there was a functional relation between peer read-alouds of adapted 5th grade novels and an increased number of unmodeled, prompted correct responses to reading comprehension questions by students with ID.

Shurr and Taber-Doughty (2016) extended their earlier work by incorporating additional types of age-appropriate reading materials (i.e., newspapers and job training manuals), and peer tutors to support high school students with ID in an inclusive setting. Following instruction from peers with the picture plus discussion intervention, participants with moderate ID in Shurr and Taber-Doughty's multiple probe across texts SCD study exhibited increased comprehension on a retell measure. Adding classwide peer tutoring and discussion to instruction provides enhanced opportunities for interaction between students of all ability levels in inclusive classes and positively impacts listening comprehension outcomes (Odom, Chandler, Ostrosky, McConnell, & Reaney, 1992).

Providing instruction with adapted texts and instructional supports aimed at strengthening listening comprehension skills circumvents decoding deficiencies and allows students with ID to access the general education core curriculum. Acquiring listening skills and content knowledge are important aspects of reading comprehension and can increase the ability of students with ID to participate in inclusive environments. However, enhanced listening comprehension alone will not enable students to read and comprehend text independently. Studies designed to promote self-regulated reading comprehension for students with ID are highlighted in the next section.

Increasing Reading Independence

Whereas providing adaptations and supports can cultivate understanding of a particular text, instruction in foundational skills and comprehension strategies can foster more self-regulated learning. Fewer studies have focused on increasing reading comprehension for students with ID. Nevertheless, the small corpus of research conducted for students with ID using comprehensive early reading curricula, graphic organizers, and strategy instruction is promising.

Comprehensive early reading curricula. One approach to reading comprehension research for students with ID is to adapt comprehensive early reading curricula that have shown success with TD students or students with LD (Allor, Mathes, Champlin, & Cheatham, 2009; Browder, Ahlgrim-Delzell, Courtade, Gibbs, & Flowers, 2008). For example, in a longitudinal experiment, Allor, Mathes, Roberts, Cheatham, and Al Otaiba (2014) found that the scientifically based reading program, *Early Interventions in Reading* (*EIR*; Mathes & Torgesen, 2005), developed for students at-risk for and with LD, was also effective for students with ID. Initially, students were taught to identify basic elements of a story, sequencing, and to use simple graphic organizers to enhance listening comprehension. As the students' independent reading skills increased, they engaged in more advanced reading comprehension activities (i.e., prediction,

making inferences, summarizing, and content webbing for informational text). Allor and her colleagues demonstrated that when students with ID received direct instruction of comprehension strategies as part of a comprehensive early reading curriculum, scores on measures of text comprehension significantly increased.

Integrating comprehension instruction into a comprehensive early reading curriculum can be a valuable tool to teach reading comprehension skills to students with ID, while continuing to teach and reinforce decoding skills. However, the reading selections in such programs tend to be simplified to aid decoding, and are not necessarily aligned to grade-level content. Especially for older students, it is important to provide opportunities to access texts with a range of complexity and age-appropriate topics (Coleman & Pimentel, 2012). Furthermore, using texts with grade-appropriate content can potentially increase academic engagement and opportunities for discourse with same age peers. Graphic organizers and strategies instruction can support reading comprehension of age-appropriate texts in general education settings.

Graphic organizers. Students with ID who have attained enough independent reading skill to read connected text may benefit from content enhancements such as graphic organizers. Graphic organizers encourage self-regulation of reading comprehension by providing a visual framework for connecting key relationships and ideas from texts (Kim, Vaughn, Wanzek, & Wei, 2004). Graphic organizers have evidence of effectiveness for students with LD and can be integrated in inclusive classes (Hughes, Maccini, & Gagnon, 2003; Dexter & Hughes, 2011). In a multiple probe across participants SCD study, students with ID were able to successfully use a graphic organizer to summarize important information from social studies passages (Zakas, Browder, Ahlgrim-Delzell, and Heafner, 2013) Zakas and colleagues reported a functional relation between intervention and students' scores on comprehension questions related to

adapted grade-level U.S. History passages. In another experimental SCD study, participants with ID (n = 3) in grades 6 to 8 independently read adapted middle school language arts texts, using a graphic organizer to support reading comprehension (Browder, Hudson, & Wood, 2013). Browder et al. reported data represent a functional relation between intervention and correct answers to comprehension questions.

Strategies instruction. Direct instruction of comprehension strategies has been identified as a key element of effective elementary (Shanahan et al., 2010) and adolescent (Biancarosa & Snow, 2004) literacy instruction. Strategy instruction encourages independent reading comprehension skills across a variety of texts and contexts (RAND, 2002). For example, in an experimental SCD study, Flores and Ganz (2007) reported a functional relation between a portion of the well-researched Direct Instruction (DI) *Corrective Reading Thinking Basics Program* (Engelmann, Haddox, Hanner, & Osborn, 2002) and the reading comprehension performance of four students with autism spectrum disorder (ASD) and ID. Participants increased correct responses on measures of making inferences, factual recall, and completing analogies. While the results were promising, training materials consisted of simplified texts of 1 – 2 sentences in length. Additional research is needed to ascertain if the results would generalize to longer, more authentic passages.

Despite strong evidence of effectiveness as methods to improve reading comprehension for students who are TD, and those who are at-risk or have been identified with LD, there has been limited research on strategies for answering and generating questions for students with ID (Rosenshine, Meister, & Chapman, 1996; National Reading Panel [NRP], 2000). In a multiple probe across participants SCD study, Wood, Browder, and Flynn (2015) examined the effects of teaching middle school students with ID (n = 4) a self-questioning strategy using modified least

prompts and a graphic organizer. Teachers read segments of the grade-level social studies text aloud with students in resource rooms and general education inclusive environments. Though the participants did not read independently, researchers required students to focus more intently on the texts by including an additional step of identifying the source of the answers (i.e., in the book or not in the book). Researchers reported a functional relation between the intervention and the number of questions generated, questions answered correctly, and accurate identification of the answer source. Identifying the location of answers to questions supports text comprehension, and is integral to the widely recommended Question Answer Relationships (QAR) strategy.

One researcher (Reichenberg, 2014) conducted a group experimental research study to compare the effects of the QAR strategy to reciprocal teaching ("Right There") on standardized listening and reading comprehension measures for students (n = 31) aged 12 to 16 years with ID. Findings of a repeated measures ANOVA analysis indicate non-significant between-groups differences slightly favoring students in the "Right There" group over students in the QAR group. However, the within group analysis suggested students in both groups made significant gains over pretest scores on listening and reading comprehension measures. Researchers reported that instruction followed a model-lead-test format in both groups. In both conditions, students first made a prediction about the theme of the text based on a support picture that was presented. However, in the "Right There" group, students read texts in small segments and in the QAR group, students read the entire text before applying the strategy. It is uncertain to what extent this procedural difference may have accounted for between-group variance.

In summary, students with ID require effective strategies to support successful participation in general education classrooms where close reading of text and demonstration of comprehension through text-dependent questions are emphasized. Several effective systematic

instructional procedures have been identified for students with ID that support increased access to text. Fewer studies have been conducted for this population that examine the effects of strategies to promote independent reading and comprehension of texts. The purpose of the present study was to assess the effect of the QAR strategy on reading comprehension outcomes for middle school students with ID. The QAR strategy was chosen because it is well matched to general education curricular demands, has garnered a reputation and evidence of effectiveness, and may provide a means for students with ID to self-regulate reading comprehension in multiple academic domains and environments. In the following section, the conceptual, operational, and procedural foundations of the QAR strategy are described, followed by a summary of literature in support of QAR's effectiveness.

Question Answer Relationships Strategy

Conceptual foundations. QAR is a strategy that focuses on improving text-based question generating and question answering. The QAR reading comprehension strategy was developed primarily by Raphael (1982; 1986), based on the taxonomy of questions proffered by Pearson and Johnson (1978). Whereas taxonomies had previously been developed to describe types of questions (e.g., literal and inferential), Pearson and Johnson proposed considering the relationship between questions and the contribution of both the reader and text when answering them. Pearson and Johnson posited that there are three basic types of questions: textually explicit, textually implicit, and scriptally implicit. In their system, the three categories of questions account for varying degrees of input from information found in the text and that from the individual's knowledge base. The answers to ***Text Explicit*** (TE) questions can be found directly in the text, in one sentence. Additionally, the TE question and answer will share many of the same words. ***Text Implicit*** (TI) questions require the reader to integrate textual information.

That is, the answer is not directly stated in the text, but can be deduced by connecting information provided in two or more sentences throughout the text (Davey & Macready, 1995). In contrast, ***Script Implicit*** (SI) questions require the reader to draw upon their own knowledge to answer questions. Pearson and Johnson hypothesized that knowledge of the relationship between a question and its answer source would influence a reader's ability to answer comprehension questions. Describing the relationship between questions and their answers allowed for the development of a heuristic for question answering that could be demonstrated to novice readers, aiding them to be more strategic when answering questions from text.

Operational foundations. Raphael (1982) originally conceived of three mnemonics to represent the three categories of QAR questions (i.e., right there, think & search, on my own). Mnemonics and definitions of QAR question types are displayed in Table 1. As the name implies, answers to "Right There" questions can be found directly in the text. A "Right There" question relies on factual recall and aligns with a ***Text Explicit*** question. Consider the following simplified text: "Ted is at a carnival. He is happy." An example of a "Right There" question is: "Who is at a carnival?" "Think and Search" QARs are ***Text Implicit*** questions. The answers to "Think and Search" questions can also be found in the text, but in more than one sentence. The reader connects ideas across sentences, paragraphs, or chapters to answer a "Think and Search" question (Raphael, 1982). An example of a "Think and Search" question is: "Who is happy?" To correctly answer this "Think and Search" question, the reader must look back at the preceding sentence to resolve the anaphor (i.e., he = Ted). "On my Own" QARs represent SI questions. Drawing upon the reader's general world knowledge or opinion, an "On my Own" question can be answered without the text. An example of an "On my Own" question might be: "What makes people happy?" The question is relevant to the text, but cannot be answered by information

provided in it. For example, readers could respond, “Carnivals make people happy because they have fun games and rides” or they could list other things that make people happy that are completely unrelated to carnivals. Any reasonable answer from the respondents’ personal experiences or knowledge would be acceptable.

Raphael (1986) revised the QAR strategy by more broadly categorizing the QAR question types, offering an alternate mnemonic for the TI QAR question, and adding a fourth QAR question type (see Table 1). The “In the Book” category was comprised of “Right There” and “Think and Search” questions. Additionally, Raphael suggested that “Putting it Together” would be an apt name for the TI questions (instead of or in addition to “Think and Search”) because the reader must put together information from different parts of the text to answer a question. Further, Raphael refined the QAR category that corresponds to SI questions, adding the “Author and You” QAR. Raphael subdivided the “In my Head” category into “Author and You” and “On my Own” questions, both of which correspond to the SI category of the Pearson and Johnson (1978) taxonomy. Readers make an elaborative inference to correctly answer an “Author and You” question. That is, readers must combine their own knowledge with a clue provided in the text. An “Author and You” question (e.g., “What did Katy’s mom expect her to do when she dropped the vase?”) might be posed after reading the following text: “Katy dropped a vase. Katy’s mom brought her a broom and dustpan.” To answer this “Author and You” question correctly, readers would infer that the vase broke and know that brooms and dustpans are tools to clean up the pieces.

Procedural foundations. Raphael (1982, 1986) suggested implementing the QAR strategy following the gradual release model of instruction. The gradual release model is based on the principles of shaping and fading behaviors (Pearson & Gallagher, 1983). Initially, the

teacher models the strategy procedures to the whole class, "thinking aloud" to provide additional explanations and justifications for the steps in the process. Instruction is then typically practiced in smaller groups and dyads, culminating in individual practice and performance. Raphael recommended teaching the QAR strategy by using the broad categories "In the Book" and "In my Head." Additionally, Raphael proposed initially using shorter texts to practice with the QAR questions and increasing the text length incrementally. Finally, Raphael encouraged teachers to include visual mnemonics and illustrations to define QAR question categories.

Perception of effectiveness. QAR has been recommended for use with a range of populations, ages, and contexts to facilitate comprehension on a variety of outcomes. Though not exhaustive, Table 2 presents a sampling of non-experimental resources that suggest using the QAR strategy. For instance, QAR can be found in textbooks written for use in university teacher training programs (e.g., Browder & Spooner, 2014). Additionally, recently published literature reviews and articles aimed at practitioners suggest using the QAR strategy with upper elementary students (Swanson, Edmonds, Hairell, Vaughn, & Simmons, 2011), in co-taught content area classes (Fenty, McDuffie-Landrum, & Fisher, 2012), and with students who have ASD (Whalon & Hart, 2011).

Prior to conducting the present study, the principal investigator (PI) developed and distributed an electronic, anonymous survey querying 36 middle school (grades 5 – 8) special education (n = 16) and general education (n = 20) content area co-teachers in four states and the District of Columbia about their knowledge of and interest in the QAR strategy. Respondents were largely Caucasian (78.4%), female (67.6%), and between the ages of 25 to 34 (45.9%). Most respondents (48.6%) had more than seven years of teaching experience and a master's level

or higher education (78.4%). Teachers indicated they taught students with ID in general (91.4%) and special education (51.4%) settings. A sample of the survey is provided in Appendix A.

Respondents were asked to answer two yes/no questions, and rate their level of agreement with 18 statements regarding the effectiveness and appropriateness of the QAR strategy on a scale of 0 (strongly disagree) to 100 (strongly agree). More than half of all respondents (59.4%) indicated they had previously used QAR in their classrooms and rated their familiarity with the QAR strategy at a median score of 62.5. Individual teachers who rated their familiarity with QAR below 50.0 were asked to watch a short informational video describing the strategy. The median rating of effectiveness by teachers who had used QAR was 74.0. Overall, respondents rated QAR as an evidence-based practice (EBP; 74.5). Teachers' median responses indicated general support of the QAR strategy as a potentially effective reading comprehension strategy overall (85.0), for students who are typically developing (91.0), students with reading disabilities (87.0), and students with ID (75.0). Further, the median responses of surveyed teachers indicated a belief that QAR could potentially support students with ID to participate in inclusive classrooms (80.5). Results of the survey, coupled with an extensive systematic review and evaluation of the published QAR experimental research literature, served as the foundation for adapting the QAR strategy as a potential means to support students with ID to successfully participate in inclusive general education classes. Results of the systematic review are summarized in the following section.

Evidence of effectiveness. In a systematic review of published experimental QAR research (Davidson, Lemons, & LeJeune, in preparation), one SCD and 10 experimental group design studies were identified that have reading comprehension as an outcome (n = 1,189). Overall, the evidence in support of QAR as an effective reading comprehension strategy is

mixed. Authors of five of the included group design studies (Benito et al., 1993; Graham & Wong, 1993; Raphael & Pearson, 1985; Raphael & Wonnacott, 1985b; Simmonds, 1992) reported significant differences between groups in favor of the QAR condition over the comparison condition. Researchers in the SCD study (Ezell et al., 1992) reported increased mean performance on reading comprehension measures across QAR question types following the introduction of training with the QAR strategy. In four studies, researchers did not find significant differences on reading comprehension outcomes between QAR strategy and no-QAR strategy comparison groups (Labercane & Battle, 1987; Raphael & McKinney, 1983; Raphael & Wonnacott, 1985a; Reichenburg, 2014). Results of one study indicated significant differences between groups in favor of a no-QAR strategy package over a package of strategies that included QAR (Fagella-Luby et al., 2007).

Furthermore, an assessment of study features and quality, using guidelines distributed by the Council for Exceptional Children (CEC; Cook et al., 2015), produced mixed evidence to classify QAR as an EBP. After applying quality indicators to study features reported in four domains (i.e., construct, internal, external, and statistical validity) nine of the 11 studies did not meet quality standards for methodological soundness. Thus, the results of these studies must be interpreted with caution. For example, four of the included studies had small sample sizes ($n < 40$), which may have contributed to the lack of significant differences on reading comprehension outcomes between participants in the QAR treatment condition and the no treatment control condition. Importantly, seven of the included studies received limited ratings of quality for collecting and reporting data on procedural fidelity. Without procedural fidelity data, it is possible elements unrelated to the QAR strategy may have influenced the results of the study.

Currently, there is insufficient evidence of QAR's effectiveness for students who have LD or ID. Three studies included students with LD (n = 475; Fagella-Luby et al., 2007; Labercane & Battle, 1987; Simmonds, 1992), and one included students with ID (n = 31; Reichenberg, 2014). Fagella-Luby et al. (2007) found effects in favor of the no-QAR condition; however, QAR was only one part of a package of strategies implemented as part of the comparison condition in the study. It is not possible to disaggregate the effect of the QAR strategy from the other strategy components. Conversely, Simmonds reported positive significant effects of the QAR strategy on reading comprehension measures. However, whole classes of students were randomly assigned to conditions and Simmonds did not account for nesting in the data analysis. In addition, Simmonds received limited ratings in five out of seven essential quality indicators, constraining interpretability of study results. Labercane and Battle and Reichenberg did not find statistically significant differences between QAR treatment and control groups in their respective studies. In both of these studies, the small sample sizes may not have provided enough statistical power to detect any meaningful differences. Additionally, Labercane and Battle experienced severe attrition of participants, which could affect the results of the study in unaccounted ways.

The finding that there is mixed evidence in support of the QAR strategy overall and insufficient evidence for individuals with LD or ID, does not necessarily mean that the QAR strategy is ineffective. Additional research focusing on individuals with ID is needed to assess the potential of QAR to facilitate reading comprehension with this population. As previously mentioned, several of the recommended procedures for delivering the QAR strategy align well with practices that have evidence of effectiveness for students with ID. For example, the QAR intervention has been implemented using explicit, scaffolded instruction, repeated practice,

visual aids, picture supports, peer tutors, and shared reading (Spooner & Browder, 2015). The reported results of the QAR studies are sufficiently promising to warrant further study using rigorous methodology and experimental research designs.

Purpose of the Study

The present experimental study was undertaken to evaluate the effectiveness of adapting the QAR comprehension strategy for use with middle school students with ID to enhance comprehension of adapted science and social studies texts. Specifically, the study addressed the following research question:

1. Will instruction with an adapted version of the QAR strategy result in increased application of the strategy and correct responses to text-dependent questions on taught and untaught texts for middle school students with ID?

Adapting the QAR strategy, using practices that have successfully been used with students with ID, contributes to needed text comprehension research for this population, and also to the evidence base of the QAR strategy. A description of the participants, settings, materials, procedures, and assessments used in the present study are detailed in the following section.

Chapter III

METHOD

Participants

The PI obtained approvals through Vanderbilt University's institutional review board (IRB), and the Metropolitan Nashville Public Schools (MNPS). In addition, the PI received consent from the principal and a special education teacher at a middle school with whom she had established a prior relationship. The special educator contributed her expertise to the development of materials for this study, and agreed to participate in the study by nominating potential student participants, sending study information to the parents of potential participants, allowing intervention and testing sessions to take place in her classroom, and providing ongoing feedback about the perceived effectiveness and acceptability of study procedures. Once informed consents of parents were obtained according to IRB protocols, screening assessments were administered. Results of screening tests and demographic information are reported in Table 3.

Participants were three students in grades 5 – 8, recruited through a large metropolitan school district in the southeastern United States who (a) had a documented diagnosis of an intellectual disability (ID) or functional delay (FD), (b) primarily communicated verbally, (c) were behaviorally ready to attend and participate in instruction for a minimum of 25 minutes, (d) were able to decode connected text independently or with minimal assistance at a first grade level or higher, (e) were capable of gripping a pencil without assistance and could write independently or from a model, (f) were available for intervention 4 to 5 days per week, (g) received teacher nomination as individuals who had difficulty answering questions from text

and, (h) obtained signed parental consent. The participants' disability status and reading level was ascertained through a combination of school administered test results, IEP records, and researcher-administered reading tests. Detailed descriptions of the measures are provided in the "Measures" section below.

Oscar was a 14 year old, African-American, male who attended 8th grade (see Table 3). According to his school records, Oscar received special education services under the ID category. Researchers confirmed Oscar had a below average full-scale IQ score (IQ 57) on the KBIT-2 (Kaufman & Kaufman, 2004). Oscar demonstrated appropriate verbal initiation and maintenance of basic conversational topics and was able to express his needs and ideas independently. Oscar's IEP team determined that he was eligible to participate in the Tennessee Alternate Achievement Test (TN Alt). Results of the *Kaufman Test of Educational Achievement, 2nd Ed*. (KTEA-II; Kaufman, 2004), administered by school personnel indicated Oscar could read a first grade level passage independently. Additionally, on a researcher-administered first grade level DIBELS reading passage, Oscar read 31 words correctly per minute (WCPM). Further, Oscar's scores on the Word ID, Word Attack, and Passage Comprehension subtests of the WRMT placed him in the extreme lower percentile (< .1) (Woodcock, 2011). Oscar's IEP included goals for answering "what, where, and who" questions following reading unfamiliar passages, and for developing necessary skills for academic written expression. Oscar received English Language Arts (ELA) and Math instruction in his special education classroom and received instructional accommodations and modifications when he attended inclusive social studies and science classes with an aide.

Elmer was a 12 year old, Caucasian, male who was in 5th grade and was diagnosed with functional delay (FD) and Down syndrome (DS; see Table 3). Elmer's score on the KBIT-2

(Kaufman & Kaufman, 2004) administered by the researcher was in the lower extreme category (IQ 40). Elmer communicated verbally in English for a variety of purposes. According to his IEP, the primary language spoken in Elmer's home was Arabic. Elmer participated in TN Alt testing. The special education teacher provided Elmer with small group ELA and Math instruction in the special education classroom. Elmer received instructional accommodations and modifications in science and social studies in inclusive settings with an instructional aide. In addition, Elmer scored in the lower extreme percentile (< .1) on Word ID, Word Attack, and Passage Comprehension subtests of the WRMT (Woodcock, 2011). Results of school-administered KTEA-II (Kaufman, 2004) tests indicated Elmer a kindergarten, month 10 level for letter and word recognition. Further, on a researcher-administered first grade level DIBELS ORF passage, Elmer read 25 WCPM. Elmer's IEP included goals for answering "what, where, and who" questions following reading unfamiliar passages, and for developing necessary skills for academic written expression.

Bernie was a 12 year old, Caucasian male who attended 6th grade and was identified with ID and DS (see Table 3). Bernie's researcher- administered full scale IQ was in the lower extreme category (IQ 40; KBIT-2, Kaufman & Kaufman, 2004). Bernie participated in TN Alt testing. According to results of the school-administered *Brigance Reading Inventory* (BRI; Brigance, 2001), Bernie read a second grade level passage with one miscue and answered comprehension questions with 60% accuracy, placing him at a second grade reading level. Additionally, Bernie read 21 WCPM on the researcher-administered first grade DIBELS ORF passage. Additionally, Bernie scored in the lower extreme percentile (< .1) for Word ID, Word Attack, and Passage Comprehension subtests of the WRMT (Woodcock, 2011). Bernie received small group ELA and math instruction in the special education classroom, and participated in

inclusive social studies and science classes with an aide when deemed appropriate. Bernie's IEP included goals for answering "what, where, and who" questions following reading unfamiliar passages, and for developing necessary skills for academic written expression.

Setting

The study was conducted in a middle school encompassing grades five through eight, with a total enrollment of 650 students of diverse backgrounds, located in an urban school district in the southeastern United States. Approximately half of the student population qualified for free and reduced lunch, nearly 5% were English language learners, and close to 14% were receiving special education services. Intervention was administered one-on-one in the participants' typical special education classroom environment. To minimize distractions and lost time from other academic tasks, intervention was held each day at a time that was convenient for the students and classroom teacher. The tutor was seated in close proximity, adjacent to the participant at a table with sufficient room for writing.

Interventionists

The PI was a doctoral student in special education at Vanderbilt University with over fifteen years of experience working to develop literacy skills with students who have reading disabilities (RD), autism spectrum disorder (ASD), developmental disabilities, and ID. An additional member of the research team who had previous experience working with students with disabilities implemented intervention and testing. Both interventionists demonstrated implementing the intervention and testing with 100% fidelity prior to beginning the study.

Adaptations and Modifications

Adaptations. In the present study, three adaptations of QAR question types were introduced (see Table 1). ***Text Explicit***, "**Right There**" questions could be answered with

information found directly in the targeted text. The ***Text Implicit*** category was comprised of "**Search and Find**" questions that involved matching pronouns to their referents within the targeted text. "Think and Find" questions were substituted for ***Script Implicit***, "**On My Own**" questions. "Think and Find" questions were answered with information found outside of the text (i.e., ***Extratextual Explicit***). Rather than require students to draw upon previously acquired knowledge, students were provided with supplemental fact sheets on the passage topic where answers to "Think and Find" questions could be accessed.

There were three reasons for the adaptations to the QAR question types. First, introducing three types of questions instead of four decreased the cognitive load for students with limited working memory capacity. It may not always be reasonable to expect students with ID to consistently maintain and access information in their memory. Second, maintaining focus on texts as sources of information aligns with the current emphasis of the CCSS-ELA on close reading and answering text-dependent questions. Third, students practiced searching within the body of a main text and outside of the text in a concrete and predictable way while learning the strategy. Finding answers "in your head" and making inferences are less concrete skills. In addition to the adaptations, the intervention was modified to provide three levels of support to participants, the materials and procedures of which are detailed in the following section.

Modifications. The procedures and materials in baseline, intervention, and mastery for each of the three Levels of modification are summarized in Table 5, Table 6, and Table 7, respectively. In each version of the intervention, the tutor a) introduced and defined the targeted QAR question & icon (i.e., "Right There," "Search and Find," "Think and Find"), b) read the passage, c) found the targeted QAR question, d) connected the question and answer sentence, and e) answered question in writing. All participants began in Level 1, the least scaffolded

version of the adapted QAR intervention. Generally, the level of scaffolding was increased on the modified versions of testing probes by a) providing smaller chunks of text from which to find the answer, b) providing completion prompts (i.e., answer stems; Level 2, Level 3), c) reducing the number of QAR question types presented on each probe from three to one (Level 3), and d) reducing the number of probes per passage from four to two (Level 3).

Level 1. As seen in Table 6, in Level 1, tutors introduced the adapted QAR strategy using the "Basketball" training passage (Appendix B), Level 1 "Basketball" BKFS (Appendix C), and Level 1 "Basketball" question and answer training sheets (Appendix D). Participants in Level 1 were tested using a Level 1 probe (Appendix E) and the associated science or social studies QAR passage (Appendix F, Table 4) and BKFS (Appendix G). In addition, during training and assessment, students were required to find the answer sentences in the full science or social studies passage or among eight factual statements provided on Level 1 background knowledge fact sheet (BKFS). Further, students in Level 1 answered the question in writing without a completion prompt. During administration of Level 1 baseline, mastery, and maintenance assessment probes, tutors provided up to two verbal prompts for identifying the targeted QAR icon, three prompts for finding the answer sentence(s), and one prompt for writing the answer on the line. Students answered questions on four probes in the Level 1 version of the intervention. Students who did not respond in Level 1 after a minimum of three intervention sessions were given the Level 2 version of the intervention.

Level 2. The Level 2 version of the adapted QAR strategy included modifications to the materials in order to provide additional support for participants. As seen in Table 6, the Level 2 intervention procedures are similar to Level 1. Level 2 "Basketball" training question and answer sheets (see Appendix H), BKFS (Appendix I) and Level 2 science and social studies BKFS

(Appendix J) and testing probes (Appendix K) included smaller chunks of text from which students could locate answers. In addition, completion prompts were provided (one of each QAR question type) so participants had to write fewer words to answer the questions. During administration of Level 2 baseline, mastery, and maintenance assessment probes, tutors could provide two verbal prompts for identifying the targeted QAR icon, ***two*** prompts for finding the answer sentence(s), and one prompt for writing the answer on the line, if necessary. Students answered questions on four probes in the Level 2 version of the intervention. After three sessions of instruction with the Level 2 strategy, students who were nonresponsive received the Level 3 version of the intervention.

Level 3. The Level 3 version of the adapted QAR strategy provided the most amount of support. The Level 3 question and answer training sheet contained either one or two sentences of text from the targeted science or social studies passage and a single, targeted QAR answer stem (Appendix L). Likewise, the Level 3 intervention BKFS contained one factual statement below the picture supports (Appendix M). Level 3 baseline, mastery, and maintenance probes included the same targeted QAR questions that were trained in intervention and embedded the answer sentences used during training within one or two additional lines of text from the science or social studies passage (Appendix N). Students answered questions on two probes in the Level 3 version of the intervention.

Materials

QAR passages. Forty-two passages were created for training and testing purposes. The passages were adapted from materials available in *QAR Comprehension Lessons* workbooks for grades two through eight (Raphael & Au, 2011), the *Qualitative Reading Inventory-4* test book (QRI; Leslie & Caldwell, 2006), and the *Adolescent Literacy Inventory, Grades 6 - 12* (ALI;

Brazo & Afflerbach, 2010). Table 4 provides the full scope and sequence of passages, alignment to standards, and passage characteristics. Passage difficulty was assessed using the Flesch-Kincaid (F-K) grade level and Coh-Metrix Easability online tool (Coh-Metrix; McNamara, Louwerse, Cai, & Graesser, 2005). Coh-Metrix analyzes texts on five dimensions: (a) narrativity, (b) syntactic simplicity, (c) word concreteness, (d) referential cohesion, and (e) deep cohesion. Each category is scored using a percentile scale form 0 – 100. Higher scores in each domain suggest an easier to comprehend passage. One passage (i.e., "Basketball), was created for training purposes only and the other passages could be used for both training and testing.

QAR training passages. A training passage on the origin of basketball, printed on 8.5 in. x 11 in. white paper, was created to introduce the QAR strategy procedures to participants (See Appendix B). As seen in Table 4, the "Basketball" QAR training passage was composed of 121 words in 16 sentences and had a 2.8 F-K grade reading level. According to the Coh-Metrix data, the training passage had high syntactic simplicity and high word concreteness, indicating there were a large proportion of words that were easy to visualize and comprehend. In addition, referential and deep cohesion were high, which supports comprehension. Narrativity was lower to reflect the expository nature of typical content area texts. The "Basketball" QAR training passage was used in the Level 1 and Level 2 intervention training sessions.

Adapted science and social studies passages. Passage topics were chosen that align with 5th grade level social studies and science content and standards (see Table 4). Topics included: weather, the water cycle, interdependence of living things, ecosystems, basic components of the universe, cells, solar system, westward expansion, and the Civil War. On average, the QAR science and social studies passages contained approximately 100 words (range = 75 – 126), and 12 sentences (range = 10 – 15). Passages were adapted to include a minimum of four sentence

pairs containing pronouns and their referents. The average F-K grade reading level was 4.62 (range = 1.34 – 6.62). On average, passage narrativity was low (M = 37.54; range = 2 – 85). Across passages, syntactic simplicity (M = 86.44; range = 23 – 99) and word concreteness (M = 81.20; range = 21 – 99) were high. Referential cohesion (M = 53.66; range = 3 – 99) and deep cohesion (M = 45.73; range = 2 - 99) were in the moderate to low range. The adapted science and social studies passages were used as testing materials in Level 1, Level 2, and Level 3 baseline, mastery, and maintenance probe sessions. In addition, the science and social studies adapted passages were used as training materials in Level 3 intervention sessions. A sample adapted science passage, "In the Desert" is provided in Appendix F.

QAR background knowledge fact sheets (BKFS). Level 1 and modified versions of training BKFS were printed on 8.5 in. x 11 in. to supply information for think & find ("Think And Find") questions whose answers were found outside the training passage. The top half of all BKFS were comprised of color pictures related to the passage topic. The bottom half of the BKFS contained factual statements related to the passage topic, preceded by lowercase letters.

"Basketball" BKFS. Level 1 and Level 2 versions of the "Basketball" BKFS were created to align with the "Basketball" QAR training passage. The Level 1 "Basketball" BKFS was printed on a single sheet of paper, the bottom half of which contained eight factual statements regarding the origin of basketball, lettered a – h (see Appendix C). The modified BKFS was divided onto two sheets with three lettered statements (i.e., a – c; d – f) pertaining to the origin of basketball per sheet (see Appendix I). The Level 1 "Basketball" BKFS was used to teach "Think and Find" QAR questions in the Level 1 version of the intervention. The modified "Basketball" BKFS was used to teach "Think and Find" QAR questions in the Level 2 version of the intervention.

Science and social studies BKFS. Level 1 (n = 41), Level 2 (n = 41), and Level 3 (n = 41) versions of science and social studies BKFS were created to accompany each QAR science and social studies passage. The Level 1 science and social studies BKFS contained eight factual statements related to the corresponding passage that were not included in the training passage, and were preceded by letters a – h (see Appendix G). The Level 2 version of the science and social studies BKFS was divided onto two separate sheets of paper with three factual statements on each, labeled a – c and d – f (see Appendix J). The Level 3 version of the science and social studies BKFS was printed on two pages and included one factual sentence on the origins of basketball per page (see Appendix M). Level 1 BKFS were used in the Level 1 version of the intervention during baseline, mastery, and maintenance testing sessions. Level 2 BKFS were used in the Level 2 and Level 3 versions of the intervention during baseline, mastery, and maintenance testing sessions. Level 3 science and social studies BKFS were used during Level 3 intervention "Think and Find" QAR strategy training sessions.

QAR question and answer training sheets. Three versions of question and answer training sheets were printed on 8.5 in. x 11 in. white paper in black ink for use in the Level 1, Level 2, and Level 3 versions of the adapted QAR intervention. Origin of basketball question and answer training sheets were aligned with the origin of basketball QAR training passage and BKFS content. The science and social studies question and answer training sheets corresponded to adapted science and social studies passage and BKFS topics.

"Basketball" question and answer training sheets. An example of a Level 1 "Basketball" question and answer training sheet is presented in Appendix D. The title of the basketball training passage was printed at the top of all versions of the origins of basketball question and answer training sheets. Level 1 question and answer training sheets (n = 7)

contained two lines for written responses following question stems. Appendix H presents an example of a Level 2 origin of basketball question and answer training sheet. On each Level 2 origin of basketball training sheet (n = 7) three or four lines of text from the basketball training passage were printed beneath the title at the top of the page, followed by three question stems. Question stems were one of each QAR type, preceded by the associated QAR icon. Origin of basketball question and answer training sheets were used during instruction in the Level 1 and Level 2 versions of the adapted QAR strategy intervention.

Science and social studies question and answer training sheets. An example of a science and social studies question and answer training sheet is provided in Appendix L. The science and social studies question and answer training sheets contained one or two lines of text from a science and social studies passage, one question stem with its corresponding QAR icon, and one completion prompt with lines on which to supply the written responses. The science and social studies question and answer training sheets (n = 480) aligned with the 40 QAR science and social studies passages. The science and social studies question and answer training sheets were used during training of the adapted QAR strategy in the Level 3 version of the intervention.

QAR icon cards. Figure 1 displays samples of the QAR icon cards. QAR icon cards were created for each QAR question type (i.e., "Right There," "Search and Find," "Think and Find"). QAR icons were visual mnemonics representing the three QAR question types. Cards were color-coded and printed on 3.5 in. x 5 in. cardstock. "Right There" questions were printed in blue, search and find questions were in red, and "Think and Find" questions were in yellow ink. QAR icon cards were testing materials used in the Level 3 baseline, mastery, and maintenance probe sessions.

QAR procedural facilitators. Three procedural facilitators, one for each QAR type, were printed in color on white 2.5 in. x 6 in. cardstock with the same color-coding described for QAR icon cards (see Figure 2). Procedural facilitators were visual mnemonics of the QAR strategy that prompted participants to use the strategy during mastery testing sessions, as needed. The procedural facilitators were divided into four sections containing the (a) QAR icon, (b) QAR name, (c) location of the answer sentences, and (d) potential key words and common attributes linking the questions and answers. QAR procedural facilitators were introduced as training materials in all versions of the intervention.

Visual schedule. A visual schedule containing the numbers one through four in red circles, followed by a grey square containing the words, "BREAK 2 minutes," was printed on a blue background on 2.5 in. x 6 in. cardstock (Figure 3). The visual schedule was used to cue students to the availability of reinforcers, provide structure to the sessions, encourage appropriate student behaviors, increase academic engagement, and facilitate transitions between activities.

Data collection sheets. Custom data collection sheets, printed on 8.5 in. x 11 in. white paper were created to record participant responses (Appendix O). Data collection sheets were used in baseline, mastery, and maintenance sessions. Spaces were available to record the score for each QAR strategy step, and the number of prompts provided for each step, as well as participant identification number, date, passage name, condition, and session number.

Video recorder. Each session was video recorded for purposes of interrater reliability (IRR) and procedural fidelity using a Kodak Zi8 Flip camera and a Samsung Galaxy Note 10.1 tablet. Recorded sessions were stored on a secure, password-protected server.

Measures

Kaufman Brief Intelligence Test, 2nd Ed. (KBIT-2; Kaufman & Kaufman, 2004).

The KBIT-2 is a measure of intelligence normed for individuals ages 4 – 18. Three subtests of the KBIT-2 (i.e., ***Verbal Knowledge***, ***Matrices,*** and ***Riddles***) were administered to students prior to beginning the study. The ***Verbal Knowledge*** subtest consisted of 60 items that measure general world knowledge and receptive vocabulary. The test administrator said a word or asked a question and the respondent selected the one color picture from an array of six that best exemplified the meaning of the word or answered the question. The ***Matrices*** subtest was a nonverbal measure containing 46 items requiring respondents to determine relationships among a variety of concrete and abstract visual stimuli. There were teaching items available to ensure respondents understood the nature of the task before proceeding to the testing. The 48 items in the ***Riddles*** subtest measured verbal reasoning, comprehension, and vocabulary knowledge. The examiner asked a riddle and the respondent either pointed to a picture or verbally answered. There were four teaching items included in the ***Riddles*** subtest.

Scores from the first two subtests (i.e., ***Verbal Knowledge*** & ***Matrices***) were used to calculate the verbal ability score. The internal consistency reliability for the verbal ability score was adequate ($\alpha = .90$). The verbal ability score reflects the respondents' knowledge of word meanings, verbal concept formation, ability to reason, and general information. The ***Riddles*** subtest score was used to calculate the nonverbal ability score. The internal consistency reliability of nonverbal ability scores was adequate ($\alpha = .86$). An IQ composite score was also available and had high internal consistency ($\alpha = .92$).

Woodcock Reading Mastery Test - III (WRMT-3; Woodcock, 2011). The WRMT-3 was a comprehensive battery of tests that was administered individually to measure reading

achievement and reading readiness. The test was normed for grades pre-K through 12 and ages 4-6 through 79-11. Four subtests of the WRMT-3 were administered to students prior to beginning the study. The ***Letter Identification*** subtest measured the respondent's ability to recognize letters printed in lower (n = 36) and upper case (n = 27) formats. Letters were presented to students in uniform style and font. In the ***Word Identification*** subtest, students read a list of real words of increasing difficulty out of context. The ***Word Attack*** subtest required examinees to read decodable nonsense words (n = 45) of increasing difficulty. The ***Passage Comprehension*** subtest was a modified cloze task. Examinees were presented with a sentence or passage accompanied by a color picture representation of the concept and a blank line that represented a missing word. The test measured respondents' abilities to correctly supply the missing word.

Dynamic Indicators of Basic Early Literacy Skills oral reading fluency passages (DIBELS ORF; Good & Kaminski, 2002). The DIBELS ORF test consists of 26 passages constructed to be at equivalent readability levels. Two first-grade level DIBELS ORF passages (i.e., ***A Jump Rope Contest***; ***Going to Market***) were administered to determine participant reading fluency and reading comprehension levels. The DIBELS ORF was a standardized and efficient measure of early literacy skills and was used to determine students' progress toward reading proficiency benchmarks. Respondents were asked to read aloud for one minute as the test administrator tracked the total number of words read independently and correctly. After reading the passage, respondents were asked to retell what was read. Test developers provide data for the predictive ($\alpha = .64$) and concurrent ($\alpha = .75$) validity for the measure.

QAR science and social studies testing probes. Three versions of QAR science and social studies testing probes were created for each science and social studies passage, aligned

with the three Levels of the adapted QAR strategy training conditions, materials, and procedures. The title of the corresponding science or social studies passage was printed at the top of all versions of testing probes.

Four ***Level 1 testing probes*** were created for each science and social studies testing passage. The Level 1 testing probes contained three QAR question stems (one of each type) preceded by the corresponding QAR icon and followed by blank lines for recording responses. A sample of a Level 1 testing probe is available in Appendix E. Four ***Level 2 testing probes*** were constructed for each science and social studies testing passage. Level 2 testing probes included three or four lines of text from the corresponding passage. Three question stems, completion prompts with blank lines, and the QAR icon for each respective question type, were printed on the page. A sample of a Level 2 testing probe is available in Appendix K. Two ***Level 3 testing probes*** were developed for each science and social studies testing passage. Level 3 probes include three or four sentences from the associated science or social studies passage. In addition, a single question stem without a QAR icon was provided, followed by a completion prompt and blank answer lines. A sample of a Level 3 testing probe is available in Appendix N.

Procedural fidelity data collection instruments. Procedural fidelity data collection instruments were designed for the study. Baseline and maintenance session observation data were recorded on one fidelity sheet, and intervention and mastery condition data were recorded on a second sheet. Trained observers rated the tutor's adherence to the prescribed procedures in baseline until the tutor reached 80% fidelity for a minimum of three consecutive sessions. Then, tutors were observed for a minimum of 20% of sessions until the tutor either dropped below the 80% fidelity criterion or a change of condition occurred. When entering a new condition,

observers collected procedural fidelity data on the first session. If the tutor's procedural fidelity dropped below 80%, the tutor received refresher training until meeting criterion again.

Baseline procedural fidelity instrument. The baseline procedural fidelity instrument consisted of 42 items that were marked with a 1 for the presence of an indicated behavior and a 0 for the absence of the behavior (Appendix P). The first three items were scored one time per baseline or maintenance session and pertained to overall preparedness (i.e., Did the interventionist a) read the directions, b) have all necessary materials, and c) prompt the student to read the passage). The remaining 39 items consisted of 13 items that were applied to each of the three QAR category conditions. Some of the items were essential procedural behaviors and some were optional. For example, mandatory items included providing an initial prompt to find the particular QAR question, find the answer sentence, and write the answer on the line. Optional items included additional prompts delivered if students did not answer or answered incorrectly (e.g., provide the QAR definition). Optional items were scored 1 if needed and observed, 0 if needed and not observed, and not applicable (na) if not needed and not observed. In addition, spaces were provided to tally praise statements and unplanned prompts for each QAR question type. A column was provided to collect data on the test administrator's behaviors for up to four questions of each QAR type. At the end of the document, spaces were provided to tally the total possible number of behaviors, points awarded for the observed behaviors, the percent of points received, the session length, total praise statements and unplanned prompts.

Intervention and mastery fidelity instrument. The intervention and mastery fidelity instrument consisted of a total of 32 items pertaining to intervention (n = 21) and mastery (n = 11) procedures (Appendix Q). Some items measured the presence or absence of essential behaviors (e.g., set the purpose) and some items were optional (e.g. prompts for incorrect

answers), therefore the total possible number of items scored varied between sessions. Essential items were scored 1 if present and 0 if not present. Optional items were scored 1 if necessary and present, 0 if necessary but not present, and not applicable (na) if not necessary and not present.

Independent Variable

The independent variable (IV) was a multiple component strategy package adapted from the QAR strategy developed by Raphael (1982, 1986). Three QAR question types were introduced as part of the IV 1) textual explicit (i.e., "Right There"), 2) textual implicit (i.e., "Search and Find"), and 3) extratextual explicit (i.e., "Think and Find"). The IV included a three-step strategy for each QAR question type that 1) distinguished between answers found within the text and outside the text, 2) provided the number of sentences in which the answer could be found, and 3) identified the shared words and relevant key words (i.e., pronouns) in the question and answer sentences. Additionally, the IV was delivered using a) explicit modeling, b) verbal explication of rationale (i.e., "think-aloud"), c) visual prompts, and d) visual and linguistic mnemonics. An outline of procedures is provided in Table 6.

Dependent Variable

The dependent variable (DV) was the percent of correctly completed steps of the QAR strategy. Steps included a) correctly identifying the QAR question type, b) finding and underlining the sentence(s) where the answer was located, and c) writing the correct answer to the question. A total of five points could be awarded for each QAR question. Students received one point for correctly categorizing the QAR question type, and two points each for locating the answer sentences and correctly answering the questions. Students in the Level 1 and Level 2 versions of the QAR strategy intervention completed four probes during mastery testing sessions, for a possible total of 20 points. Students in the Level 3 version of the QAR intervention

completed two probes, for a total of 10 possible points. The percent correct was recorded in order to place the responses of each participant on the same scale for comparison. Mastery level performance criteria were reached when students scored 80% correct on strategy steps and correctly answered 100% of questions on probes for three consecutive sessions. Scoring guidelines are available in Appendix R and Table 7.

Experimental Design

A multiple probe design (conditions) across QAR question types (i.e., "Right There", "Search and Find", "Think and Find") with replication across participants (Gast & Ledford, 2014) was used to establish experimental control. The multiple probe across QAR question types design allows for the staggered application of the intervention to independent yet equivalent skills (i.e., QAR question types). There were three phases of data collection: baseline, intervention (i.e., mastery), and maintenance probes. All students received a minimum of three consecutive sessions of baseline probes across all three QAR question types prior to beginning instruction, and again after reaching mastery criterion, and prior to receiving instruction on the next QAR question type. Each daily session included intervention and mastery testing, or baseline or maintenance testing. Sessions were conducted on consecutive weekdays when the student was present at school. Baseline and maintenance probes occurred on consecutive school days when no intervention instruction took place. Based on previous reading strategy work with students who have ID, the multiple probe design (conditions) across sets design was chosen because it separates intervention and baseline/maintenance probes into distinct sessions, thus reducing session time, student fatigue, and noncompliant behaviors.

Procedures

General procedures. Sessions lasted between 30 min and 45 min. Tutors followed a scripted sequence of procedures and systematic prompt hierarchy specified for baseline and maintenance (see Table 5) and mastery testing (see Table 7) conditions. Intervention procedures followed a model-lead-test format. The procedures in baseline were designed to be as similar to intervention and maintenance procedures as possible without introducing the IV. The script for each QAR question type included an advanced organizer outlining the intervention procedures that included, 1) stating the purpose and objective, 2) modeling the strategy, 3) providing guided practice, 4) providing independent practice, and 5) assessing mastery. The purpose statement was the same for each unit and the objective was specific to each type of QAR question. Procedures for Level 1 baseline, intervention, mastery, and maintenance sessions are described in the following section, followed by descriptions of modifications made for the Level 2 and Level 3 versions of the QAR strategy.

Level 1 baseline. Tutors conducted a minimum of three baseline probe sessions for each QAR question type prior to beginning intervention. First, the tutor oriented the student to the materials available (i.e., passage, BKFS, testing probes). Next, the tutor read the test directions. Students were instructed to read the passage and were assured that the tutor would help them read unknown words. After reading the passage, students were given an initial prompt to find and circle the icon for the targeted QAR question type. If students did not respond, the tutor repeated the initial prompt (e.g., *Find and circle the picture of the Right There question*) up to two additional times. If students responded incorrectly, the tutor delivered the general prompt, *That's not quite right, try again*, up to two more times. The testing probes were covered in a plastic sheet protector and students circled the icon with an erasable marker, so errors could be

easily corrected. Next, tutors prompted students to read the question. Then, tutors prompted students to find and underline the sentences that answered the question. If students did not respond or responded incorrectly, a total of three initial or general prompts could be given, respectively. Finally, the students were prompted to answer the question and write the answer on the line. Students answered four questions of each of the three QAR types. Tutors directed students to try their best and gave praise for attention and effort, but not for correct answers. No corrective feedback was given. Students answered 12 questions, four of each QAR type.

Level 1 intervention. The tutor trained only one QAR question type to mastery and then returned to baseline before training the next QAR question type. In each Level 1 QAR intervention condition, the tutor presented the QAR strategy using the basketball QAR intervention training passage and BKFS, and the procedural facilitator corresponding to the targeted QAR question type. First, the tutor ***stated the purpose and objective*** of the lesson. Next, the tutor ***modeled the strategy*** by a) introducing and defining the QAR question type and icon with the procedural facilitator, b) reading the origin of basketball QAR training passage, c) finding and reading the target QAR question on the origin of basketball QAR question and answer training sheet, d) finding the answer sentence(s) on the origin of basketball training passage or BKFS, and e) writing the answer to the question. Additionally, the tutor described each step of the process aloud as she completed it. The answer sentences for right there and search and find questions could be found in the origin of basketball QAR training passages, and answer sentences for "Think and Find" questions were on the origin of basketball BKFS. Then, the tutor ***guided*** students as they ***practiced*** the steps of the strategy using the previously described Level 1 intervention training materials. Finally, the tutor provided the students an opportunity to practice the strategy independently. When beginning initial training on a QAR

question type, tutors provided a model. However, as students became more adept with the strategy steps, tutors had the option to begin with guided practice.

Level 1 mastery testing. The mastery test directly followed the intervention session. The tutor prompted the student to read the science or social studies QAR passage, providing reading assistance as needed. Then, the tutor prompted the student to find the targeted QAR question. A correct response was indicated when the student selected the targeted QAR icon preceding the targeted QAR question. If the student did not answer in 5 s or responded incorrectly, the tutor pointed to the targeted QAR icon on the procedural facilitator and prompted the student to find the targeted QAR question. If the student still did not respond or responded incorrectly, the tutor supplied the answer and pointed to the correct QAR question.

In the next step, the tutor prompted the student to find and underline the sentences that answered the question. The student received full credit (i.e., 2 points) for independently underlining the correct answer sentence or sentences in the passage. If the student did not answer or answered incorrectly, the tutor prompted the student by pointing to the targeted QAR icon and supplying part of the definition (e.g., "The search and find answer will be in the passage in two sentences"). If a second prompt was needed, the tutor supplied additional defining characteristics of the targeted QAR (e.g., "The answer will have many of the same words as the question. Look for clue words like he, she, it, and they to help answer the question*"*). The tutor supplied the answer if the student did not respond or identified the incorrect sentences, and recorded a 0 for this step. Finally, the tutor prompted the student to write the answer on the line. The tutor could repeat the prompt to write the answer on the line one additional time. The tutor awarded 2 points for a correct response, 0 for incorrect. Each step of the mastery test was scored using the scoring guidelines delineated above, presented in Appendix R. Students answered four questions in total.

Level 2 baseline. Procedures in the Level 2 baseline condition were conducted as described in the Level 1 baseline condition, with two differences. First, students were given the Level 2 versions of adapted science and social studies passages, BKFS, and testing probes. Level 2 BKFS included smaller chunks of text and completion prompts. Second, if students underlined the incorrect answer sentences during mastery assessment, the tester provided two, rather than three, general prompts (i.e., "That's not quite right, try again"). The number of prompts was decreased in order to keep Level 2 baseline and intervention procedures as similar as possible. Students answered a total of 12 questions, four of each QAR type.

Level 2 intervention. Procedures in the Level 2 intervention condition followed the same structure outlined for the Level 1 intervention condition. Students in the Level 2 intervention condition used the Level 2 "Basketball" QAR training passage, BKFS, and question and answer training sheets. The answer sentences for "Right There" and "Search and Find" questions could be found in smaller chunks of text provided at the top of Level 2 question and answer training sheets, and answer sentences for "Think and Find" questions were found among fewer choices on the Level 2 QAR training BKFS.

Level 2 mastery testing. Mastery testing in the Level 2 version of the intervention followed the same format as in the Level 1 version. However, Level 2 QAR science and social studies testing probes and BKFS were used. In addition, if students underlined the incorrect answer sentences during mastery assessment, the tester provided three specific prompts (e.g., "The answer will be "Right There" in the passage in one sentence. The answer will have many of the same words as the question. This is the "Right There" answer sentence").

Level 3 baseline. Procedures in the Level 3 baseline condition were conducted as described in the Level 1 baseline condition, with the same number of prompts as in the Level 2

baseline condition. However, students identified the targeted QAR icon from an array of three QAR icon cards, rather than on the testing sheet. Additionally, students were tested with the Level 2 versions of BKFS and testing probes. Students answered six questions, two questions of each QAR type.

Level 3 intervention. In the Level 3 intervention condition, students received training using the adapted science and social studies QAR testing passages, Level 3 BKFS and Level 3 question and answer training sheets. The Level 3 procedures differed from Level 2 because the student received training on the same passages and questions used in mastery assessment. In addition, the text from which to find answers was further reduced to either one or two sentences, rather than three to four sentences.

Level 3 mastery testing. Level 3 assessments differed in the following ways. First, tutors presented an array of three QAR icon cards and prompted the student to identify the targeted QAR question. Next, the tutor presented the testing passage and first page of the modified BKFS to the student. The tutor prompted the student to read the passage, providing assistance as needed. Then, the tutor provided a prompt to read the question and find the sentence(s) that answered the question. Finally, the tutor prompted the student to write the answer on the line. Before presenting the second question, the tutor replaced the first page of the modified BKFS with the second page. Finally, students were assessed on two, rather than four questions of the targeted QAR type.

Maintenance conditions. Students continued to be tested on QAR question types for which they met mastery criteria. Maintenance probes of mastered QAR question types were administered during baseline probe sessions of untaught QAR question types. All maintenance conditions followed the procedures as described for their respective baseline conditions.

Data Analysis

Intervention effectiveness was primarily determined through visual analysis of the relationship between QAR strategy instruction and the dependent variable (DV). Data on the percent of correctly completed strategy steps and correctly written answers to QAR questions were entered and graphed in an Excel spreadsheet for each participant after every session, across three QAR question types. If students answered no questions correctly, the data point was graphed as an open circle. Data points with gray shading denoted 25% – 75% correct answers, and black filled data points corresponded with 100% correctly answered questions. Experimental control was established when the level, trend, and variability of student data changed in a therapeutic direction with the systematic and sequential introduction of the independent variable, and remained stable or changed in a counter-therapeutic direction when the independent variable had not been introduced.

Procedural Fidelity

Prior to the beginning of the study, the interventionist trained three independent observers to meet the procedural fidelity criteria. The independent observers practiced scoring live demonstrations that simulated baseline and intervention study conditions. Before providing procedural fidelity observation data in the study, the independent observers correctly rated the presence and absence of intervention elements across conditions with 90% or higher accuracy and 90% or higher agreement.

Independent observers rated procedural fidelity using direct observation of video recorded baseline and maintenance (Appendix P), intervention and mastery (Appendix Q) sessions and the respective procedural fidelity data collection instrument. Procedural fidelity was evaluated on 100% of initial video recorded sessions until a fidelity score of 80% or higher was

achieved on three sessions in a row in baseline and intervention conditions. After achieving the 80% benchmark, fidelity data were collected on no less than 20% of subsequent, randomly selected sessions. In addition, procedural fidelity was rated on the first session each time there was a condition change. If a tutor's adherence to study protocols dropped below 80% fidelity, the PI initiated refresher training and the observer collected additional fidelity data until the tutor reached the minimum acceptable criteria again.

Interrater Reliability (IRR)

To ensure accuracy of data collection and scoring, an independent second rater randomly selected and re-scored a minimum of 20% of the completed passage comprehension question sheets from each participant in each condition. The second rater independently scored selected recorded sessions using data collection sheets (Appendix O) and the scoring guide (Appendix R) and entered the total number correct in an Excel spreadsheet. Agreement was defined as both raters recording the same score and same number of prompts for each step of the DV (i.e., identifying the QAR question type, finding and underlining the answer sentence(s), and writing the answer). IRR was calculated by adding the number of exact agreements between the two raters, dividing the sum by the total number of steps (e.g., 12 steps for Level 1 and Level 2; 6 steps for Level 3) and then multiplying by 100 to obtain the item-by-item IRR percent (Cooper, Heron & Heward, 2007). Raters conferred to resolve disagreements. Results are cited in the text of the report as an overall percentage and range of agreement, and also disaggregated by percentage and range of agreement on number correct and prompts.

Social Validity

The social validity of the present study was supported in five ways. First, as previously reported, 36 co-teachers in four states and the District of Columbia were anonymously surveyed

about their knowledge of and interest in the QAR strategy using a customized, researcher-created REDCap online survey instrument (Appendix A; Harris et al., 2009). Respondents indicated that reading comprehension goals are appropriate for students with ID. Additionally, surveyed teachers indicated agreement with statements that the QAR strategy could be useful to increase reading comprehension and support inclusion of middle school students with ID in co-taught general education classes. Second, a special education teacher currently working in a MNPS middle school contributed to the development of content, format, and procedures of the intervention. Third, as illustrated in Table 4, the content of the intervention was aligned to grade-level curriculum standards. Fourth, components of the intervention addressed participants' IEP goals to improve responses to "wh" questions and increase written expression. Fifth, several of the passages share the theme of natural disasters (e.g., hurricanes, tornadoes, earthquakes) and provide practical information relevant before, during, or after a weather-related emergency.

CHAPTER IV

RESULTS

Results are presented in three parts. First, the percent of agreement between independent raters' scores of participant responses and prompts are reported as means and ranges. Next, the calculated means and ranges of procedural fidelity are presented for each participant in all phases of the study. Finally, participant baseline, mastery, and maintenance assessment data are a) described in text, b) graphed with sessions on the abscissa and percent correct on the ordinate, and c) tabulated with means and standard deviations (*SD*) across phases and question types.

Interrater Reliability

Interrater reliability (IRR) data were collected for all three participants' responses for all three QAR question types. IRR was calculated for a minimum of 20% of participant responses in baseline, intervention, and maintenance conditions (range = 20% - 27%). Across observed sessions, the IRR on scoring Oscar's mean percent of correct strategy steps was 90.13% (range = 61% - 100%). The IRR for prompts across Oscar's observed sessions was 82.75% (range = 50% - 100%). Overall, the mean IRR between raters for Oscar's data was 86.50% (range = 75% - 100%). Elmer's mean IRR for correctly completed strategy steps across observed sessions was 89.20% (range = 58% - 100%). The mean IRR for prompts across Elmer's observed sessions was 87.73% (range = 50% - 100%). In total, the mean IRR for Elmer's data was 88.53% (range = 71% - 100%). IRR for Bernie's percent of correct strategy steps across observed sessions averaged 95.94% (range = 83% - 100%). Across Bernie's sessions, the mean IRR for prompts delivered was 92.19% (range = 75% - 100%).

Procedural Fidelity

Procedural fidelity data were collected for all interventionists in all phases using a researcher-created checklist (see Appendices P & Q). Procedural fidelity data were collected on a minimum of 25% of baseline, intervention, and maintenance sessions (range = 25% - 30%). The trained observer collected procedural fidelity data in 14 of Oscar's sessions. The mean procedural fidelity for Oscar's tutor was 98.16% (range = 91.50% - 100%). Procedural fidelity was observed in 15 of Elmer and Bernie's sessions, respectively. The mean procedural fidelity for Elmer's tutor was 97.16% (range = 91.00% - 100%), and the mean procedural fidelity for Bernie's tutor was 99.49% (range = 95.56% - 100%).

Research Question Results

Participants in the present study were assessed with baseline, mastery, and maintenance probes to answer the research question: *Will instruction with an adapted version of the QAR strategy result in increased application of the strategy and correct responses to text-dependent questions on taught and untaught texts for middle school students with ID?* Each participant's baseline, mastery, and maintenance probe data were graphed individually. All three students received Level 1 intervention for "Right There" questions. Oscar completed Level 1 intervention for all three QAR question types. Elmer and Bernie both received additional intervention on "Right There" questions using the Level 2 version of intervention. Elmer finished the intervention after receiving Level 2 intervention on all three QAR question types. Bernie completed intervention after he received instruction on all QAR question types in Level 3 intervention. In addition to the graphed data, means and standard deviations (SD) of the percent of correctly completed strategy steps for each participant by question type, across conditions and versions are presented in Table 7.

Oscar. Figure 1 presents Oscar's percent of correct strategy steps and correctly answered questions on all three QAR question types, in baseline, intervention, and maintenance conditions of the Level 1 version of the adapted QAR strategy. Oscar participated in a total of 27 sessions, 14 sessions of instruction and mastery testing, and 13 baseline or maintenance probe sessions. After instruction, Oscar reached mastery criteria for "Right There" and "Think and Find" questions in three sessions each. Oscar required eight sessions of intervention to obtain mastery of "Search and Find" questions. Visual analysis of graphed data for each question type is detailed in the following section.

Level 1. As displayed in the top tier of the graph, during baseline, Oscar's percent of correct strategy steps on "Right There" questions was low, variable, and followed a relatively stable trend. Oscar correctly answered 25% of questions in the first and second sessions and no questions in the third session of Level 1 "Right There" baseline. Following introduction of the Level 1 "Right There" QAR strategy intervention, there was an immediate increase in level to 100% correct completion of strategy steps, including the correct answer to all four questions. Oscar met mastery criteria for "Right There" questions by correctly answering all questions and completing 90% and 100% of strategy steps in the second and third sessions of Level 1 "Right There" QAR intervention, respectively.

The middle tier of Figure 4 displays Oscar's percent of correct strategy steps on "Search and Find" questions. Data for "Search and Find" questions indicate Oscar's percent of correct responses remained below mastery levels, were moderately variable, following an increasing trend from 5% to 60% across the first four baseline sessions, then decreasing to 40% and 30% correct in the fifth and sixth baseline sessions, respectively. After training with the Level 1 "Search and Find" strategy, the level of Oscar's correct strategy steps rose to 60% and his

percent of correct responses remained flat. The level of his percent of correct strategy steps completed remained at a high level, in a stable but slightly decelerating trend for an additional five sessions. Based on Oscar's nonresponsive data pattern, the PI intensified the "Search and Find" strategy instruction. Oscar's tutor more concretely modeled matching the pronoun to its referent. Immediately following the increased explicit modeling, the level of Oscar's correct strategy steps reached 80% with 100% correct answers to questions, remaining stable and reaching mastery criterion in the eighth session of "Search and Find" intervention.

Oscar showed the most improvement on "Think and Find" questions, as evidenced in the bottom tier of the graph in Figure 1. Across nine sessions, Oscar's baseline data for "Think and Find" questions stayed low and stable (range = 0 - 20%) with no correct answers on "Think and Find" questions. Subsequent to training with the Level 1 intervention for "Think and Find" questions, Oscar's level of correct strategy steps and responses immediately increased to 100%. Mastery criteria were met when Oscar's percent of correctly completed "Think and Find" strategy steps remained at 100% for three consecutive sessions.

Oscar's maintenance data for two of the three QAR question types were variable. Oscar's mean percent of correct strategy steps for "Right There" questions was 74.50% (SD = 20.06%). Of the ten "Right There" maintenance sessions, Oscar got 100% correct answers in only the final two sessions. Oscar was tested for maintenance of "Search and Find" questions for seven sessions, with a mean percent correct of 47.86% (SD = 17.53%). Oscar did not score 100% correct on answers to "Search and Find" maintenance questions. Mean maintenance levels of correct responses were 16.19% higher than baseline levels. Oscar's mean percent of correct strategy steps for "Think and Find" questions in the maintenance condition was 98.33% (SD = 2.50%).

Elmer. Elmer's baseline, intervention, and maintenance data for the Level 1 adapted version of the QAR strategy are provided in Figure 5. Experimental control was achieved when Elmer was instructed using the Level 2 version of the adapted QAR strategy, the results of which are presented in Figure 6. As indicated in Figure 6, a functional relation between adapted QAR strategy instruction and Elmer's percent of correctly completed strategy steps and answered questions was established with the "Right There" QAR questions and replicated with the "Search and Find" and "Think and Find" QAR question types.

Level 1. Elmer's percent of correct responses during four Level 1 adapted QAR baseline sessions were low and stable and did not include any correct answers across all question types. After introduction of the Level 1 adapted QAR intervention, Elmer's correct strategy steps increased to 30%. Elmer's percent of correctly completed strategy steps decreased to 15% in the second session and slightly increased to 20% in the third session of Level 1 intervention. Elmer did not answer any questions correctly and displayed avoidant behaviors during intervention sessions. Following the third session of Level 1 intervention, the PI instructed the tutor to collect baseline data on all question types using the Level 2 probes.

Level 2. Figure 6 presents Elmer's baseline, intervention, and maintenance data with the Level 2 version of the adapted QAR strategy. Elmer's response pattern across the first three sessions of baseline in the Level 2 version of the adapted QAR was low and stable, or displayed a slightly decreasing trend. In the first three baseline sessions, Elmer did not answer any questions correctly across all QAR question types. Following the introduction of strategy instruction, Elmer's correctly completed "Right There" strategy steps immediately increased from 20% in the third baseline session to 50%. The pattern of data representing Elmer's percent of correct strategy steps and responses to questions followed an increasing trend in five

subsequent sessions, reaching 100% correct in the seventh session of the Level 2 "Right There" intervention condition. Mastery criteria were met in the ninth session after Elmer achieved 90% correct completion of strategy steps and 100% correct answers to "Right There" questions for an additional two consecutive sessions.

Elmer's percent of correctly completed strategy steps in six "Search and Find" baseline sessions were at a low level, slightly variable, and stable trend. In the fourth "Search and Find" baseline session, Elmer answered one question correctly; his correct answers in the other five sessions were zero. Following introduction of the Level 2 adapted "Search and Find" QAR strategy instruction there was an immediate increase in Elmer's percent of correct strategy steps to 55%. The pattern of Elmer's responses followed an increasing trend in the second and third sessions of SF intervention with 75% correct strategy steps in each. In the fourth and fifth sessions of intervention, Elmer answered the questions with 100% accuracy and completed 90% of the strategy steps correctly. Mastery criteria were met in the sixth session of "Search and Find" intervention when Elmer answered 100% of the questions and 80% of strategy steps correctly.

The pattern of Elmer's responses in nine Level 2 adapted "Think and Find" QAR sessions indicated low levels of response with a stable and slightly decreasing trend. Elmer did not answer any "Think and Find" questions correctly during baseline sessions. A dramatic change in the level of Elmer's percent of correctly completed strategy steps from 20% to 100% was evidenced immediately following receipt of Level 2, adapted "Think and Find" strategy instruction. In the second session, Elmer's percent correct dropped to 60% and he answered less than 100% of "Think and Find" questions correctly. In the third and fourth Level 2 "Think and Find" intervention sessions, Elmer correctly completed 80% of strategy steps with 100% correct

responses to questions, respectively. Elmer reached mastery criteria in the fifth "Think and Find" intervention session with a level of 90% correctly completed strategy steps and 100% correctly answered questions.

Bernie. Bernie was first instructed with the Level 1 version of the adapted QAR strategy. When the intervention began, Bernie exhibited many escape-motivated behaviors. For example, Bernie would grab the materials, throw them, and turn away from the tutor. The tutor was unable to complete a full session with Bernie within 45 min and spent much of the time redirecting attention and providing reminders about access to reinforcing activities in exchange for cooperative behavior. Bernie was probed across all question types with Level 2 science and social studies probes and began Level 2 intervention on "Right There" questions. Data for Bernie's performance in Level 1 and Level 2 versions of the adapted QAR strategy are available in figure 7. Due to his performance in Level 2 intervention, Bernie was instructed with the Level 3 version of the intervention. Level 3 data are displayed in figure 8.

Level 1. The left side of Figure 7 displays the results of Bernie's baseline and intervention probes in the Level 1 adapted QAR strategy condition. Bernie's baseline performance in all three question types are low and stable and include no correct answers. The data pattern for Bernie's percent of correct strategy steps to "Right There" and "Search and Find" questions was stable and for "Think and Find" questions a slightly accelerating trend was noted (range = 0 – 10%). In the third session, Bernie exhibited non-compliant behaviors that caused the early cessation of intervention.

Level 2. The right side of Figure 7 displays Bernie's baseline and intervention data for the Level 2 version of the adapted QAR intervention. During the three Level 2 baseline sessions, Bernie did not answer any questions correctly for any QAR question type. The pattern of his

baseline data for "Right There" questions was low and variable, beginning at 10% correct, increasing to 45% correct in session two, and decreasing to 25% correct in the third session (M = 26.67%; SD = 16.67%). Bernie's baseline data for the SF QAR questions in the Level 2 condition were at a low level with a slightly decreasing trend (M = 16.67%; SD = 5.77%). For "Think and Find" QAR questions, Bernie's baseline data were low and slightly variable. Bernie correctly completed 20% of strategy steps in the first session, decreased to 5% correct in the second session, and 15% in the third session (M = 13.33%; SD = 7.64%).

Immediately following introduction of the Level 2 intervention for "Right There" questions, the level of Bernie's percent of correct strategy steps increased to 90% and included 100% correct answers to four "Right There" questions. In the next four sessions, Bernie answered the "Right There" questions with less than 100% accuracy, and the percent of correct strategy steps followed a decreasing trend to 60%, remaining level for an additional two sessions. In the sixth intervention session, Bernie answered the "Right There" questions with 100% accuracy but only attained 60% correct on strategy steps. In the seventh session of Level 2 intervention, Bernie's percent of correct strategy steps dropped to 45% with less than 100% correct answers. Due to the downward trend in Bernie's pattern of responses, lengthy session times, and ongoing disruptive behaviors, the PI decided to use the Level 3 version of the intervention with Bernie.

Level 3. Figure 8 displays Bernie's data for baseline, intervention, and maintenance sessions in the Level 3 version of the adapted QAR intervention. As seen in Figure 8, Bernie's pattern of response in the Level 3, "Right There" baseline condition was variable. Bernie correctly performed 30% of strategy steps for two sessions with no correct answers on two "Right There" QAR questions. In the third Level 3 baseline session, Bernie's percent of correct

strategy steps increased to 70% and he answered one question correctly. Upon introduction of instruction with the Level 3 QAR strategy for "Right There" questions, Bernie's percent of correct strategy steps completed increased to 80% with 50% correct answers to "Right There" questions. This was followed by a decrease to 50% correct strategy steps and answers, respectively, in session two. In the remaining three sessions of Level 3 intervention for "Right There" questions, Bernie answered all questions correctly and completed strategy steps with 100%, 80%, and 100% accuracy, respectively.

During the initial three baseline sessions in the Level 3 condition, Bernie's percent of correct strategy steps was variable for "Search and Find" (M = 16.67%; SD = 15.28%) QAR questions and was low and stable for "Think and Find" questions (M = 20%; SD = 0). In the first session of Level 3 baseline for "Search and Find" questions, Bernie correctly completed 30% of strategy steps with no correct answers. In the second session, Bernie completed no strategy steps correctly and incorrectly answered both "Search and Find" questions. Bernie's strategy steps increased to 20% in the third baseline session with 100% correct answers to "Search and Find" questions. Across the first three Level 3 baseline sessions for "Think and Find" questions, Bernie scored 20% for correctly completing strategy steps and did not correctly answer any "Think and Find" questions.

CHAPTER V

DISCUSSION

Although researchers have identified a large number of evidence based reading comprehension practices for students who are typically developing and for those with reading disabilities, many fewer reading comprehension practices have been identified for adolescents with ID (Browder et al., 2006). The purpose of this study was to contribute to the reading comprehension research conducted with individuals with ID. Further, the results of this study contribute to the existing literature on the effectiveness of the QAR strategy for increasing text comprehension. A multiple probe across QAR question types (conditions) experimental single case design study was conducted to answer the question: *Will instruction with an adapted version of the QAR strategy result in increased application of the strategy and correct responses to text-dependent questions on taught and untaught texts for middle school students with ID?*

The findings of this study support a functional relation between Levels 1 and 2 of an adapted QAR strategy intervention and the percent of correct responses on probes of untaught adapted science and social studies texts. A functional relation was also found for Level 3 of the adapted QAR strategy intervention and the percent of correct responses on probes of taught adapted science and social studies texts. Due to training in Levels 1 and 2 prior to Level 3 baseline, the relation between the IV and DV for Bernie's "Right There" questions in Level 3 is less clear. Generally, Level 3 intervention resulted in a higher percentage of correct answers for Bernie. Next, a discussion of the present study's outcomes is presented, contextualized within the corpus of existing reading comprehension research for students with ID and the broader QAR

research literature. This is followed by limitations, suggestions for future research, and implications for practice.

Reading Comprehension Research for Students with ID

Systematic prompting. Similar to previous reading comprehension research for students with ID, the present study included least intrusive prompting. Wolery, Ault, and Doyle (1992) described least intrusive prompting as a prompting hierarchy of at least three levels, beginning with the least amount of support (e.g., task direction) and ending with the most assistance (e.g., controlling prompt). Least intrusive prompting is an instructional procedure that has been successfully used to teach skills to individuals with a variety of disabilities, across a range of ages (Wolery, Ault, & Doyle, 1992). In the present study, students increased their percent of correct responses when the system of least prompts was provided during intervention and did not increase their percent of correct responses when they were given the same number of general prompts in baseline. The results of the present study are promising and add to recent experimental research that focuses on increasing text comprehension for individuals with ID. In the following sections, three experimental multiple probe across participants design studies that use systematic prompting to promote text comprehension with students with ID are highlighted.

In one study, researchers trained teachers to follow a task analysis and use systematic prompting to increase engagement in grade-appropriate literacy activities for six middle school students with ID (Browder, Trela, & Jimenez, 2007). In addition to the fact that teachers, rather than researchers implemented the intervention, the study by Browder et al. differed from the present study in some notable ways. First, the students included in this study were non-readers. Second, the researchers adapted novels that were typically used in their grade-level literacy classes with summaries and embedded picture symbol supports. The picture supports were used

as part of the systematic prompting procedures. For example, if students did not respond correctly after receiving the task demand, (e.g., "Who loved his home?") teachers in the Browder et al. study prompted students to find the answer by drawing attention to the page where the answer could be found, supplying a verbal answer and asking the student to point to the correct picture, and finally pointing to the correct picture symbol embedded in the adapted text and asking the student to point to it also. Consistent with the present study, results of the Browder et al. study indicated students increased independent correct responses to comprehension questions. Unlike the present study, students in the Browder et al. study made additional gains on skills such as repeating predictable storylines, identifying target sounds, and concepts of print.

In another study, researchers taught peers to deliver systematic prompts to increase listening comprehension of adapted grade-level science texts that were read aloud to three fourth-grade students with ID in a general education classroom (Hudson, Browder, & Jimenez, 2014). After listening to the science passage, students were asked six questions. If the students answered incorrectly, an error correction procedure was used. If they did not respond, the system of least prompts procedure was initiated.

Hudson et al. incorporated four prompts in the prompting hierarchy. First, students could listen to the peer re-read the passage. Then, they read the sentence where the answer could be found. Next, the peer said the correct answer. Finally, the peer tutor pointed to the correct answer on the response board. Because finding the answer sentence was the targeted skill in one step of the adapted QAR strategy, rereading the sentence where the answer could be found would be a controlling prompt in the present study. Instead, the prompting sequence in the present study provided definitions of the QAR question types that included a general description of the location of the answer sentences. In addition, reducing the number of sentences from which

participants looked for an answer was a permanent modification made to the materials in Levels 2 and 3 of the present study. Elmer and Bernie required this additional level of support, as well as systematic prompting to successfully use the adapted QAR strategy and correctly answer reading comprehension questions.

Mims, Hudson, & Browder (2012) used systematic prompting in a study with four middle school students with autism and ID. Students were asked eight "wh" questions and three sequence questions for each adapted 6th-grade biography. Questions were interspersed throughout the texts, rather than massed at the end, so that questions and answers were on the same page. Mims et al. reported that the number of unprompted correct responses increased for three of the four students following intervention with systematic prompting. However, researchers reported that one student responded minimally to the intervention with the first biography and received six sessions of massed trial training (i.e., 10 question answer trials at 0 s delay and 10 trials at 4 s delay) prior to intervention until his level of correct unprompted responses increased.

Similarly, in the present study, Bernie did not respond to instruction in Levels 1 and 2 with the "Basketball" training passage. Therefore, the adapted QAR intervention was modified in Level 3 to train Bernie to use the adapted QAR strategy with science and social studies passages he would also be assessed with in mastery. Although Bernie did not maintain the mastery level of correct responses he attained during intervention, he was able to apply the strategy on untaught passages, unprompted in maintenance.

Text enhancements. Graphic organizers and procedural facilitators are examples of text enhancements that have bee used to increase reading and listening comprehension outcomes for students with a variety of ability levels (Gajria, Jitendra, Sood, & Sacks, 2007). Although the two

terms are sometimes used interchangeably, graphic organizers and procedural facilitators function differently for enhancing comprehension of text. Whereas graphic organizers are visual representations of text concepts, content, and structure (Kim,Vaughn, Wanzek, and Wei, 2004), procedural facilitators provide a visual reminder of the steps and strategies used by proficient readers to comprehend text (Baker, Gersten, & Scanlon, 2002). Results of the present study extend findings from previous studies that have effectively used text enhancements to support text comprehension with students with ID.

Researchers in several studies have incorporated graphic organizers to support text comprehension. For example, Wood, Browder, and Flynn (2015) used a graphic organizer to help students determine if answers to comprehension questions were "in text" or "not in text." Fourth-and-fifth grade students with ID listened to sections of their fifth-grade social studies text book read aloud by the teacher and were assessed on their ability to generate four questions, identify the source of answers, and answer six questions verbally. Researchers reported a functional relation between the IV and each of the three DVs. After receiving intervention in this experimental multiple probe across participants study, the students generated more questions, appropriately categorized the answer source to more questions, and increased correct responses to questions. In the present study, a procedural facilitator was incorporated to support students to find the answers to reading comprehension questions. Students accessed the procedural facilitator to visually prompt them to use the adapted QAR strategy steps and increased their percent of correct responses to QAR comprehension questions.

In another study, Zakas, Browder, Ahlgrim-Delzell, and Hefner (2013) used two types of graphic organizers to support comprehension of adapted social studies texts for three middle school students with autism who participated in alternate achievement testing (IQ range = 61 –

76). Prior to implementing the modified graphic organizer intervention, Zakas and colleagues pre-taught participants to use a vocabulary map. The vocabulary map contained seven terms, definitions, and picture cues that the students would encounter in the text. Researchers reported a functional relation between the graphic organizer intervention and all three students' responses to reading comprehension questions. Findings of the present study provide additional support that instruction that includes text enhancements such as graphic organizers and procedural facilitators can increase listening and reading comprehension of social studies texts for upper elementary and middle school students with ID.

Shared reading and text characteristics. Results of the present study align with studies in which researchers have used shared reading and content area texts as part of their text comprehension interventions aimed at students with ID (Browder, Trela, & Jimenez, 2007; Mims, Hudson, & Browder, 2012; Wood, Browder, & Flynn, 2015). Likewise, outcomes of the present study corroborate findings from reading comprehension studies wherein students independently read adapted content area texts. In contrast to studies that presented texts through listening to texts read aloud, students in the present study read the text out loud as independently as possible. For example, in Level 1 and Level 2 of the present study, the tutor modeled reading the "Basketball" training passage, but students were tested on an untrained science or social studies passage that they read out loud. In other words, Oscar and Ernie did not have the testing passage read aloud to them. In Level 3, Bernie was trained using the same passage he was later tested with. Therefore, Bernie did have the benefit of a read aloud to enhance his comprehension. Although students in the present study read texts with assistance from the tutor as needed, the outcomes of the present study align with studies in which read-alouds or shared reading were employed.

There were similarities and differences between the characteristics of the texts used in this study and those used in previous studies. In some studies (e.g., Browder, Trela, & Jimenez, 2007; Zakas, Browder, Ahlgrim-Delzell, & Hefner, 2013) researchers embedded pictures within the text to enhance reading and listening comprehension with students with ID. In other studies (e.g., Shurr & Taber-Doughty, 2012, 2016), pictures were presented separate from text and were used to facilitate discussion to increase knowledge of the concepts within the text. Similar to the present study, Hudson, Browder, and Jimenez (2014) accompanied the summarized science texts with a single picture.

In the present study, expository texts containing grade-appropriate science and social studies content were adapted to increase their readability. Expository text is more difficult for students to read and comprehend due to the a) density of concepts presented, b) text structure, c) large amount of unfamiliar vocabulary, and d) reliance on prior knowledge that is often lacking (Saenz & Fuchs, 2002). The passages used in this study were adapted to have simplified syntax and comparable sentence structures to ones found in texts written at lower grade levels. The adaptations were provided to assist participants to read independently. However, as can be seen in the sample text, "In the Desert," words such as *evaporation*, *absorb*, and *moisture*, increase the difficulty of the text beyond the participants' independent reading levels (see Appendix F). Pictures were included on the BKFS in the present study to supplement comprehension of the concepts in the passages. In two studies (Shurr & Taber-Doughty, 2012, 2016) researchers used unadapted grade-level texts, newspaper articles, and employee handbooks. Rather than adapt the texts, interventionists read small segments of authentic texts aloud to students, incorporating adjunct pictures and discussion to further support comprehension.

Text structure includes syntactic cues to help the reader make connections between sentences. For example, good readers know that pronouns refer to an antecedent noun that can be accessed in short-term memory or quickly located by scanning backward in the text. The results of this study indicate that the three participants were not reliably resolving anaphora prior to instruction. After instruction with the QAR strategy, each participant increased their ability to use the pronouns as cues to facilitate correct question answering. The focus in this study on having students read the words in the text rather than rely on embedded pictures or listening to passages read aloud to them, may have resulted in the gains all three participants exhibited in matching pronouns to their referents.

Response modes. The decision to focus on written responses in the present study was made for several reasons. First, all three students in this study had IEP goals to improve written expression. Requiring written responses provided an opportunity for participants to practice sentence construction. Second, there is some evidence that reading and writing are reciprocal acts and training in one has beneficial effects in the other as well (Graham & Hebert, 2011). Third, one of the defining features of Down syndrome (DS) is difficulty with expressive language and articulation (Farrell & Elkins, 1994). Previous reading research has shown that students with DS benefit from, and often enjoy simple writing tasks (Lemons et al., 2015). Finally, requiring written responses is a standard practice in general education classes. One objective of the present study was to focus on developing literacy skills that could potentially be applied in general education settings. Thus, written responses were included in the present study in consideration of that future aim.

In an experimental multiple probe across preposition sets (conditions) design study previously conducted by the PI of the current study and colleagues, a functional relation was

demonstrated between a three-step strategy and increased correct responses to text-dependent "where" questions (Davidson, Lemons, King, & Smith, 2016). Similar to the present study, the three participants with DS and ID matched salient features of the question to answer sentences in text, and provided written responses to text-dependent, "where" questions. Two of the students were in middle and high school, and the youngest student attended a mixed age elementary classroom in a private school. The classroom teacher of the youngest participant (age = 8) informed the PI that he had few previous experiences with writing answers. Yet, all three participants successfully mastered all trained "where" question sets and independently wrote their answers following printed completion prompts. Likewise, all participants in the present study were able to write their responses to text-dependent targeted QAR questions.

Unlike the previously described "where" question strategy study (Davidson et al., 2016), in the present study, all students began in Level 1 and were required to write their responses in full sentences. Oscar was able to independently write his responses in full sentences across phases for all three QAR question types. For Elmer and Bernie, the writing task in Level 1 was slow and labored, contributing to increased avoidant behaviors and impeding learning outcomes. It is important to strike a balance between allowing the student to experience success independently and challenging students to grow beyond their present level of ability. Providing scaffolded support can increase student performance without undue frustration, especially with less structured cognitive tasks (Rosenshine & Meister, 1992). Therefore, in Level 2 and 3 the training and assessment probes were modified to include completion prompts to reduce the amount of writing the two students with DS needed to produce to answer questions.

In contrast to the present study, most researchers in previous text comprehension studies conducted with students with ID have not required participants to write their responses to

comprehension questions. Most often, previous researchers have allowed students to answer comprehension questions verbally (e.g., Browder, Trela, & Jimenez, 2007; Shurr & Taber-Doughty, 2016; Wood, Browder, & Flynn, 2015) or receptively from an array of choices (e.g., Hudson, Browder, & Jimenez, 2014; Mims, Hudson, & Browder, 2012; Shurr & Taber-Doughty, 2012). Permitting participants to select answers receptively supports students who are non-verbal to participate in reading comprehension activities. For example, after listening to peer-delivered read-alouds of adapted science texts, participants in one study used response boards with six picture-plus-text options to indicate their answers to listening comprehension questions (Hudson, Browder, & Jimenez, 2014).

Similarly, participants in another study selected among four response options comprised of symbolic pictures and a few words of text (Mims, Hudson, & Browder, 2012). Four of the seven students included in the two aforementioned studies communicated through symbolic communication using eye gaze, pictures, and objects. Likewise, allowing constructed responses, as in the present study, circumvents verbal expressive communication and articulation difficulties often experienced by students with DS and ASD. However, constructing written responses can present difficulties for individuals who have fine motor challenges.

Some researchers have successfully included writing as part of their reading comprehension intervention with participants with ID. Zakas, Browder, Ahlgrim-Delzell, and Hefner (2013) required students to write their answers on graphic organizers. Similarly, participants in one study responded verbally during intervention, but recorded their written questions and answers related to social studies texts in journals during generalization sessions in inclusive classrooms (Wood, Browder, and Flynn, 2015). In the present study, students

responded independently by either writing full sentences (Level 1) or partial sentences following printed completion prompts (Level 2 and Level 3).

Comprehensive reading intervention and maintenance. The focus of the present study was to determine if students could learn to use the adapted QAR strategy and apply it to science and social studies texts to increase their percent of correct responses to reading comprehension questions. Because the intervention addresses complex skills, it was decided to limit the number of instructional elements in the intervention as much as possible. In practice, instruction with the adapted QAR strategy could be incorporated into a more comprehensive reading curriculum, such as the one developed by Allor and colleagues.

There is evidence that individuals with ID can benefit from the same evidence based practices identified for students with other disabilities and students with typical development (Allor et al., 2014). After cessation of intervention in the present study, Elmer and Bernie did not maintain mastery levels of responding across all QAR question types. Likewise, when assessed after instruction with the Level 1 adapted QAR intervention was no longer available, Oscar did not respond to "Search and Find" questions at criterion level. It is possible that once students reach mastery, they may need ongoing practice of the mastered QAR types to maintain the skill.

In a longitudinal study, Allor, Mathes, Roberts, Cheatham, Al Otaiba (2014) found that students with ID often required two to four years of reading intervention to make one year of progress in the curriculum. In the present study, the total number of sessions spent directly teaching the strategy in any one QAR question type condition was relatively short (range = 3 – 9). In addition, once students met mastery criteria for a QAR question type, there was no additional instruction on that question type. In their study, Allor Champlin, Roberts, Jones, and

Champlin (2010) incorporated repeated practice and review of strategies such as text previews, sequencing events, and making predictions.

QAR in content areas. The present study provides data in support of the effectiveness of the QAR strategy for promoting reading comprehension of science and social studies texts. Previous recommendations for using QAR to increase comprehension of science texts have lacked empirical data. For example, in a descriptive article aimed at practitioners, Kinniburgh and Shaw (2008) outlined recommended practices for teaching the QAR strategy to students in grades 4 and above in order to improve reading comprehension in science classes. Additionally, Kinniburgh and Baxter (2012) conducted a quasi-experimental, single group, pre-post design study with 10 fourth-grade students who were identified as poor readers or students with reading disabilities in a general education science class. The science teacher provided direct instruction with the QAR strategy for four weeks. The instructor read aloud as students followed along in their fourth grade science textbook. A special education teacher administered the pre and post-tests using an informal reading inventory (Analytical Reading Inventory [ARI]; Wood & Moe, 2007). Participants showed gains across all QAR question types. However, results were confounded because the same passages were administered at pre and post-test and there was no comparison group to provide experimental control.

Limitations

Although the evidence from the present study is promising, several limitations of the present study are worth considering. For example, the texts used in training and assessment were highly adapted and had predictable structures. Students were not assessed using authentic classroom science and social studies texts that were less aligned to the intervention. Additionally, due to the relatively short duration of intervention and high proportion of testing sessions, the PI

did not administer a standardized comprehension measure at post-test to evaluate far transfer of the study skills. It is unknown to what extent the increases in correct responses would transfer to assessments using questions that are dependent on texts typically used in general education science and social studies classes.

Another limitation of the present study was due to the characteristics of participants. Because a small number of students participated, it is unknown to what extent results of this study might generalize to other students who have similar characteristics to the individuals in this study. Furthermore, each participant completed the intervention with varying levels of support provided in the intervention. The placement of participants into different levels of the intervention based on their response to the intervention likely influenced the outcomes of individual participants in unique ways. Moreover, students from different populations and with different characteristics may not experience comparable results. Similarly, generalizability of study results is limited because trained researchers, rather than classroom teachers, administered the intervention.

Future Research

In future studies, researchers should examine whether students can maintain the effects of strategy training found in the present study. Intensifying the dosage of treatment by increasing the number of intervention sessions and incorporating ongoing review of mastered QAR question types may result in greater retention and independent application of the QAR strategy skills. In a quasi-experimental, within-group design QAR study, a sample of fourth-grade students with TD (n = 34) maintained gains in mean accuracy on ***textually explicit*** and ***textually implicit*** questions when assessed at follow-up in grade five (Ezell, Hunsicker, Quinque, & Randolph, 1996). The participants received instruction and ongoing practice QAR intervention for 40 min, twice per

week for 16 weeks. Given that students with LD outperform students with ID following reading, guided inquiry, and inductive reasoning interventions, it is likely students with ID would need more intensive intervention over a longer period of time to acquire and maintain a complex reading skill such as the QAR strategy (Caffrey & Fuchs, 2007).

Literature suggests that the QAR strategy is a means to promote inclusion in co-taught content area classes (Fenty, McDuffie-Landrum, & Fisher, 2012). Future experiments should be designed to assess whether students with ID can learn, and apply the adapted QAR strategy in inclusive middle school science and social studies classes. Embedded instruction with systematic prompting has been identified as an evidence-based practice to support middle school students with ID to learn content in general education classes (e.g., Hudson, Browder, & Jimenez, 2014; Hudson, Browder, & Wood, 2013). For example, in one study, middle school students with ID were able to learn social studies content in an inclusive classroom when trained paraprofessionals presented vocabulary instruction using embedded instruction paired with constant time delay or simultaneous prompting (Riessen, McDonnell, Johnson, Polychronis, & Jameson, 2003).

Hahn (1985) described another approach wherein middle school students were taught to use the QAR strategy with expository texts during a supplemental reading program that met for 50 min, three days per week in a self-contained classroom. The reading teacher modeled the strategy, followed by opportunities for group and individual practice. Once students were proficient at generating three types of QAR questions (i.e., “Right There,” “Think and Search,” “On my Own”) in writing, they made folders with passages and QAR questions, called “Reading Power Kits,” to use during independent reading time in their respective general education reading classes. Further empirical data are required to determine whether instruction embedded

in general education classes or instruction in self-contained settings would support students with ID to learn and employ the QAR strategy in inclusive content area classes.

Another extension to the present study would be to have teachers, rather than researchers, implement the QAR adapted strategy instruction. In a qualitative analysis of a yearlong QAR professional development program implemented in secondary content area classes, Wilson, Grisham, and Smetana (2009) reported that teachers demonstrated increased knowledge and use of the strategy following training. Further, the content area teachers related their perception of QAR's effectiveness to enhance reading comprehension and their willingness to continue using the strategy. In a non-experimental, action research analysis, Kinniburgh and Prew (2010) described teacher and student responses to training with the QAR strategy that they received in a Reading First funded summer reading academy. When interviewed, the authors reported that teachers and students were enthusiastic about using the strategy and conveyed a belief that the QAR strategy contributed to positive gains in reading comprehension scores at post-test. A K -2 special education teacher reported that the QAR strategy as it was implemented was difficult for her students, but might be beneficial for older students with disabilities. Future experimental research could examine whether the adapted version of the QAR strategy used in the current study would improve reading comprehension outcomes of students with ID when teachers implement the intervention.

Another way to extend the findings of the present study is to incorporate alternate response modes. In future studies, researchers can examine the effect of QAR training when participants are able to answer verbally, by selecting among written or pictorial answer choices, generating QAR questions, or using a cloze format. For example, following intervention with picture support and discussion, middle school students with ID in one study demonstrated

comprehension by answering five literal, three-option multiple choice questions (Shurr & Taber-Doughty, 2012). Allowing participants to indicate comprehension by generating QAR questions is an alternative that may be especially advantageous. Wood, Browder, and Flynn (2015) found that participants with ID in their study were able to generate questions after receiving instruction with a graphic organizer and systematic prompts. Research suggests that generating questions is an effective practice for improving reading comprehension (Rosenshine, Meister, & Chapman, 1996). Finally, cloze procedures have been successfully used with students who have disabilities to indicate comprehension of text (Carr, Dewitz, & Patberg, 1989; O'Connor & Klein, 2004). Researchers can extend the results of the current study by allowing alternate modes of response in future experiments.

Implications for Practice

Based on the outcomes and limitations of this study, several recommendations for practitioners can be made. Overall, the students in this study were able to learn and apply an adapted QAR strategy and increase their percent of correct responses to text-dependent science and social studies questions. The three participants attended grades 5 – 7, qualified for alternate achievement assessment, communicated verbally, and could hand write their responses. The students read independently at approximately the first grade level, but were able to read more challenging texts with tutor assistance. Two of the students were diagnosed with Down syndrome (DS) and all three had intellectual disabilities; however, one student was identified as functionally delayed (i.e., less impaired adaptive skills; FD). One student spoke a primary language other than English. Students with similar characteristics to the participants in this study may benefit from instruction with the adapted QAR strategy.

When students are first learning a strategy, it is important to focus on developing the skill by providing modeling, supported practice with simpler texts, and opportunities for independent practice (Pressley et al., 1990). Research has shown that reading comprehension interventions with multiple components result in larger reading comprehension effects than single strategy studies (NRP, 2000). When students are able to apply the strategy with less support, teachers should introduce additional evidence based strategies more complex texts. Moreover, students with ID will benefit from comprehensive literacy instruction that incorporates all five elements identified by the National Reading Panel (i.e., phonics, phonological awareness, fluency, vocabulary, and comprehension), as well as writing and strategies instruction (Allor, Mathes, Roberts, Cheatham, & Al Otaiba, 2014). In particular, pre-teaching difficult vocabulary words through discussion and sight word training may enhance reading comprehension when paired with the QAR strategy.

Activating background knowledge is an important aspect of reading comprehension (Pressley & Woloshyn, 1995). In the current study, factual statements and picture supports were available to students on the BKFS, but the tutors did not emphasize or discuss them. There is evidence that picture supports and discussion enhance reading comprehension of expository texts for middle school students with ID (Shurr & Taber-Doughty, 2012, 2016). Teachers could use fact sheets such as the ones provided in the current study to stimulate discussion. In fact, it has been suggested that QAR questions can be incorporated into reading comprehension instruction to facilitate discussion (Vacca & Vacca, 1986) and can be applied to pictures as well (Cortese, 2004). There is also some research to suggest that including QAR questions in a reciprocal teaching framework, is an effective method for improving reading comprehension (Labercane & Battle, 1987).

Prior to beginning instruction with the adapted QAR strategy, teachers should consider whether their students possess the requisite skills to benefit from instruction. For example, teachers may want to pre-determine whether students can match pronouns with their referents outside of connected text before beginning instruction of "Search and Find" questions within passages. Similarly, teachers could pre-teach question words (e.g., who, what, where, when) to ensure students understand what is being asked (Browder, Hudson, & Wood, 2013; Morgan, Moni, & Jobling, 2009). In an action research study, teachers successfully taught students in grades K – 2 to identify question words (i.e., who, what, where, when, why, how) and used them as key words to discriminate between questions whose answers are "in the text" and those that are "in your head" (Kinniburgh & Prew, 2010).

Teachers may want to first introduce the strategy to students by having them categorize questions as either "in the book" or "not in the book." Providing many examples and non-examples of questions that fall into these two broad categories will facilitate greater understanding of the concepts (Browder & Spooner, 2014). Next, providing instruction with the highest level of support (Level 3) will potentially free up students' working memory to focus on learning the new strategy. Students can progress through less scaffolded levels of support as they become more adept at using the strategy. In addition, teachers should include ongoing review of mastered QAR question types to reinforce their retention. In the current study, there seemed to be some facilitative effect on the students' ability to answer "Right There" questions when "Think and Find" questions were freshly trained. Teachers may consider introducing these questions as pairs following the same dichotomous structure initiated in the first phase of instruction (i.e., "in the book" and "not in the book").

Conclusion

In sum, the present study incorporated elements of instruction that have been identified as effective for teaching students with ID with the QAR reading comprehension strategy that has some evidence of effectiveness for students with TD, LD, and ID. Whereas many procedures identified to support text comprehension for individuals with ID are general instructional and material enhancements that can be applied to a number of academic skills or strategies, a reading comprehension strategy such as QAR encourages readers to be more active, engaged, and independent text comprehenders (RAND, 2002). Three students with differing levels of support needs were able to learn and apply the adapted QAR strategy components to correctly answer text-dependent reading comprehension questions. Despite noted limitations, the present study contributes much needed research to identify effective techniques to enhance comprehension of text for students with ID, especially at the middle and secondary school levels and with content area texts. Additional research is needed to examine the effects of the intervention in various contexts.

Table 1. QAR Question Type Definitions and Adaptations

Origin	Taxonomy	Location	Mnemonic	Definition
Raphael (1982)	Text Explicit	In the Text	Right There	Answers can be found directly in the text, in one sentence. Answers share many of the same words with the question.
Raphael (1986)	Text Explicit	In the Text	Right There	
Adapted QAR	Text Explicit	In the Text	Right There	
Raphael (1982)	Text Implicit	In the Text	Think and Search	Answers are found in the text, in more than one sentence. Readers need to "think and search" or "put together" different parts of the text to find the answer. The answer can be within a paragraph, across paragraphs, or across chapters and books.
Raphael (1986)	Text Implicit	In the Text	Putting it Together	
Adapted QAR	Text Implicit	In the Text	Search and Find	Answers are found in two sentences in the text. One sentence contains a pronoun. The second sentence precedes the pronoun sentence and contains the referent for the pronoun. Readers must "search and find" the referent to resolve the anaphora. (bridging inference)
Raphael (1986)	Script Implicit	In your Head	Author and You	The answer is not in the text. To answer the question, readers connect information from the text with information from their own background knowledge. (elaborative inference)
Raphael (1982)	Script Implicit	In your Head	On my Own	The answer is not in the text. Readers need to use their own ideas and experiences from their background knowledge to answer the questions.
Raphael (1986)	Script Implicit	In your Head	On my Own	
Adapted QAR	Extra-textual Explicit	Outside the Text	Think and Find	The answer is not in the main text. Readers must search outside the text for the answer. The answer can be found directly on the background knowledge fact sheet, in one statement. The answer shares many of the same words with the question.

Table 2. Non-Experimental Resources Recommending QAR

Reviews/Practitioner Papers/Books
Bernadowski, C., & Kolencik, P. L. (2010). *Research-based Reading Strategies in the Library for Adolescent Learners*. Santa Barbara, CA: Linworth Publishing Company.
Browder, D. M., & Spooner, F. (2014). *More language arts, math, and science for students with severe disabilities*. Baltimore, MD: Paul H. Brookes Publishing.
Cortese, E. E. (Dec. 2003 – Jan 2004). The application of question-answer relationship strategies to pictures. *The Reading Teacher, 57*(4), 374-380.
El Zein, F., Solis, M., Vaughn, S., & McCulley, L. (2014). Reading comprehension interventions for students with autism spectrum disorders: A synthesis of research. *Journal of Autism and Developmental Disorders, 44*, 1303-1322.
Fenty, N. S., McDuffie-Landrum, & Fisher, G. (2012). Using collaboration, co-teaching, and question answer relationships to enhance content area literacy. *Teaching Exceptional Children, 44*(6), 28-37.
Gajria, M., Jitendra, A. K., Sood, S., & Sacks, G. (2007). Improving comprehension of expository text in students with LD: A research synthesis. *Journal of learning disabilities*, *40*(3), 210-225. [Reviewed Labercane & Batalle (1987); Simmonds (1992); Wong & Jones (1982)]
Gavelek, J. R., & Raphael, T. E. (1982). Instructing metacognitive awareness of question-answer relationships: Implications for the learning disabled. *Topics in Learning & Learning disabilities*, *2*, 27-36.

Table 2. Non-Experimental Resources Recommending QAR Cont'd.

Gersten, R., Fuchs, L. S., Williams, J. P., & Baker, S. (2001). Teaching reading comprehension strategies to students with learning disabilities: A review of research. *Review of Educational Research, 71*(2), 279-320.

Helfeldt, J. P., & Henk, W. A. (Apr, 1990). Reciprocal question-answer relationships: An instructional technique for at-risk students. *Journal of Reading, 33*(7), 509-514.

Jitendra, A. K., Burgess, C., & Gajria, M. (2011). Cognitive strategy instruction for improving expository text comprehension of students with learning disabilities: The quality of evidence. *Exceptional Children*, *77*(2), 135-159.

Kinniburgh, L. H., & Shaw, E. L. (2009). Using question-answer relationships to build reading comprehension in science. *Science Activities, 45*(4), 19- 26.

McIntosh, M. E., & Draper, R. J. (1996). Using the question-answer relationship strategy to improve students' reading of mathematics texts. *The Clearing House, 69*(3), 154-162.

Mesmer, H. A. E., & Hutchins, E. J. (2002). Using QARs with charts and graphs. *The Reading Teacher, 56*(1), 21-27.

National Reading Panel (US), National Institute of Child Health, & Human Development (US). (2000). *Report of the national reading panel: Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction: Reports of the subgroups*. National Institute of Child Health and Human Development, National Institutes of Health.

Pearson, P. D., & Johnson, D. D. (1978). *Teaching reading comprehension*. New York: Harcourt School.

Table 2. Non-Experimental Resources Recommending QAR Cont'd.

Raphael, T. E. (1982). Question-answering strategies for children. *The Reading Teacher, 36*(2), 186-190.

Raphael, T. E. (1982b). Improving question-answering performance through instruction. (Reading Education Report No. 32). Urbana: University of Illinois, Center for the Study of Reading.

Raphael, T. E. (1986). Teaching question answer relationships, revisited. *The Reading Teacher,* 516-522.

Raphael, T. E., & Au, K. H. (2005). QAR: Enhancing comprehension and test taking across grades and content areas. *The Reading Teacher, 59*(3), 206-221.

Rosenshine, B., Meister, C., & Chapman, S. (1996). Teaching students to generate questions: A review of the intervention studies. *Review of Educational Research, 66*(2), 181-221.

Stahl, K. A. D. (2004). Proof, practice, and promise: Comprehension strategy instruction in the primary grades. *The Reading Teacher, 57*(7), 598-609.

Swanson, P. N., & De La Paz, S. (1998). Teaching effective comprehension strategies to students with learning and reading disabilities. *Intervention in School and Clinic*, *33*(4), 209-218.

Vacca, R.T. & Vacca, J. (2010) *Content Area Reading: Literacy and Learning Across the Curriculum,* Longman, N.Y.

Whalon, K. & Hart, J. E. (2011). Adapting an evidence-based reading comprehension strategy for learners with Autism spectrum disorder. *Intervention in School and Clinic, 46*(4), 195-203.

Wong, B. Y. L. (1985). Self-questioning instructional research: A review. *Review of Educational Research, 55*(2), 227-268.

Table 2. Non-Experimental Resources Recommending QAR Cont'd.

QAR: No Comparison Group
Asberg, J. & Sandberg, A. D. (2010). Discourse comprehension intervention for high-functioning students with autism spectrum disorders: Preliminary findings from a school-based study. *Journal of Research in Special Educational Needs, 10*(2), 91-98.
Cummins, S., Streiff, M., & Ceprano, M. (2012). Understanding and applying the QAR strategy to improve test scores. *Journal of Inquiry & Action in Education*, *4*(3), 18-26.
Ezell, H. K., Hunsicker, S. A., & Quinque, M. M. (1997). Comparison of two strategies for teaching reading comprehension skills. *Education and Treatment of Children, 20*(4), 365-382.
Ezell, H. K., Hunsicker, S. A., Quinque, M. M., & Randolph, E. (1996). Maintenance and generalization of QAR reading comprehension strategies. *Reading Research and Instruction, 31*(1), 64-81.
Kinniburgh, L. H., & Baxter, A. (2012). Using question answer relationships in science instruction to increase the reading achievement of struggling readers and students with reading disabilities. *Current Issues in Education, 15*(2), 1-9.
Kinniburgh, L. H., & Prew, S. S. (2010). Question Answer Relationships (QAR) in the Primary Grades: Laying the Foundation for Reading Comprehension. *International Journal of Early Childhood Special Education*, *2*(1).
Raphael, T. E., Winograd, P., & Pearson, P. D. Strategies children use when answering questions. In M. L. Kamil & A. J. Moe (Eds.), Perspectives on reading research and instruction. Washington, D. C.: National Reading Conference, 1980.

Table 2. Non-Experimental Resources Recommending QAR Cont'd.

Raphael, T. E., & Wonnacott, C. A. (Dec., 1981). The effect of metacognitive awareness training on question-answering behavior: Implementation in a fourth grade developmental reading program. Paper presented at the Annual Meeting of the National Reading Conference, Dallas, TX. Raphael, T. E., & Wonnacott, C. A. (Dec., 1981). The effect of response and type of posttest on understanding of and memory for text. Paper presented at the Annual Meeting of the National Reading Conference, Dallas, TX. Stafford, T., Wilson, N. S., & Sanabria, I. (2012). The role of questioning as thinking on readers' ability to interact with text. In *American Reading Forum Annual Yearbook* (Vol. 32, pp. 2-8). Wilson, N. S., Grisham, D. L., & Smetana, L. (2009). Investigating content area teachers understanding of a content literacy framework: A yearlong professional development initiative. *Journal of Adolescent & Adult Literacy*, *52*(8), 708-718.
Statistical Analysis of Respondent Characteristics and Question Types
Tal, N. F., Siegel, L. S., & Maraun, M. (1994). The role of question type and reading ability in reading comprehension. *Reading and Writing: An Interdisciplinary Journal (6)*, 387 – 402. Wang, D. (2006). What can standardized reading tests tell us? Question-answer relationships and students' performance. *Journal of College Reading and Learning*, *36*(2), 21-37.

Table 3. Student demographic data

Participants	Age	Grade	Race	Primary Language	Disability	K-BIT IQ	WRMT	ORF WPM	IEP Inclusion Science, SS, Specials	Alternate Assessment
Oscar	14y 6m	8	Black	English	ID	57	WID: 55 WA: 55 PC: 55	31	YES	YES
Elmer	12y 1m	5	White	Arabic	FD/DS	40	WID: 55 WA: 55 PC: 55	25	YES	YES
Bernie	12y 9m	6	White	English	ID/DS	40	WID: 55 WA: 55 PC: 55	21	As Appropriate	YES

Note. WID = Word Identification; WA = Word Attack; PC = Passage Comprehension

WPM = words per minute; ORF = Oral Reading Fluency; AA = African American; CAU = Caucasian

K-BIT = Kaufman Brief Intelligence Test; SS = Social Studies

Table 4. QAR passage characteristics

Passage	Standards	F-K Grade	Narrativity	Syntactic Simplicity	Word Concreteness	Referential Cohesion	Deep Cohesion
Seasons	ES.2A-B.4 Identify seasons ES.2A. Recognize daily and seasonal weather changes	4.5	27	97	74	72	29
Temperature & Weather	ES.2A. Recognize daily and seasonal weather changes ES.2B. Realize that weather is associated with temperature, precipitation, and wind conditions and can be measured using tools and instruments	4.5	24	87	81	80	33
Water Cycle	ES.2A-B.6 Identify evaporation, precipitation, and runoff as parts of a water cycle in a diagram	4.9	25	99	99	40	35
Clouds and Precipitation	ES.2A. Recognize daily and seasonal weather changes ES.2B. Realize that weather is associated with temperature, precipitation, and wind conditions and can be measured using tools and instruments	5.2	22	86	77	68	31
Water Wise	ES.4B. Demonstrate understanding that earth materials can be recycled or conserved	3.6	64	92	97	52	70
Nashville Floods	ES.4B. Demonstrate understanding that earth materials can be recycled or conserved	4.3	32	93	98	10	60
Hurricanes	ES.2A. Recognize daily and seasonal weather changes ES.2B. Realize that weather is associated with temperature, precipitation, and wind conditions and can be measured using tools and instruments ES.3A.3 Identify certain forces that cause changes in the environment	4.1	15	95	96	19	59
Tornadoes	ES.2A. Recognize daily and seasonal weather changes ES.2B. Realize that weather is associated with temperature, precipitation, and wind conditions and can be measured using tools and instruments ES.3A.3 Identify certain forces that cause changes in the environment	3.8	14	95	77	38	22
Earthquakes	ES.3A.3 Identify certain forces that cause changes in the environment	2.8	16	97	34	18	61
Red Cross	5.12 (SBE) Draw on informational text to explain the roles of the military and civil leaders during the Civil War	3.4	29	99	93	53	98
Air for Your Lungs	LS.4A. Recognize the basic requirements of all living things	3.6	33	85	70	66	30

Note: Social Studies standards are from the TN Department of Education's website The State Board of Education (SBE), www.http://Tennessee.gov
Science Standards are from the website's Alternate Learning Expectations (grades 6-8)

Table 4. QAR passage characteristics cont'd.

Passage	Standards	F-K Grade	Narrativity	Syntactic Simplicity	Word Concreteness	Referential Cohesion	Deep Cohesion
Where People Live	(SBE) 1.21 Describe how the location of his/her community, climate, and physical surroundings affect the way people live, including their food, clothing, shelter, transportation and recreation.	4.49	54	90	98	86	6
Earth's Special Star	ES.1A-B.4 Identify sun, moon, stars, and planets PS.3A Identify the sun as the main source of earth's heat and light energy	5.4	11	23	21	54	12
Life Cycle of Stars	ES.1A. Recognize that different objects appear in the day and nighttime sky ES.1A-B.4 Identify sun, moon, stars, and planets	3.49	33	85	70	66	30
Ecosystems	LS.2C. Examine interrelationships among plants, animals, and their environment	6.62	23	73	57	22	17
Dust Bowl	ES.2A-B.7 Recognize that temperature affects evaporation (SBE) 5.51Compare and contrast a first hand and second hand account of the impact of the Dust Bowl of the 1930s.	5.00	27	95	99	16	62
Arctic Tundra Biome	ES.3A Identify the earth's major geological features	5.45	2	92	67	20	47
Plants adapt to survive	LS.4A. Recognize the basic requirements of all living things LS.4B. Recognize the basic parts of plants LS.3A. Recognize the differences among plants and animals of the same kind, including the features that help them to survive in different environments	3.52	81	77	98	99	81
Catching Some Rays	LS.1A.5 Identify plant parts such as roots, stem, leaf, fruit, petal PS.3A Identify the sun as the main source of earth's heat and light energy	4.54	75	91	72	70	29
The Nile River	ES.3A Identify the earth's major geological features	4.86	56	97	35	89	2
In the Desert	LS.2C. Examine interrelationships among plants, animals, and their environment	3.90	26	95	76	30	26
Arctic Animals	LS.2A. Recognize the distinction between living and non-living things LS.2C. Examine interrelationships among plants, animals, and their environment LS.3A. Recognize the differences among plants and animals of the same kind, including the features that help them to survive in different environments GLE 0507.5.1 Investigate physical characteristics associated with different groups of animals.	3.97	40	83	97	76	40

Table 4. QAR passage characteristics cont'd.

Passage	Standards	F-K Grade	Narrativity	Syntactic Simplicity	Word Concreteness	Referential Cohesion	Deep Cohesion
Whales & Fish	LS.2A. Recognize the distinction between living and non-living things LS.2C. Examine interrelationships among plants, animals, and their environment GLE 0507.5.1 Investigate physical characteristics associated with different groups of animals.	3.24	60	93	99	86	43
Amphibians & Reptiles	LS.2A. Recognize the distinction between living and non-living things LS.2C. Examine interrelationships among plants, animals, and their environment GLE 0507.5.1 Investigate physical characteristics associated with different groups of animals.	5.46	18	99	96	23	13
The Octopus	LS.2A. Recognize the distinction between living and non-living things LS.2C. Examine interrelationships among plants, animals, and their environment GLE 0507.5.1 Investigate physical characteristics associated with different groups of animals.	5.01	55	85	90	92	20
Busy Beaver	LS.2A. Recognize the distinction between living and non-living things LS.2C. Examine interrelationships among plants, animals, and their environment GLE 0507.5.1 Investigate physical characteristics associated with different groups of animals.	2.66	23	94	92	38	81
Otters Just Want to Have Fun	LS.2C. Examine interrelationships among plants, animals, and their environment LS.2A. Recognize the distinction between living and non-living things GLE 0507.5.1 Investigate physical characteristics associated with different groups of animals.	4.96	35	87	98	36	48
Incredible Insects	LS.2A. Recognize the distinction between living and non-living things LS.2C. Examine interrelationships among plants, animals, and their environment	5.23	72	71	87	54	12
Protected Paradise	LS.2C. Examine interrelationships among plants, animals, and their environment	6.11	5	60	99	50	2
Friend of the Animals	GLE 0507.5.1 Investigate physical characteristics associated with different groups of animals.	6.19	76	76	99	67	85
The Mining Boom	ES.4B. Demonstrate understanding that earth materials can be recycled or conserved .	5.06	48	92	86	50	92
Colonial Schools	8.5 Describe the settlement of New Netherlands and the subsequent possession of the colony by the English, including a diverse population.	4.49	55	80	99	56	21

Table 4. QAR passage characteristics cont'd.

Passage	Standards	F-K Grade	Narrativity	Syntactic Simplicity	Word Concreteness	Referential Cohesion	Deep Cohesion
Early Railroads	(SBE) S.S. 5.1 Compare and contrast the myth of the Antebellum South to the realities of the region including the harshness of slavery, increased immigration to urban areas, and growth of railroads.	5.71	14	85	99	91	86
Hornbook	8.5 Describe the settlement of New Netherlands and the subsequent possession of the colony by the English, including a diverse population.	4.86	67	99	82	58	77
Amazing Amphibians	LS.2A. Recognize the distinction between living and non-living things LS.2C. Examine interrelationships among plants, animals, and their environment GLE 0507.5.1 Investigate physical characteristics associated with different groups of animals.	4.57	35	93	71	3	84
Young Abe Lincoln	(SBE) 5.3 Use primary sources to analyze multiple samples of abolition leaders' writings and their stance on slavery.	5.71	85	49	93	86	7
President Lincoln	(SBE) 5.12 Draw on informational text to explain the roles of the military and civil leaders during the Civil War, including Abraham Lincoln (SBE) 5.19 Draw on information from multiple print or digital resources to describe the impact of the assassination of Abraham Lincoln on the nation.	6.04	70	64	55	98	76
Ending Slavery	(SBE) 5.1 Compare and contrast the myth of the Antebellum South to the realities of the region including the harshness of slavery, increased immigration to urban areas, and growth of railroads.	6.58	20	99	58	18	91
We Dared to Lead	(SBE) 8.1 Explain the primary motivations for English colonization of the New World, including the rise of the middle class (joint stock companies), the need to move surplus population, and the search for religious freedom.	5.83	17	99	68	11	99
Sodbusters	ES.4B. Demonstrate understanding that earth materials can be recycled or conserved	1.34	41	98	93	44	37
Brooklyn Bridge	(SBE) 5.37 Provide information about important business leaders, inventors, and entrepreneurs and the impact they had on American society	4.37	14	95	79	95	21
Basketball	(SBE) 5.37 Provide information about important business leaders, inventors, and entrepreneurs and the impact they had on American society	2.8	46	99	97	56	94
Average Passage Characteristics (range)		4.62 (1.34 – 6.62)	37.54 (2 – 85)	86.44 (23 – 99)	81.20 (21 – 99)	53.66 (3 – 99)	45.73 (2 -99)

Table 5. Procedures and Modifications, Baseline and Maintenance

Baseline & Maintenance	Level 1	Level 2	Level 3
Directions and orientation to materials	Tutor: "You are going to read a passage and then answer some questions. If you come to a word you don't know, I will read it for you. Try your best. This is a passage about X, and this is a fact sheet about X"	Tutor: "You are going to read a passage and then answer some questions. If you come to a word you don't know, I will read it for you. Try your best. This is a passage about X, and this is a fact sheet about X"	Tutor: "You are going to read a passage and then answer some questions. If you come to a word you don't know, I will read it for you. Try your best. This is a passage about X, and this is a fact sheet about X"
Read the passage	Student reads; tutor provides assistance as needed; science and social studies passage Appendix I	Student reads; tutor provides assistance as needed; science and social studies passage Appendix I	Student reads; tutor provides assistance as needed; science and social studies passage Appendix I
Find and read the targeted QAR question	Select among 3 icons preceding questions; 3 questions per page, 1 each QAR type Task direction: "Find the 'Targeted QAR' question." 2 prompts "That's not quite right. Try again." Task direction: "Read the question." Appendix L	Select among 3 icons preceding questions; 3 questions per page, 1 each QAR type Task direction: "Find the 'Targeted QAR' question." 2 prompts "That's not quite right. Try again." Task direction: "Read the question." ***Appendix M***	Select among 3 ***icon cards***; ***1 question per page***, ***1 QAR type*** Task direction: "Find the 'Targeted QAR' question." 2 prompts "That's not quite right. Try again." Task direction: "Read the question." ***Figure 1; Appendix N***
Score	1 = correct no prompt 0 incorrect, 1 or 2 prompts, or no answer	1 = correct no prompt 0 incorrect, 1 or 2 prompts, or no answer	1 = correct no prompt 0 incorrect, 1 or 2 prompts, or no answer
Connect the question and answer sentence	Underline answer sentences in full text science and social studies passage Task direction: "Find the sentences that answer the question." 3 prompts "That's not quite right. Try again." Appendix I; Appendix J	Underline answer sentences in ***smaller text chunk on Level 2 testing probe***; ***fewer choices on Level 2 BKFS (6 statements; 3 per page)*** Task direction: "Find the sentences that answer the question." ***2 prompts*** "That's not quite right. Try again." ***Appendix K; Appendix M***	Underline answer sentences in smaller text chunk on ***Level 3 testing probe; fewer choices on BKFS (6 statements; 3 per page)*** Task direction: "Find the sentences that answer the question." 2 prompts "That's not quite right. Try again." Appendix K; ***Appendix N***
Score	2 = correct no prompt 1 = correct, 1 prompt 0 = incorrect, 2 prompts, or no answer	2 = correct no prompt 1 = correct, 1 prompt 0 = incorrect, 2 prompts, or no answer	2 = correct no prompt 1 = correct, 1 prompt 0 = incorrect, 2 prompts, or no answer
Answer questions in writing	Level 1 testing probe; write complete sentence, blank line; 4 questions Task direction: "Answer the question." 1 prompt "That's not quite right. Try again." Appendix L	***Level 2 testing probe; completion prompt; write 3 -4 words;*** 4 questions Task direction: "Answer the question." 1 prompt "That's not quite right. Try again." ***Appendix M***	***Level 3 testing probe***; completion prompt; write 3 -4 words***; 2 questions*** Task direction: "Answer the question." 1 prompt "That's not quite right. Try again." ***Appendix N***
Score	2 = correct no prompt 0 = incorrect, 1 or 2 prompts, or no answer	2 = correct no prompt 0 = incorrect, 1 or 2 prompts, or no answer	2 = correct no prompt 0 = incorrect, 1 or 2 prompts, or no answer

Note. Changes in materials and procedures between levels are italicized and bold.

Table 6. Procedures and Modifications, Intervention

Intervention	Level 1	Level 2	Level 3
Set purpose	Tutor: "It's important to make sure we understand what we read. Asking and answering questions helps us understand what we read. Knowing where to find the answer helps us answer the question."	Tutor: "It's important to make sure we understand what we read. Asking and answering questions helps us understand what we read. Knowing where to find the answer helps us answer the question."	Tutor: "It's important to make sure we understand what we read. Asking and answering questions helps us understand what we read. Knowing where to find the answer helps us answer the question."
State objective	Tutor: "We will learn about 'Target QAR' questions."	Tutor: "We will learn about 'Target QAR' questions."	Tutor: "We will learn about 'Target QAR' questions."
Introduce/define the QAR	Introduce the QAR procedural facilitator	Introduce the QAR procedural facilitator	Introduce the QAR procedural facilitator
	Pair icon and definition	Pair icon and definition	Pair icon and definition
	Model-Guide-Independent Practice		
Read the passage	Tutor: This is a passage about 'Basketball' and this is a fact sheet about 'Basketball.' I can read the passage. Watch me."	Tutor: This is a passage about 'Basketball' and this is a fact sheet about 'Basketball.' I can read the passage. Watch me."	Tutor: This is a passage about ***'Science or Social Studies'*** and this is a fact sheet about ***'Science or Social Studies'*** I can read the passage. Watch me."
	Tutor models reading the "Basketball" passage aloud	Tutor models reading the "Basketball" passage aloud	Tutor models reading a ***'Science or Social Stuides' passage*** aloud
	Appendix B	Appendix B	***Appendix I; Table 7***
Find and read the targeted QAR question	Tutor: "I can find the 'Target QAR Question.' Watch me."	Tutor: "I can find the 'Target QAR Question.' Watch me."	Tutor: "I can find the 'Target QAR Question.' Watch me."
	Tutor models selecting among 3 icons preceding questions on Level 1 "Basketball" question and answer sheet; 3 questions per page, 1 each QAR type	Tutor models selecting among 3 icons preceding questions on ***Level 2 "Basketball" question and answer sheet***; 3 questions per page, 1 each QAR type	Tutor models selecting among 3 ***icon cards***; connects to targeted QAR question and answer sentences on ***Level 3 science and social studies*** question and answer sheet; ***1 question per page, 1 QAR type***
	Appendix E	***Appendix F***	***Appendix G***
Connect the question and answer sentences	Tutor: "I can find the sentences that answer the 'Targeted QAR' question. Watch me."	Tutor: "I can find the sentences that answer the 'Targeted QAR' question. Watch me."	Tutor: "I can find the sentences that answer the 'Targeted QAR' question. Watch me."
	Tutor models underlining answer sentences in full "Basketball" passage or Level 1 BKFS	Tutor models underlining answer sentences in ***smaller text chunk on Level 2 "Basketball" question and answer sheet, fewer choices on Level 2 "Basketball" BKFS (6 total, 3 per page)***	Tutor models underlining answer sentences in smaller text chunk on ***Level 3 "science and social studies" question and answer sheet; fewer choices on Level 3 "science and social studies" BKFS (6 total, 3 per page)***
	Appendix B; Appendix C; Appendix E	***Appendix D; Appendix F***	***Appendix G; Appendix K***
Answer questions in writing	Tutor: "I can write the answer on the line. Watch me."	Tutor: "I can write the answer on the line. Watch me."	Tutor: "I can write the answer on the line. Watch me."
	Tutor models writing the full sentence on the Level 1 "Basketball" question and answer sheet	Tutor models writing the ***3 or 4 words missing from the completion prompt on the Level 2 "Basketball" question and answer sheet***	Tutor models writing the ***3 or 4 words missing from the completion prompt on the Level 3 "science and social studies" question and answer sheet***
	Appendix E	***Appendix F***	***Appendix G***

Note. Changes in materials and procedures between levels are italicized and bold.

Table 7. Procedures and Modifications, Mastery

Mastery	Level 1	Level 2	Level 3
Directions and orientation to materials			
	Tutor: "You are going to read a passage and then answer some questions. If you come to a word you don't know, I will read it for you. Try your best. This is a passage about X, and this is a fact sheet about X"	Tutor: "You are going to read a passage and then answer some questions. If you come to a word you don't know, I will read it for you. Try your best. This is a passage about X, and this is a fact sheet about X"	Tutor: "You are going to read a passage and then answer some questions. If you come to a word you don't know, I will read it for you. Try your best. This is a passage about X, and this is a fact sheet about X"
Read the passage	Student reads; tutor provides assistance as needed; science and social studies passage	Student reads; tutor provides assistance as needed; science and social studies passage	Student reads; tutor provides assistance as needed; science and social studies passage
	Appendix I	Appendix I	Appendix I
Find and read the targeted QAR question			
	Select among 3 icons preceding questions; 3 questions per page, 1 each QAR type	Select among 3 icons preceding questions; 3 questions per page, 1 each QAR type	Select among 3 ***icon cards***; ***1 question per page***, ***1 QAR type***
	Task direction: "Find the 'Targeted QAR' question."	Task direction: "Find the 'Targeted QAR' question."	Task direction: "Find the 'Targeted QAR' question."
	2 prompts	2 prompts	2 prompts
Prompt 1	Point to icon, "Find the 'Targeted QAR' question."	Point to icon, "Find the 'Targeted QAR' question."	Point to icon, "Find the 'Targeted QAR' question."
Prompt 2	"This is the 'Targeted QAR' question."	"This is the 'Targeted QAR' question."	"This is the 'Targeted QAR' question."
	Task direction: "Read the question."	Task direction: "Read the question."	Task direction: "Read the question."
	Appendix L	***Appendix M***	***Figure 1; Appendix N***
Score	1 = correct no prompt 0 = incorrect, 1 or 2 prompts, or no answer	1 = correct no prompt 0 = incorrect, 1 or 2 prompts, or no answer	1 = correct no prompt 0 = incorrect, 1 or 2 prompts, or no answer
Connect the question and answer sentences			
	Underline answer sentences in full text science and social studies passage	Underline answer sentences in ***smaller text chunk on Level 2 testing probe***; ***fewer choices on Level 2 BKFS (6 total, 3 per page)***	Underline answer sentences in smaller text chunk on ***Level 3 testing probe; fewer choices on BKFS (6 total, 3 per page)***
	Task direction: "Find the sentences that answer the question."	Task direction: "Find the sentences that answer the question."	Task direction: "Find the sentences that answer the question."
	3 prompts	***2 prompts***	2 prompts
"Right There"			
Prompt 1	Point to procedural facilitator, "The answer will be 'Right There' in the passage, in one sentence."	Point to procedural facilitator, "The answer will be 'Right There' in the passage, in one sentence. The answer will have many of the same words as the question."	Point to procedural facilitator, "The answer will be 'Right There' in the passage, in one sentence. The answer will have many of the same words as the question."
Prompt 2	Point to procedural facilitator, "The answer will have many of the same words as the question."	Point to answer sentence: "This is the 'Right There' answer sentence."	Point to answer sentence: "This is the 'Right There' answer sentence."
Prompt 3	Point to answer sentence: "This is the 'Right There' answer sentence."		
Score	1 = correct, no prompts	1 = correct, no prompts	1 = correct, no prompts
	0 = incorrect, 1 or more prompts, or no answer	0 = incorrect, 1 or more prompts, or no answer	0 = incorrect, 1 or more prompts, or no answer
"Search and Find"			
Prompt 1	Point to procedural facilitator, "The 'Search and Find' in the passage in two sentences."	Point to procedural facilitator, "The 'Search and Find' answer is in the passage in two sentenceswill have a lot of the same words as the question. Look for clue words like he, she, it, and they."	Point to procedural facilitator, "The 'Search and Find' answer is in the passage in two sentenceswill have a lot of the same words as the question. Look for clue words like he, she, it, and they."
Prompt 2	Point to procedural facilitator, "The 'Search and Find' answer will have a lot of the same words as the question. Look for clue words like he, she, it, and they."	Point to answer sentence: "This is the 'Search and Find' answer sentence."	Point to answer sentence: "This is the 'Search and Find' answer sentence."
Prompt 3	Point to answer sentence: "This is the 'Search and Find' answer sentence."		
Score	2 = corect, no prompts	2 = corect, no prompts	2 = corect, no prompts
	1 = correct pronoun sentence, no prompt, incorrect or no second sentence	1 = correct pronoun sentence, no prompt, incorrect or no second sentence	1 = correct pronoun sentence, no prompt, incorrect or no second sentence
	0 = incorrect	0 = incorrect	0 = incorrect

Note. Changes in materials and procedures between levels are italicized and bold.

Table 7. Procedures and Modifications, Mastery (continued)

Mastery	Level 1	Level 2	Level 3
Connect the question and answer sentences			
"Think and Find"			
Prompt 1	"The 'Think and Find' answer sentence will be on the BKFS in one sentence.	"The 'Think and Find' answer sentence will be on the BKFS in one sentence and will have many of the same words as the question."	"The 'Think and Find' answer sentence will be on the BKFS in one sentence and will have many of the same words as the question."
Prompt 2	"The 'Think and Find' answer will have many of the same words as the question."	Point to answer sentence: "This is the 'Think and Find' answer sentence."	Point to answer sentence: "This is the 'Think and Find' answer sentence."
Prompt 3	Point to answer sentence: "This is the 'Think and Find' answer sentence."		
	Appendix I; Appendix J	***Appendix K; Appendix M***	Appendix K; ***Appendix N***
Score	2 = correct no prompt	2 = correct no prompt	2 = correct no prompt
	1 = correct 1 prompt	1 = correct 1 prompt	1 = correct 1 prompt
	0 = incorrect, 2 prompts, or no answer	0 = incorrect, 2 prompts, or no answer	0 = incorrect, 2 prompts, or no answer
Answer questions in writing			
	Level 1 testing probe; write complete sentence, blank line; 4 questions	***Level 2 testing probe; completion prompt; write 3 -4 words;*** 4 questions	***Level 3 testing probe***; completion prompt; write 3 -4 words***; 2 questions***
	1 prompt	1 prompt	1 prompt
	"That's not quite right. Try again."	"That's not quite right. Try again."	"That's not quite right. Try again."
	Appendix L	***Appendix M***	***Appendix N***
Score	2 = correct no prompt	2 = correct no prompt	2 = correct no prompt
	0 = incorrect, 1 or 2 prompts, or no answer	0 = incorrect, 1 or 2 prompts, or no answer	0 = incorrect, 1 or 2 prompts, or no answer

Note. Changes in materials and procedures between levels are italicized and bold.

Table 8. Participants' mean percent of correct strategy steps in all phases and conditions

	Mean % Right There (SD)	Mean % Search & Find (SD)	Mean % Think & Find (SD)	Mean % Across Questions (SD)
Oscar				
Level 1				
Baseline	23.33 (15.28)	31.67 (18.62)	15.56 (6.82)	22.22 (14.37)
Intervention	96.67 (5.77)	65.63 (13.74)	100.00 (0.00)	79.64 (19.75)
Maintenance	74.50 (20.06)	57.33 (17.61)	98.33 (2.50)	70.24 (24.92)
Elmer				
Level 1				
Baseline	3.75 (2.50)	6.25 (2.50)	10.00 (4.08)	6.67 (3.89)
Intervention	21.67 (7.64)	---	---	21.67 (7.64)
Level 2				
Baseline	25.00 (8.66)	25.00 (8.66)	15.00 (5.00)	18.89 (6.54)
Intervention	82.22 (14.81)	77.50 (12.94)	82.00 (12.58)	80.75 (13.70)
Maintenance	52.22 (17.70)	39.17 (17.72)	70.00 (18.03)	50.83 (19.80)
Bernie				
Level 1				
Baseline	0.00 (0.00)	1.67 (2.89)	5.00 (5.00)	2.22 (3.63)
Intervention	5.00 (0.00)	---	---	5.00 (0.00)
Level 2				
Baseline	26.67 (16.67)	16.67 (5.77)	13.33 (7.64)	18.89 (11.67)
Intervention	68.13 (15.34)	---	---	68.13 (15.34)
Level 3				
Baseline	43.33 (23.09)	8.33 (13.29)	14.44 (8.82)	17.22 (17.42)
Intervention	82.00 (20.49)	64.44 (28.33)	85.00 (10.00)	73.89 (24.29)
Maintenance	55.56 (21.28)	46.00 (24.08)	35.00 (21.21)	50.00 (21.92)

Figure 1. QAR icon cards

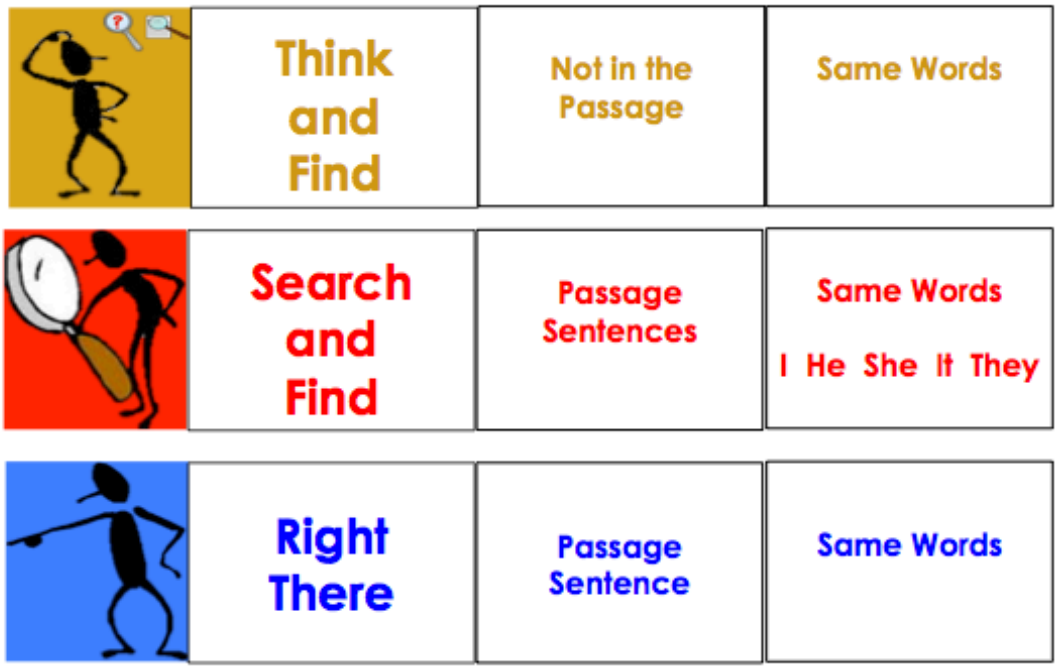
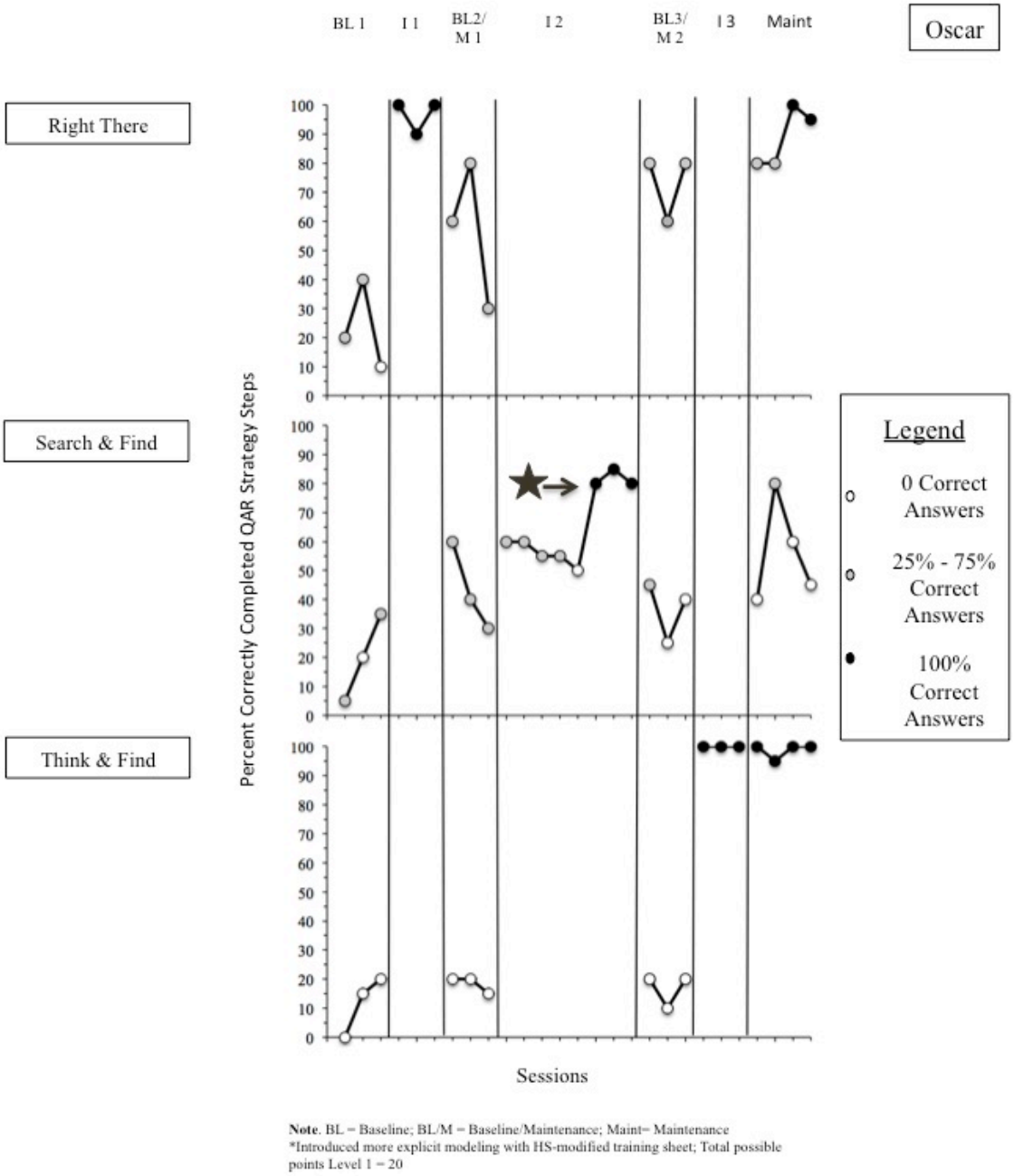


Figure 2. **QAR intervention training procedural facilitators**

Figure 3. QAR visual schedule



Note. BL = Baseline; BL/M = Baseline/Maintenance; Maint= Maintenance
*Introduced more explicit modeling with HS-modified training sheet; Total possible points Level 1 = 20

Figure 4. Level 1 Adapted QAR Baseline, Mastery, & Maintenance Data

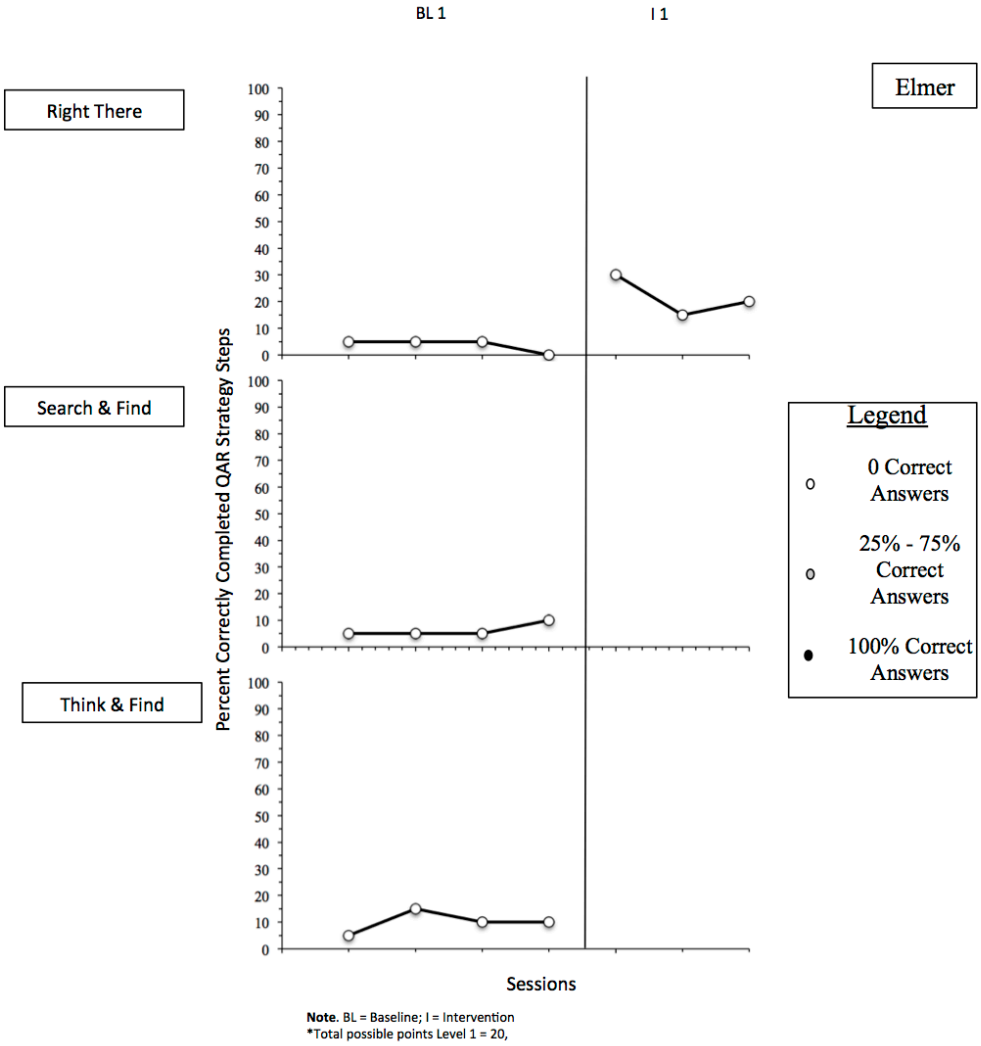
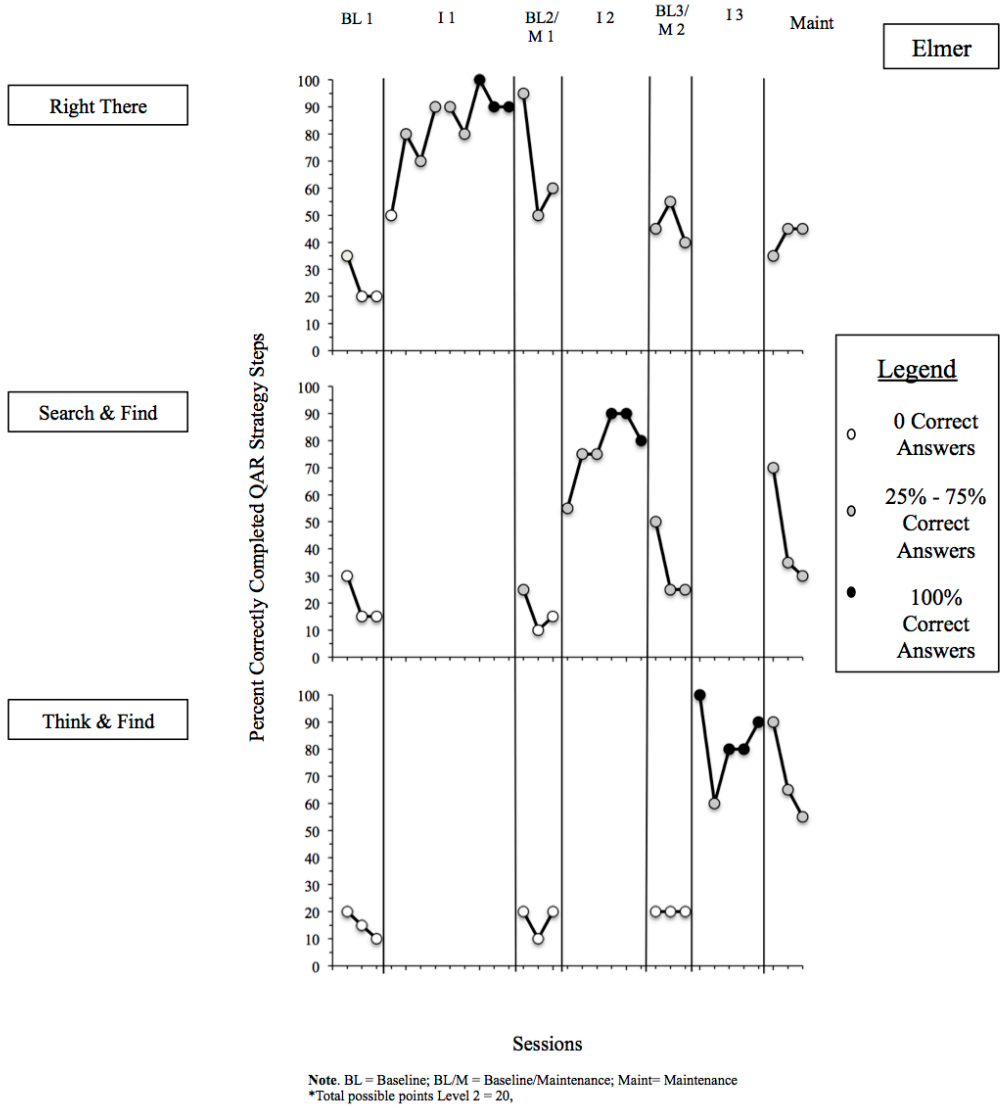
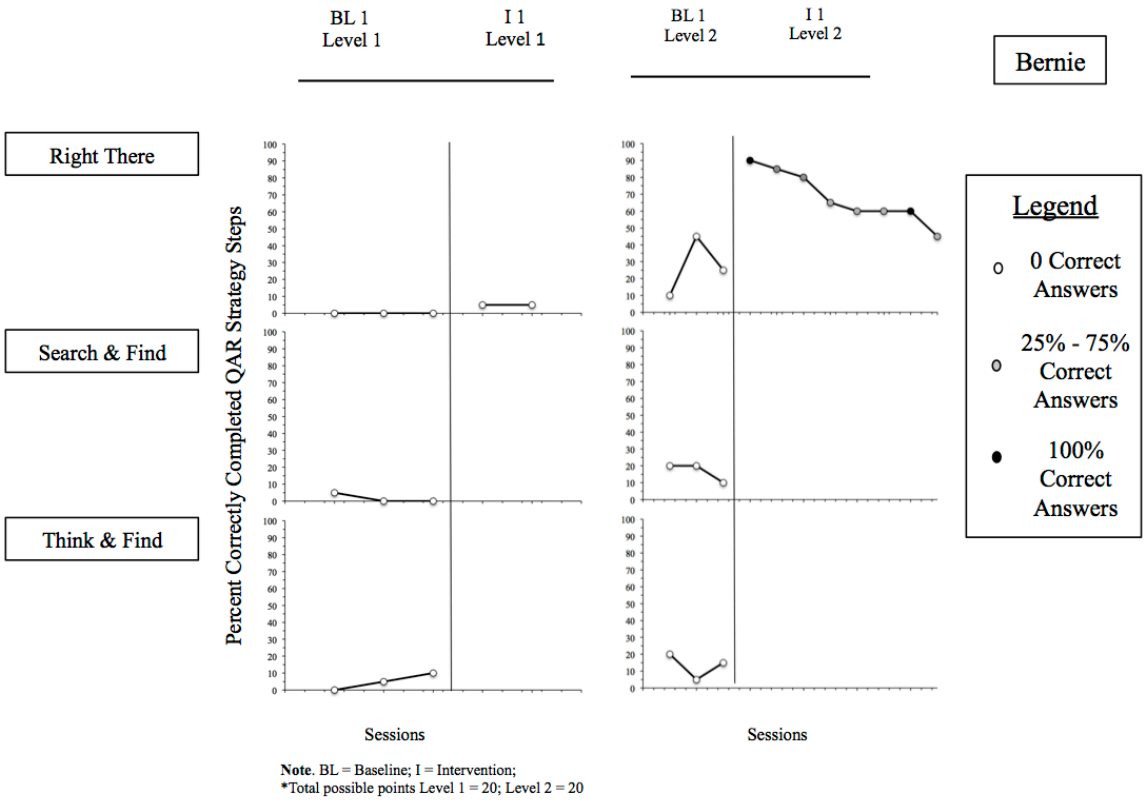


Figure 5. Level 1 Adapted QAR Baseline & Mastery Data



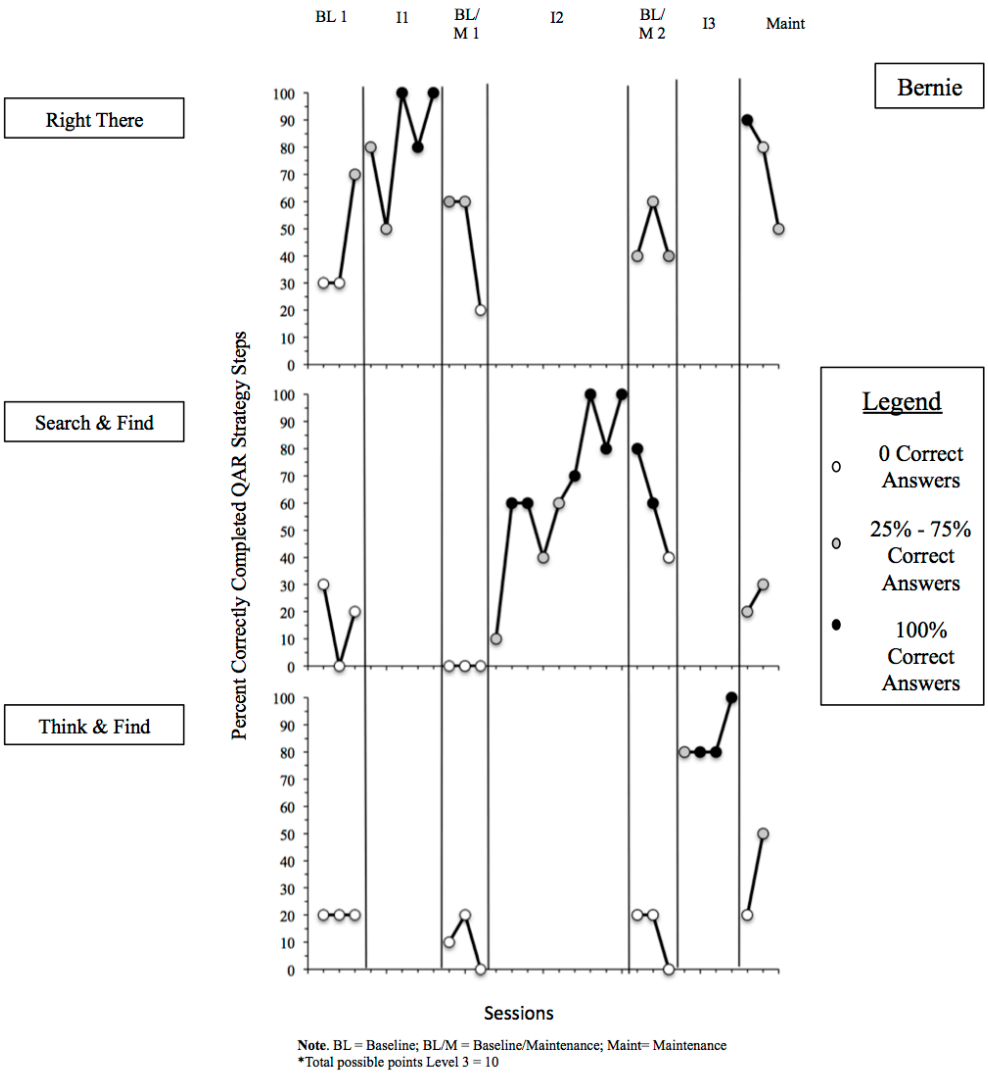
Note. BL = Baseline; BL/M = Baseline/Maintenance; Maint= Maintenance
*Total possible points Level 2 = 20,

Figure 6. Level 2 Adapted QAR Baseline, Mastery, & Maintenance Data



Note. BL = Baseline; I = Intervention;
*Total possible points Level 1 = 20; Level 2 = 20

Figure 7. Level 1 and Level 2 Adapted QAR Baseline & Mastery Data



Note. BL = Baseline; BL/M = Baseline/Maintenance; Maint= Maintenance
*Total possible points Level 3 = 10

Figure 8. Level 3 Adapted QAR Baseline, Mastery, & Maintenance Data

REFERENCES

Allor, J. H., Mathes, P. G., Champlin, T., & Cheatham, J. P. (2009). Research-based techniques for teaching early reading skills to students with intellectual disabilities. *Education and Training in Developmental Disabilities*, 356-366.

Allor, J. H., Mathes, P. G., Roberts, J. K., Cheatham, J. P., & Al Otaiba, S. (2014). Is scientifically based reading instruction effective for students with below-average IQs? *Exceptional Children*, *80*(3), 287-306.

Ault, M. J., Wolery, M., Doyle, P. M., & Gast, D. L. (1989). Review of comparative studies in the instruction of students with moderate and severe handicaps. *Exceptional Children*, *55*(4), 346-356.

Benito, Y. M., Foley, C. L., Lewis, C. D., & Prescott, P. (1993). The effect of instruction in question–answer relationships and metacognition on social studies comprehension. *Journal of Research in Reading*, *16*(1), 20-29.

Biancarosa, G., & Snow, C. E. (2004). *Reading next: A vision for action and research in middle and high school literacy*. Alliance for Excellent Education.

Brigance, A. H. (2001). *Brigance diagnostic inventory of basic skills*. Louisville, KY: American Printing House for the Blind.

Brozo, W. G., & Afflerbach, P. (2010). *Adolescent literacy inventory: Grades 6-12*. Pearson/Allyn & Bacon.

Browder, D. M., Ahlgrim-Delzell, L., Courtade, G., Gibbs, S. L., & Flowers, C. (2008). Evaluation of the effectiveness of an early literacy program for students with significant developmental disabilities. *Exceptional Children*, *75*(1), 33-52.

Browder, D. M., Gibbs, S., Ahlgrim-Delzell, L., Courtade, G. R., Mraz, M., & Flowers, C. (2008). Literacy for students with severe developmental disabilities: what should we teach and what should we hope to achieve? *Remedial and Special Education*.

Browder, D. M., Hudson, M. E., & Wood, A. L. (2013). Teaching students with moderate intellectual disability who are emergent readers to comprehend passages of text. *Exceptionality*, *21*(4), 191-206.

Browder, D. M., Lee, A., & Mims, P. (2011). Using shared stories and individual response modes to promote comprehension and engagement in literacy for students with multiple, severe disabilities. *Education and Training in Autism and Developmental Disabilities*, 339-351.

Browder, D. M., Mims, P., Spooner, F., Ahlgrim-Delzell, L., & Lee, A. (2008). Teaching elementary students with multiple disabilities to participate in shared stories. *Research and Practice for Persons with Severe Disabilities*, *33*, 3-12.

Browder, D. M., & Spooner, F. (2014). *More language arts, math, and science for students with severe disabilities*. Baltimore, MD: Paul H. Brookes Publishing.

Browder, D. M., Trela, K., & Jimenez, B. (2007). Training teachers to follow a task analysis to engage middle school students with moderate and severe developmental disabilities in grade-appropriate literature. *Focus on Autism and Other Developmental Disabilities*, *22*(4), 206-219.

Browder, D. M., Wakeman, S. Y., Spooner, F., Ahlgrim-Delzell, L., & Algozzine, B. (2006). Research on reading instruction for individuals with significant cognitive disabilities. *Exceptional Children, 72*(4), 392-408.

Browder, D. M., Wood, L., Thompson, J., & Ribuffo, C. (2014). Evidence-based practices for students with severe disabilities (Document No. IC-3). Retrieved from University of Florida, Collaboration for Effective Educator, Development, Accountability, and Reform Center website: http://ceedar.education.ufl.edu/tools/innovation-configurations.

Brozo, W. G., & Afflerbach, P. (2011). *Adolescent literacy inventory: Grades 6-12*. Pearson/Allyn & Bacon.

Chall, J. S. (1983). *Stages of reading development.* New York, NY: McGraw-Hill.

Chard, D. J., Vaughn, S., & Tyler, B. J. (2002). A synthesis of research on effective interventions for building reading fluency with elementary students with learning disabilities. *Journal of Learning Disabilities*, *35*(5), 386-406.

Coleman, D., & Pimentel, S. (2012). Revised publishers' criteria for the Common Core State Standards in English Language Arts and Literacy, grades 3–12. Retrieved from Student Achievement Partners at www.achievethecore.org/stealthesetools.

Cook, B. G., Buysse, V., Klingner, J., Landrum, T. J., McWilliam, R. A., Tankersley, M., & Test, D. W. (2015). CEC's standards for classifying the evidence base of practices in special education. *Remedial and Special Education*, *36*(4), 220 - 234.

Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). *Applied Behavior Analysis* (2nd ed.). Upper Saddle River, NJ: Pearson.

Copeland, S. R., & Cosbey, J. (2009). Making progress in the general curriculum: Rethinking effective instructional practices. *Research and Practice for Persons with Severe Disabilities*, *34*(1), 214-227.

Courtade, G. R., Test, D. W., & Cook, B. G. (2014). Evidence-based practices for learners with severe intellectual disability. *Research and Practice for Persons with Severe Disabilities*, *39*(4), 305-318.

Davey, B., & Macready, G. B. (1985). Prerequisite relations among inference tasks for good and poor readers. *Journal of Educational Psychology*, *77*(5), 539 – 552.

Davidson, K. A., Lemons, C. J., King, S. A., & Smith, K. H. (2016, January). *Who, clue, place: A text-based where-question strategy for students with Down Syndrome*. Poster presented at the 17th International Conference on Autism, Intellectual Disability, and Developmental Disabilities, Honolulu, Hawaii.

Dexter, D. D., & Hughes, C. A. (2011). Graphic organizers and students with learning disabilities: A meta-analysis. *Learning Disability Quarterly*, *34*(1), 51-72.

Engelmann, S., Haddox, P., Hanner, S., & Osborn, J. (2002). Corrective reading thinking basics: Comprehension level A. *Columbus, OH: SRA McGraw-Hill*.

Fagella-Luby, M., Schumaker, J. S., & Deshler, D. D. (2007). Embedded learning strategy instruction: Story-structure pedagogy in heterogeneous secondary literature classes. *Learning Disability Quarterly, 30*(2), 131-147.

Fang, Z. & Wei, Y. (2010). Improving middle school students' science literacy through reading infusion. *The Journal of Educational Research, 103*(4), 262-273.

Fenty, N. S., McDuffie-Landrum, K., & Fisher, G. (2012). Using collaboration, co-teaching, and question answer relationships to enhance content area literacy. *Teaching Exceptional Children*, *44*(6), 28-37.

Fisher, D., & Frey, N. (2001). Access to the core curriculum critical ingredients for student success. *Remedial and Special Education*, *22*(3), 148-157.

Fisher, D., & Frey, N. (2012). Text complexity and close readings. *International Reading Association: Newark DE*.

Fisher, D., Frey, N., & Lapp, D. (2008). Shared readings: Modeling comprehension, vocabulary, text structures, and text features for older readers. *The Reading Teacher*, *61*(7), 548-556.

Flores, M. M., & Ganz, J. B. (2009). Effects of direct instruction on the reading comprehension of students with autism and developmental disabilities. *Education and Training in Developmental Disabilities*, 39-53.

Gajria, M., Jitendra, A. K., Sood, S., & Sacks, G. (2007). Improving comprehension of expository text in students with LD: A research synthesis. *Journal of learning disabilities*, *40*(3), 210-225.

Gast, D. L., & Ledford, J. R. (2014). *Single case research methodology: Applications in special education and behavioral sciences*. New York: Routledge.

Good, R. H., & Kaminski, R. A. (2002). *DIBELS oral reading fluency passages for first through third grades* (Technical Report No. 10). Eugene, OR: University of Oregon.

Graham, S., & Hebert, M. (2011). Writing to read: A meta-analysis of the impact of writing and writing instruction on reading. *Harvard Educational Review*, *81*(4), 710-744.

Graham, L. & Wong, B. Y. L. (1993). Comparing two modes of teaching a question-answering strategy for enhancing reading comprehension: Didactic and self-instructional training. *Journal of Learning Disabilities, 26*(4), 270- 279.

Grigal, M., Hart, D., & Migliore, A. (2011). Comparing transition planning, postsecondary education, and employment outcomes of students with intellectual and other disabilities. *Career Development for Exceptional Individuals*, 0885728811399091.

Guthrie, J. T., & Kirsch, I. S. (1987). Distinctions between reading comprehension and locating information in text. *Journal of Educational Psychology*, *79*(3), 220.

Guthrie, J. T., & Mosenthal, P. (1987). Literacy as multidimensional: Locating information and reading comprehension. *Educational Psychologist*, *22*(3-4), 279-297.

Guzel-Ozmen, R. (2006). The effectiveness of modified cognitive strategy instruction in writing with mildly mentally retarded Turkish students, *Exceptional Children, 72*(3), 281 – 297.

Haager, D., & Vaughn, S. (2013). The common core state standards and reading: Interpretations and implications for elementary students with learning disabilities. *Learning Disabilities Research & Practice*, *28*(1), 5-16.

Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). A metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform*, *42*(2), 377-81.

Hoover, W. A., & Gough, P. B. (1990). The simple view of reading. *Reading and writing*, *2*(2), 127-160.

Hudson, M. E., & Browder, D. M. (2014). Improving listening comprehension responses for students with moderate intellectual disability during literacy class. *Research and Practice for Persons with Severe Disabilities*, *39*(1), 11-29.

Hudson, M. E., Browder, D. M., & Jimenez, B. A. (2014). Effects of a peer-delivered system of least prompts intervention and adapted science read-alouds on listening comprehension for participants with moderate intellectual disability. *Education and Training in Autism and Developmental Disabilities*, *49*(1), 60 – 77.

Hudson, M. E., & Test, D. W. (2011). Evaluating the evidence base of shared story reading to promote literacy for students with extensive support needs. *Research and Practice for Persons with Severe Disabilities*, *36*(1-2), 34-45.

Hughes, C. A., Maccini, P., & Gagnon, J. C. (2003). Interventions that positively impact the performance of students with learning disabilities in secondary general education classes. *Learning Disabilities*, *12*(3), 101-111.

Individuals With Disabilities Education Improvement Act of 2004, 20 U.S.C. 1400 *et seq*.

Jitendra, A. K., Burgess, C., & Gajria, M. (2011). Cognitive strategy instruction for improving expository text comprehension of students with learning disabilities: The quality of evidence. *Exceptional Children*, *77*(2), 135-159.

Karvonen, M., Wakeman, S. Y., Browder, D. M., Rogers, M. A. S., & Flowers, C. (2011). Academic curriculum for students with significant cognitive disabilities: Special education teacher perspectives a decade after IDEA 1997. Retrieved from: http://files.eric.ed.gov/fulltext/ ED521407.pdf.

Kaufman, A. S. & Kaufman, N. L. (2004). *Kaufman Test of Educational Achievement—second edition (K-TEA—II): Comprehensive form*. Circle Pines, MN: American Guidance Service.

Kaufman, A. S. & Kaufman, N. L. (2004). *Kaufman Brief Intelligence Test, Second Edition*. Bloomington, MN: Pearson.

Kim, A. H., Vaughn, S., Wanzek, J., & Wei, S. (2004). Graphic organizers and their effects on the reading comprehension of students with LD A synthesis of research. *Journal of Learning Disabilities*, *37*(2), 105-118.

Koritsas, S., & Iacono, T. (2011). Secondary conditions in people with developmental disability. *American Journal of Intellectual and Developmental Disabilities*, *116*(1), 36-47.

Labercane, G., & Battle, J. (1987). Cognitive Processing Strategies, Self-Esteem, and Reading Comprehension of Learning Disabled Students. *BC Journal of Special Education*, *11*(2), 167-85.

Leslie, L., & Caldwell, J. (2005). *Qualitative Reading Inventory-VI*. New York: Addison Wesley Longman.

Mathes, P. G., & Torgesen, J. K. (2005). *Early interventions in reading*. Columbus, OH: SRA/ McGraw-Hill.

McNamara, D.S., Louwerse, M.M., Cai, Z., & Graesser, A. (2005, January 1). Coh-Metrix version 1.4. Retrieved from http//:cohmetrix.memphis.edu.

Mims, P. J., Browder, D. M., Baker, J. N., Lee, A., & Spooner, F. (2009). Increasing comprehension of students with significant intellectual disabilities and visual impairments during shared stories. *Education and Training in Developmental Disabilities*, 409-420.

Mims, P. J., Lee, A., Browder, D. M., Zakas, T. L., & Flynn, S. (2012). Effects of a treatment package to facilitate English/language arts learning for middle school students with moderate to severe disabilities. *Education and Training in Autism and Developmental Disabilities*, 414-425.

Mims, P. J., Hudson, M. E., & Browder, D. M. (2012). Using read-alouds of grade-level biographies and systematic prompting to promote comprehension for students with

moderate and severe developmental disabilities. *Focus on Autism and Developmental Disabilities, 27*(2), 67-80.

Morgan, M. F., & Moni, K. B. (2008). Literacy: Meeting the challenge of limited literacy resources for adolescents and adults with intellectual disabilities. *British Journal of Special Education*, *35*(2), 92-101.

Nashville School Finder. (2016). *Bellevue Middle Prep*. www.http://nashvilleschoolfinder.org

National Assessment of Educational Progress. (2015.). *The nation's report card*. Retrieved from http://www.nationsreportcard.gov.

National Governors Association Center for Best Practices, Council of Chief State School Officers. (2010). *Common Core State English Language Arts Standards.* Washington, D.C.: National Governors Association Center for Best Practices, Council of Chief State School Officers.

National Reading Panel (US), National Institute of Child Health, & Human Development (US). (2000). *Report of the national reading panel: Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction: Reports of the subgroups*. National Institute of Child Health and Human Development, National Institutes of Health.

No Child Left Behind Act of 2001 (2002). Public Law 107-110, 107th Congress of the United States of America. (http://www.ed.gov/legislation/ESEA02/107-110.pdf).

Odom, S. L., Chandler, L. K., Ostrosky, M., McConnell, S. R., & Reaney, S. (1992). Fading teacher prompts prom peer‐initiation interventions for young children with disabilities. *Journal of Applied Behavior Analysis*, *25*(2), 307-317.

Pearson, P. D., & Gallagher, M. C. (1983). The instruction of reading comprehension. *Contemporary Educational Psychology, 8*(3), 317 – 344.

Pearson, P. D., & Johnson, D. D. (1978). *Teaching reading comprehension*. New York: Holt, Reinhart, & Winston.

Pressley, M., Woloshyn, V., Lysynchuk, L. M., Martin, V., Wood, E., & Willoughby, T. (1990). A primer of research on cognitive strategy instruction: The important issues and how to address them. *Educational Psychology Review*, *2*(1), 1-58.

RAND Reading Study Group. (2002). *Reading for understanding: Toward an R&D program in reading comprehension.* Santa Monica, CA: RAND.

Raphael, T. E. (1982). Question-answering strategies for children. *The Reading Teacher, 36*(2), 186-190.

Raphael, T. E. (1986). Teaching question answer relationships, revisited. *The Reading Teacher, 39*(6), 516 - 522.

Raphael, T. & Au, K. (2011). *QAR Comprehension Lessons: Grades 2-3.* New York: Scholastic.

Raphael, T. & Au, K. (2011). *QAR Comprehension Lessons: Grades 4 -5.* New York: Scholastic.

Raphael, T. & Au, K. (2011). *QAR Comprehension Lessons: Grades 6 - 8.* New York: Scholastic.

Raphael, T. E., & McKinney, J. (1983). An examination of fifth-and eight-grade children's question-answering behavior: An instructional study in metacognition. *Journal of Reading Behavior, 15*(3), 67-86.

Raphael, T. E., & Pearson, P. D. (1985). Increasing students' awareness of sources of information for answering questions. *American Educational Research Journal, 22*(2), 217-235.

Raphael, T. E., & Wonnacott, C. A. (1985). Heightening fourth-grade students' sensitivity to sources of information for answering comprehension questions. *Reading Research Quarterly, 20*(3), 282-296.

Reichenberg, M. (2014). The importance of structured text talks for students' reading comprehension. *Journal of Special Education and Rehabilitation, 15*(3-4), 77-94.

Riessen, T., McDonnell, J., Johnson, J. W., Polychronis, S., & Jameson, M. (2003). A comparison of constant time delay and simultaneous prompting within embedded instruction in general education classes with students with moderate to severe disabilities. *Journal of Behavioral Education, 12*(4), 241-259.

Roberts, C. A., Leko, M. M., & Wilkerson, K. L. (2013). New directions in reading instruction for adolescents with significant cognitive disabilities. *Remedial and Special Education*, *34*(5), 305-317.

Rosenshine, B., & Meister, C. (1992). The use of scaffolds for teaching higher-level cognitive strategies. *Educational leadership*, *49*(7), 26-33.

Rosenshine, B., Meister, C., & Chapman, S. (1996). Teaching students to generate questions: A review of the intervention studies. *Review of educational research*, *66*(2), 181-221.

Shanahan, T., Callison, K., Carriere, C., Duke, N. K., Pearson, P. D., Schatschneider, C., & Torgesen, J. (2010). *Improving reading comprehension in kindergarten through 3rd grade: A practice guide* (NCEE 2010-4038). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. Retrieved from whatworks.ed.gov/publications/ practiceguides.

Shurr, J., & Taber-Doughty, T. (2012). Increasing comprehension for middle school students with moderate intellectual disability on age-appropriate texts. *Education and Training in Autism and Developmental Disabilities*, 359-372.

Shurr, J., & Taber-Doughty, T. (2016). The picture plus discussion intervention text access for high school students with moderate intellectual disability. *Focus on Autism and Other Developmental Disabilities*, 1-11. doi: 1088357615625056.

Simmonds, E. P. (1992). The effects of teacher training and implementation of two methods for improving the comprehension skills of students with learning disabilities. *Learning Disabilities Research & Practice*.

Spooner, F., & Browder, D. M. (2015). Raising the bar: Significant advances and future needs for promoting learning for students with severe disabilities. *Remedial and Special Education*, *36*(1), 28 – 32. doi: 0741932514555022.

Spooner, F., Knight, V. F., Browder, D. M., & Smith, B. R. (2011). Evidence-based practice for teaching academics to students with severe developmental disabilities. *Remedial and Special Education*, 33(6), 374 - 387.

Stanovich, K. E. (1990). Concepts in developmental theories of reading skill: Cognitive resources, automaticity, and modularity. *Developmental Review*, *10*(1), 72-100.

Swanson, E., Edmonds, M. S., Hairrell, A., Vaughn, S., & Simmons, D. C. (2011). Applying a cohesive set of comprehension strategies to content-area instruction. *Intervention in School and Clinic*, 20(10), 1-7.

Udvari-Solner, A. (1992). Curricular Adaptations: Accommodating the Instructional Needs of Diverse Learners in the Context of General Education.

Wei, X., Blackorby, J., & Schiller, E. (2011). Growth in reading achievement of students with disabilities, ages 7 to 17. *Exceptional Children, 78*(1), 89-106.

Whalon, K., & Hart, J. E. (2011). Adapting an evidence-based reading comprehension strategy for learners with autism spectrum disorder. *Intervention in School and Clinic*, *46*(4), 195-203.

Wood, L., Browder, D. M., & Flynn, L. (2015). Teaching students with intellectual disability to use a self-questioning strategy to comprehend social studies text for an inclusive setting. *Research and Practice for Persons with Severe Disabilities*, *40*(4), 275-293.

Woodcock, R.W. (2011). *Woodcock Reading Mastery Tests – III*. Bloomington, MN: Pearson.

Zakas, T. L., Browder, D. M., Ahlgrim-Delzell, L., & Heafner, T. (2013). Teaching social studies content to students with autism using a graphic organizer intervention. *Research in Autism Spectrum Disorders*, *7*(9), 1075-1086.

Confidential

QAR Inclusion Survey

Consent to participate
You have been selected to take part in this survey because of your participation in Project CALI. Thank you for taking your valuable time to answer a few survey questions about including students with intellectual disabilities in content area classes. This information will be used as part of a project to develop strategies to better support reading comprehension for students with ID in general education classes.Your survey will be anonymous and answers will be kept confidential. Your participation is totally voluntary. If you complete the entire survey, you will receive an Amazon Gift Card for $25.
Do you agree to participate?

- ◯ Yes
- ◯ No

Thank you for your interest in taking the survey. This concludes the session.

What is your gender?

- ◯ female
- ◯ male

Race/Ethnicity

- ◯ White/Non Hispanic
- ◯ African American
- ◯ Asian/Pacific Islander
- ◯ Hispanic or Latino
- ◯ Native American or American Indian
- ◯ Other

Please enter your race/ethnicity _____

What is your age?

- ◯ 18 -24
- ◯ 25 - 34
- ◯ 35 - 44
- ◯ 45 - 54
- ◯ 55 -64
- ◯ 65 - 74
- ◯ 75 or older

In what state do you currently teach?

- ◯ Alabama
- ◯ Alaska
- ◯ Arizona
- ◯ Arkansas
- ◯ California
- ◯ Colorado
- ◯ Connecticut
- ◯ Delaware
- ◯ District of Columbia
- ◯ Florida
- ◯ Georgia
- ◯ Hawaii
- ◯ Idaho
- ◯ Illinois
- ◯ Indiana
- ◯ Iowa
- ◯ Kansas
- ◯ Kentucky
- ◯ Louisiana
- ◯ Maine
- ◯ Maryland
- ◯ Massachusetts
- ◯ Michigan
- ◯ Minnesota
- ◯ Mississippi
- ◯ Missouri
- ◯ Montana
- ◯ Nebraska
- ◯ Nevada
- ◯ New Hampshire
- ◯ New Jersey
- ◯ New Mexico
- ◯ New York
- ◯ North Carolina
- ◯ North Dakota
- ◯ Ohio
- ◯ Oklahoma
- ◯ Oregon
- ◯ Pennsylvania
- ◯ Rhode Island
- ◯ South Carolina
- ◯ South Dakota
- ◯ Tennessee
- ◯ Texas
- ◯ Utah
- ◯ Vermont
- ◯ Virginia
- ◯ Washington
- ◯ West Virginia
- ◯ Wisconsin
- ◯ Wyoming

What grade(s) do you currently teach?

- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10
- ☐ 11
- ☐ 12

(Check all that apply)

What is your job title?

☐ Special education teacher
☐ General education teacher
☐ Dual certification [special & general education]
(Check all that apply)

In what settings do you teach?

☐ Special education, Self Contained
☐ Special education, Inclusion
☐ Special education, Other
☐ General education, English
☐ General education, Social Studies
☐ General education, Science
☐ General education, Math
☐ General education, Other
(Check all that apply)

In what other special education setting do you teach?

_____
(Specify)

In what other general education setting do you teach?

_____
(Specify)

Do you currently co-teach any classes?
*Co-teach means you provide instruction along with another teacher in a classroom that includes students with disabilities and students who are typically achieving.

◯ Yes
◯ No

Which classes do you currently co-teach?

☐ English
☐ Social Studies
☐ Science
☐ Math
(Check all that apply)

How many years have you taught?

◯ Less than 1 year
◯ 2 -3 years
◯ 4 - 7 years
◯ More than 7 years

What is the highest level of education you have attained?

◯ Bachelor's
◯ Master's
◯ Doctoral

Do you have additional certifications?

◯ Yes
◯ No

Additional Certifications

_____
(List all certifications, one per line, include Teach For America, if applicable)

Have you taught students with intellectual disabilities?

◯ Yes
◯ No

In what setting(s) have you taught students with intellectual disabilities?

☐ General education setting
☐ Special education setting
(Check all that apply)

What are some appropriate targets of instruction for a student with mild to moderate intellectual disabilities in a general education class?

- ☐ Sight words
- ☐ Vocabulary
- ☐ Reading comprehension
- ☐ Writing
- ☐ Content (General Education)
- ☐ Content (Adapted/Alternate)
- ☐ Hands-on instruction

(Check all that apply)

Please slide the button to the left or right to indicate your level of disagreement or agreement with the following statements.

I think teaching students with intellectual disabilities in general education settings can be effective.

Strongly Disagree — Strongly Agree

(Place a mark on the scale above)

It is more effective to teach students with intellectual disabilities in an inclusive setting than in a non-inclusive setting.

Strongly Disagree — Strongly Agree

(Place a mark on the scale above)

It is more effective to teach students with intellectual disabilities in a self-contained classroom than a general education setting.

Strongly Disagree — Strongly Agree

(Place a mark on the scale above)

My teacher training program adequately prepared me to teach students with intellectual disabilities in a general education setting.

Strongly Disagree — Strongly Agree

(Place a mark on the scale above)

My teacher preparation program adequately prepared me to teach academic content to students with intellectual disabilities.

Strongly Disagree — Strongly Agree

(Place a mark on the scale above)

My teacher preparation program adequately prepared me to teach literacy to students with intellectual disabilities.

Strongly Disagree — Strongly Agree

(Place a mark on the scale above)

After my teacher training I have received professional development to prepare me to teach students with intellectual disabilities in a general education setting.

◯ Yes
◯ No

The professional development was helpful and effective.

Strongly Disagree — Strongly Agree

(Place a mark on the scale above)

I am familiar with the Question Answer Relationships (QAR) reading comprehension strategy.

Strongly Disagree — Strongly Agree

(Place a mark on the scale above)

QAR Defined
Please watch a 5 minute video that describes QAR

I have used QAR in my classroom.

◯ Yes
◯ No

Using QAR enhanced my students' reading comprehension.

Strongly Disagree — Strongly Agree

(Place a mark on the scale above)

QAR is an evidence-based practice
[QAR has quality scientific, empirical evidence to support its effectiveness as a reading comprehension strategy.]

Strongly Disagree — Strongly Agree

(Place a mark on the scale above)

QAR has the potential to be an effective reading comprehension strategy.

Strongly Disagree — Strongly Agree

(Place a mark on the scale above)

A modified version of QAR could potentially be used to increase reading comprehension for students with intellectual disabilities.

Strongly Disagree — Strongly Agree

(Place a mark on the scale above)

QAR could potentially support reading comprehension for students with reading disabilities.

Strongly Disagree — Strongly Agree

(Place a mark on the scale above)

QAR could potentially support reading comprehension for students who are typically developing.

Strongly Disagree — Strongly Agree

(Place a mark on the scale above)

QAR could potentially help students with intellectual disabilities participate in an inclusive classroom.

Strongly Disagree — Strongly Agree

(Place a mark on the scale above)

A paraprofessional [aide] could assist a student with intellectual disabilities to use QAR.

Strongly Disagree — Strongly Agree

(Place a mark on the scale above)

A peer tutor could assist a student with intellectual disabilities to use QAR.

Strongly Disagree — Strongly Agree

(Place a mark on the scale above)

I would be interested in receiving professional development on the QAR strategy.

Strongly Disagree — Strongly Agree

(Place a mark on the scale above)

Thank you for participating in this survey. Click the button to submit your responses. A text box will appear with instructions for receiving your $25 Amazon gift card.

APPENDIX B

Basketball

Basketball was first played in Massachusetts on a winter day in 1891. James Naismith invented basketball. He wanted to invent a team sport that his students could play inside. James Naismith remembered a game called duck on a rock. He played it when he was a kid. Players threw rocks at another rock. Naismith got a soccer ball. He hung two peach baskets in the gym. Naismith made13 rules for basketball. One team would try to throw the ball in a basket. They got points if the ball went in. The other team would try to block it. The team with the most points wins! In the first game, Naismith needed a ladder when a team scored! Basketball has changed a lot since then. It is a very popular sport.

APPENDIX C
QAR intervention training background knowledge fact sheets (BKFS)- Level 1

Basketball









a. Basketball hoops are hung 10 feet high.
b. The Basketball Hall of Fame is in Springfield, Massachusetts.
c. A basket is worth 2 points.
d. In 1992 the Olympic basketball team was called the Dream team.
e. Most male players are at least six feet, three inches tall.
f. A team gets a free throw if the other team makes a foul.
g. A free throw is worth one point.
h. The National Basketball Association was founded in 1949.

APPENDIX D
"Basketball" question and answer training sheet- Level 1

Basketball

 1. How high are the basketball hoops hung ?

 2. Who invented basketball?

 3. What is a very popular sport?

APPENDIX E
QAR Science and social studies testing probe- Level 1

The Mining Boom

1. What were the miners who worked in the California Gold Rush called?

2. When did the mining boom begin in the western United States?

3. What did the mining boom begin with?

APPENDIX F
Sample science and social studies passage

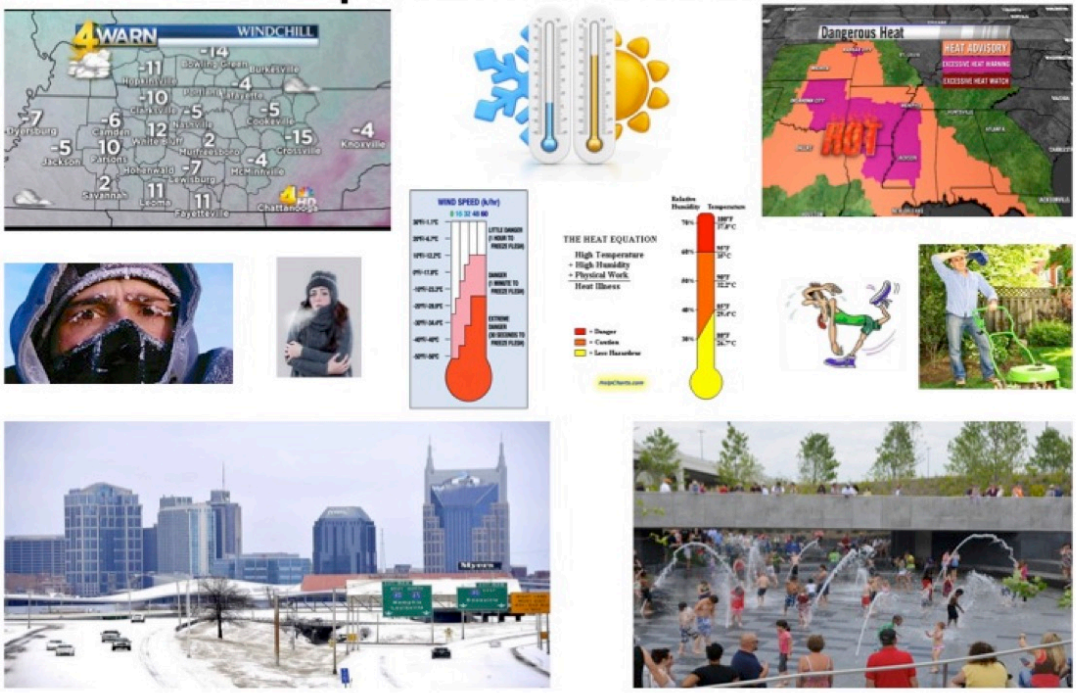
In the Desert

A desert is a very hot and dry place. The cactus is a plant. The cactus lives in the desert. It has long, shallow roots that cover a large area. Some plants have special ways to get and store water. The cactus is one of these plants. When it rains, cactus roots absorb a lot of water very quickly. The cactus stores extra rainwater in its body. It has a thick waxy covering to keep moisture inside.

This means that the cactus has water in the dry desert. The cactus is covered in spines. The spines do not lose water through evaporation. They also protect the cactus from animals.

APPENDIX G
QAR testing background knowledge fact sheet (BKFS)- Level 1

Temperature and Weather



a. If the Heat Index is very high, you should limit activities outside because it can make you sick.

b. When people move fast, they heat up.

c. It is hot in summer.

d. When the Wind Chill Index is low, it is dangerous. It is important to stay warm and limit time outside.

e. There are weather reports on the news, online, and on the radio.

f. Humidity is the amount of moisture in the air.

g. If people have to be outside when the Heat Index is high, they need to drink a lot of water.

h. If people have to be outside when the Wind Chill index is high, they need to wear warm clothing to protect themselves.

APPENDIX H
"Basketball" question and answer training sheets-Level 2

Basketball

Basketball was first played in Massachusetts in winter 1891.

James Naismith invented basketball.

He wanted a team sport his students could play inside.

Who invented basketball?

_____

_____ invented basketball.

Who wanted a team sport his students could play inside?

_____

_____wanted a team sport his students could play inside.

Where is the Basketball Hall of Fame located?

The Basketball Hall of Fame is located in

_____

_____.

APPENDIX I

QAR intervention background knowledge fact sheet (BKFS)- Level 2

a. Basketball hoops are hung 10 feet high.

b. The Basketball Hall of Fame is in Springfield, Massachusetts.

c. A basket is worth 2 points.

Basketball









d. Most male players are at least six feet, three inches tall.
e. A team gets a free throw if the other team makes a foul.
f. A free throw is worth one point.

APPENDIX J
QAR testing background knowledge fact sheet (BKFS)- Level 2 & Level 3

Arctic Animals

a. The Arctic is the coldest place on Earth.

b. Polar bears are big white bears who live in the Arctic.

c. Snow melts away in spring in the Arctic.

Arctic Animals








d. Warmth also escapes through human ears.

e. The Arctic region is found in the northernmost part of Earth.

f. The name Arctic is from a word that means, “near the bear”.

Hurricanes

The weather service warns people when a hurricane is coming.
People can then have time to evacuate their homes.
They can go back when the hurricane is over.

1. Who can go back when the hurricane is over?

_____

_____

can go back when the hurricane is over.

2.Why should people have canned food?

_____

People should have canned food because they may lose

_____

3.When does the national weather service warn people?

_____

The weather service warns people when

_____

APPENDIX L
Science and social studies question and answer training sheets- Level 3

In the Desert

The cactus lives in the desert.

 **Where does the cactus live?**

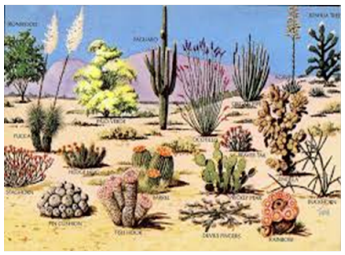
The cactus lives in _____

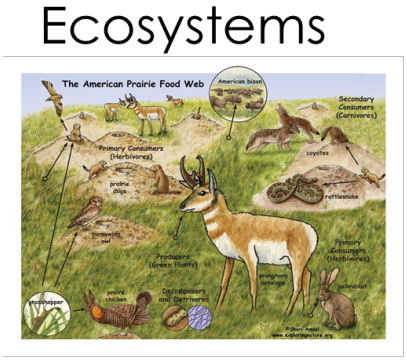
_____

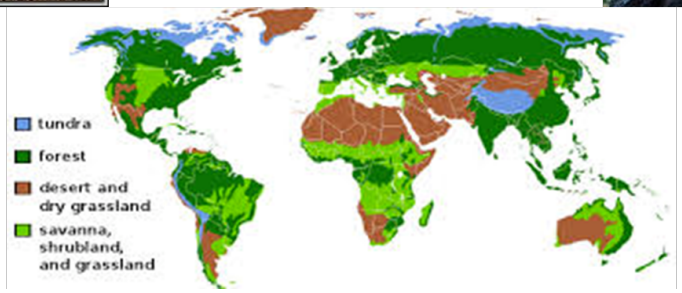
_____

_____

APPENDIX M
QAR intervention background knowledge fact sheet (BKFS)- Level 3







Tennessee is part of a forest ecosystem.

APPENDIX N
QAR science and social studies testing probes- Level 3

In the Desert

A desert is a very hot and dry place.

The cactus is a plant.

The cactus lives in the desert.

It has long, shallow roots that cover a large area.

Where does the cactus live?

The cactus lives in _____

_____

_____

_____

APPENDIX O
Data collection sheet

Student ID: **Date:** **Unit:** **Session:**

	QAR Correct?	Prompts?	Sentence Correct?	Prompts?	Answer Correct?	Mastery Test Prompts?	Total Prompts	Total Score	
RT M P									
Question 1									
Question 2									
Question 3									
Question 4									
Total									
SF M P									
Question 1									
Question 2									
Question 3									
Question 4									
Total									
TF M P									
Question 1									
Question 2									
Question 3									
Question 4									
Total									

APPENDIX P
Baseline procedural fidelity instrument

Observer:_____ Observation #:_____

Student:_____ Observation Date:_____

Does the tester:

	Session # **Date:**	Q1	Q2	Q3	Q4	Y/N/NA
	Baseline					
1.	Read directions?					
2.	Have all necessary materials?					
3.	Prompt the student to read the passage?					
4.	Prompt the student to find the Right There question?					
5.	Use correct prompts for no answer?					
6.	Use correct prompts for incorrect answer?					
7.	Provide correct number of prompts?					
8.	Prompt the student to read the question?					
9.	Prompt the student to find the answer sentence(s)?					
10.	Use correct prompts for no answer?					
11.	Use correct prompts for incorrect answer?					
12.	Provide correct number of prompts?					
13.	Prompt the student to answer the question & write it on the line?					
14.	Use correct prompts for no answer?					
15.	Use correct prompts for incorrect answer?					
16.	Provide correct number of prompts?					
Praise Statements:						
Unplanned Prompts:						
17.	Prompt the student to find the Search & Find question?					
18.	Use correct prompts for no answer?					
19.	Use correct prompts for incorrect answer?					
20.	Provide correct number of prompts?					
21.	Prompt the student to read the question?					
22.	Prompt the student to find the answer sentence(s)?					
23.	Use correct prompts for no answer?					
24.	Use correct prompts for incorrect answer?					
25.	Provide correct number of prompts?					
26.	Prompt the student to answer the question & write it on the line?					
27.	Use correct prompts for no answer?					
28.	Use correct prompts for incorrect answer?					
29.	Provide correct number of prompts?					
Praise Statements:						
Unplanned Prompts:						

	Student # **Session #** **Date:**	Q1	Q2	Q3	Q4	Y/N/NA
	Baseline Continued					
30.	Prompt the student to find the Think & Find question?					
31.	Use correct prompts for no answer?					
32.	Use correct prompts for incorrect answer?					
33.	Provide correct number of prompts?					
34.	Prompt the student to read the question?					
35.	Prompt the student to find the answer sentence(s)?					
36.	Use correct prompts for no answer?					
37.	Use correct prompts for incorrect answer?					
38.	Provide correct number of prompts?					
39.	Prompt the student to answer the question & write it on the line?					
40.	Use correct prompts for no answer?					
41.	Use correct prompts for incorrect answer?					
42.	Provide correct number of prompts?					
Praise Statements:						
Unplanned Prompts:						

QAR Set	Total	Possible	Percent	Time	Praise	Prompts	Unplanned
RT							
SF							
TF							
TOTAL							

APPENDIX Q
Intervention and mastery fidelity instrument

Observer:_____ Observation #:_____

Student:_____ Observation Date:_____

Does the tutor:

	Session # **Date:**					
	Intervention	Q1	Q2	Q3	Q4	Y/N/NA
1.	Set the purpose?					
2.	State objective?					
3.	Have all necessary materials?					
4.	Show the student the QAR icon [procedural facilitator]?					
5.	Provide the QAR definition?					
6.	Lead student practice on QAR icon and definition?					
7.	Demonstrate reading the passage?					
8.	Demonstrate finding the target QAR question?					
9.	Demonstrate connecting the question to the answer in the text?					
10.	Underline the answer sentence(s)?					
11.	Demonstrate answering the question/ writing it on the line?					
12.	Prompt the student to find the target QAR question?					
13.	Prompt the student with the QAR icon [optional]?					
14.	Provide the correct QAR question [optional]?					
15.	Prompt the student to read the question?					
16.	Prompt the student to find the answer sentence(s)?					
17.	Prompt student with the QAR definition [optional]?					
18.	Provide the correct QAR answer sentence(s) [optional]?					
19.	Provide the correct QAR answer sentence(s) [optional]?					
20.	Prompt the student to answer question/write the answer on the line?					
21.	Prompt the student to answer question/write the answer on the line [optional]?					
Praise Statements:						
Unplanned Prompts:						
	Mastery Test	Q1	Q2	Q3	Q4	Y/N/NA
1.	Prompt the student to read the passage?					
2.	Prompt the student to find the target QAR question?					
3.	Prompt the student with the QAR icon [optional]?					
4.	Provide the correct QAR question [optional]?					
5.	Prompt the student to read the question?					
6.	Prompt the student to find the answer sentence(s)?					
7.	Prompt student with the QAR definition [optional]?					
8.	Provide the correct QAR answer sentence(s) [optional]?					
9.	Provide the correct QAR answer sentence(s) [optional→ for SF]?					
10.	Prompt the student to answer question/write the answer on the line?					
11.	Prompt the student to answer question/write the answer on the line [optional]?					
Praise Statements:						
Unplanned Prompts:						

Condition	Total	Possible	Percent	Time	Praise	Prompts
Intervention						
Mastery Test						
Probe						
Total						

APPENDIX R
Scoring guidelines

Scoring Guidelines

RT

Find QAR Question
1 = correct no prompt
0 = incorrect w/ 1 or 2 prompts or no answer

Find Answer Sentence
2 = correct [2 prompts unmodified; 1 prompt modified]
[Prompt is reminder of QAR icon/definition]
0 = incorrect, no answer, or when tutor provides answer

Write Answer
2 = correct no prompts
1 = correct 1 prompt
0 = incorrect

Unmodified: Student writes full sentence. Do not deduct for spelling/mechanics/grammar errors.
Modified: Student writes the 1 – 4 words that answer the sentence, as written in the answer sentence. Do not deduct for spelling/mechanics/grammar errors.

SF

Find QAR Question
1 = correct no prompt
0= incorrect w/ 1 or 2 prompts or no answer

Find Answer Sentence
2 = 2 correct sentences, no prompts
1= correct pronoun sentence, no prompt, incorrect or no 2nd sentence
0= incorrect; or correct referent sentence but incorrect or no pronoun sentence

Write Answer
2 = correct no prompts
1=correct 1 prompt
0=incorrect
Unmodified: Student writes full sentence. Do not deduct for spelling/mechanics/grammar errors. Answer must include referent, not pronoun.
Modified: Student writes the 1 – 4 words that answer the sentence, as written in the answer sentence. Do not deduct for spelling/mechanics/grammar errors.

Scoring Guidelines

TF

Find QAR Question
1 = correct no prompt
0= incorrect w/ 1 or 2 prompts or no answer

Find Answer Sentence
2 = correct [2 prompts unmodified; 1 prompt modified]
[Prompt is reminder of QAR icon/definition]
0 = incorrect, no answer, or when tutor provides answer

Write Answer
2 = correct no prompts
1=correct 1 prompt
0=incorrect or correct 2 prompts
Unmodified: Student writes full sentence. Do not deduct for spelling/mechanics/grammar errors.
Modified: Student writes the 1 – 4 words that answer the sentence, as written in the answer sentence. Do not deduct for spelling/mechanics/grammar errors.