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Reading Comprehension Interventions for Students with Autism

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READING COMPREHENSION INTERVENTIONS FOR STUDENTS WITH AUTISM

by

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ABSTRACT

Research focused on reading comprehension interventions for students with autism is limited. Available research focuses primarily on the impact of single intervention methods, whether teacher-led or technology-based. Research on intervention methods paired with technology is limited. The researcher conducted a survey of 51 special education teachers to identify what interventions, whether teacher-led or technology-based, are most frequently and effectively utilized within the classroom, as well as what methods teachers prefer to utilize within the classroom. The researcher also interviewed a sample of 5 teachers and conducted a thematic analysis to identify factors that teachers identify as most important in teaching reading comprehension. The researcher found that teacher-led instruction is preferred by most teachers, although both teacher-led and technology-based instruction were found to have some benefit within the classroom. The researcher also found that teachers preferred to work with students in a direct-instruction setting. Findings of this study will be shared as well as recommendations for future research and practice.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

LIST OF ABBREVIATIONS

CDC	Center for Disease Control
IDEA	Individuals with Disabilities Education Act
NCLB	No Child Left Behind
RECALL	Reading to Engage Children with Autism in Language and Learning
TWA	Thinking Before, While, and After

CHAPTER I – INTRODUCTION

Autism is defined as a developmental disorder that impacts emotional, social, and communication skills (Armstrong & Hughes, 2012). A March 2020 report on the US Department of Education website, in the 2018-2019 school year, noted that autism represented 11% of the total number of students identified with a disability. According to the 44th Annual Report to Congress on the Implementation of the Individuals with Disabilities Act, 2022, students with autism comprise 11.6% of the 6,464,088 students ages 6 to 21 served through Part B of IDEA. Autism represented 8.21% of students with disabilities in the state of Mississippi (IDEA, 2023). The March 2020 report further noted that 40.8% of those students spend 80% of their school day in the inclusion setting with an additional 14.8% spending between 40 and 79% of their school day in the inclusion setting (IDEA, 2023). Currently, statistics from a 2020 sample of 8-year-olds indicate that 1 in 36 children in the United States has a diagnosis of autism, a significant change from 2008 when 1 in 88 children in the United States was diagnosed with autism (CDC, 2023; Williamson et al., 2012).

Characteristics of Autism

Atypical development is prevalent in students with autism (Drill & Bellini, 2021). Students with autism often present with expressive and receptive language deficits that impact both the students' ability to communicate effectively and their ability to understand the world around them (Armstrong & Hughes, 2012). These language deficits may lead to the perception that these students do not have the ability to comprehend information at the same level as their neurotypical peers. Travers and colleagues (2011) noted that language deficits paired with social deficits create a larger barrier to engaging

in learning opportunities for students with autism than with their peers. Poor receptive language skills negatively impact these students' ability to comprehend written texts within the classroom, thus impacting their ability to participate effectively in core subjects (Filderman et al., 2022). In addition, the repetitive and stereotyped behaviors often associated with autism often prevent these students from engaging in meaningful participation in the classroom (Travers et al., 2011).

Reading Comprehension

Reading is a vital skill that impacts both students' success within the classroom as well as beyond the classroom and into the work force (Grindle et al., 2020). It is a necessary skill for all other school subjects. Reading is best described as a multi-faceted process that combines multiple skills (Head et al., 2018). Components of reading include phonemic awareness, phonics, vocabulary, reading fluency, and reading comprehension (Arciuli & Bailey, 2021; Head et al., 2018). For a reader to become fluent, they must have the precursor skills necessary to decode texts. Decoding skills include being able to sound out and read individual words (Davidson et al., 2018). To decode texts, one must have phonemic awareness, understanding that individual letters or letter pairs make sounds (Arciuli & Bailey, 2021). Readers who can decode words easily become fluent readers, able to read with appropriate rate and emphasis on punctuation and flow (Isik, 2023). The primary goal of reading written words is to demonstrate understanding of those words, both individually and when strung together into sentences and paragraphs (Armstrong & Hughes, 2012). Fluent readers can read words in sentences and paragraphs and are therefore able to focus on the primary goal of reading, that of reading for comprehension (Isik, 2023).

Reading comprehension is a critical skill for both academic pursuits as well as for living independently after school (Armstrong & Hughes, 2012). Reading comprehension is comprised of multiple other skills, including fluency, decoding skills, and language skills (Davidson et al., 2018). Reading comprehension goes beyond reading individual words and incorporates a process of reading words in an informational or literary text and taking the information read and pairing that information with prior knowledge to learn more academic content. It is vitally important for students to be able to not only learn to read but, in turn, to read to learn for them to be successful in school (Jackson & Hanline, 2020).

Research indicates that several components of thinking impact reading comprehension skills (Jackson & Hanline, 2020; Engel & Ehri, 2020). Central coherence is a process through which an individual is able to identify and connect information in the given context. Central coherence allows readers to connect written texts and aids in comprehending texts within a given context. Executive functioning, particularly working memory, also impacts reading ability as it impacts the reader's ability to recall information as additional information is being added (Jackson & Hanline, 2020; Engel & Ehri, 2020).

To remediate gaps in learning, interventions are often provided to struggling readers. Teachers may provide graphic organizers or other visual support to ensure students are able to be successful with reading activities (Filderman et al., 2022). Concept maps are utilized frequently to assist readers in organizing vocabulary and content specific information (Kim et al., 2023). Technology-based interventions, including the

use of screen readers, are also used frequently as an additional intervention (Isik, 2023, Drill & Bellini, 2022).

Reading Comprehension and Autism

Individuals with autism present with language deficits often resulting in the acquisition of language skills at a later age which, in turn, impacts the acquisition of reading comprehension skills (Kim et al., 2018). Some early literacy skills for students with autism, such as decoding skills, are typically at the average or above average range (Nation et al., 2006; Davidson et al., 2018). However, the authors also noted that, although word reading was not often deficient, comprehension skills were often found to be deficient in students with autism (Nation et al., 2006). Hyperlexia, the ability to decode words at a high level and with accuracy, is also often a characteristic of autism (Nation et al., 2006; Macdonald et al., 2021). Students with hyperlexia often begin reading early and are fascinated with letters and numbers (Macdonald et al., 2021). However, although these students may decode at a high level, these hyperlexic students with autism often struggle with reading comprehension (Nation et al., 2006; Turner et al., 2017). Davidson and colleagues (2018) noted that in a review of recent studies, data indicated between 38% and 73% of students with an autism diagnosis have difficulty with reading comprehension.

Deficits in working memory are also a potential problem for reading comprehension in students with autism spectrum disorders (Davidson et al., 2018). Children with autism spectrum disorder typically demonstrate significant difficulty in processing abstract concepts. This difficulty often translates into difficulties understanding the meaning in written words (Armstrong & Hughes, 2012). Research also

indicates that students with autism may also present with weak central coherence, causing these students to process individual words and concepts instead of focusing on how those individual words come together to create thoughts and ideas (Jackson & Hanline, 2020; Engel & Ehri, 2020).

Recommendations for Teaching Reading Comprehension

Nation and colleagues (2006) noted that students who struggle with oral language are more likely to struggle with reading and steps must be taken to prevent these students from failing at learning to read. Hunt and colleagues (2022) noted that various interventions can be effective in improving overall reading skills. Providing interventions in the classroom, such as providing shared reading opportunities, interactive lessons, and technology-based interventions, increases students' chances to be successful readers (Hunt, et al, 2022; Nation et al., 2006; Macdonald et al., 2022).

Problem Statement

As the number of students identified with autism is increasing, there is an increased need for support within the classroom (Maenner et al, 2023; El Zein, Gevarter, et al., 2016). Research in reading comprehension skills for students with autism as well as the specific areas that cause students with autism to struggle is limited (Flores et al., 2013; Knight et al., 2018). Westerveld and colleagues (2017) noted that studies have concluded that students with autism struggle with reading comprehension skills throughout school. It is important to understand the interventions that are being utilized with success by teachers within classrooms (Burke et al., 2016; Filderman et al., 2022). As reading comprehension is vital to success throughout school and life, effective

interventions are needed for these students with autism spectrum disorder and reading comprehension difficulties (Grindle et al., 2020).

Purpose Statement

The purpose of this study was to determine the strategies teachers reported utilizing to teach reading comprehension to students with autism. The study focused on teacher-led and technology-based interventions and answered the following research questions:

1. What strategies do teachers report utilizing to implement reading comprehension interventions for students with autism?

    1A. What do teachers report utilizing more frequently; teacher-led interventions, technology-based interventions, or a combination of both?

    1B. When teachers report implementation of both teacher-led and technology-based interventions in their practice, how do they compare their implementation efficiency and outcome effectiveness?

    1C. What do teachers identify as the benefits and drawbacks of each method?

    1D. What do teachers recommend for implementation of intervention strategies for future teachers?

Justification

This study intends to address the need for research in reading comprehension skills for students with autism and intends to identify the preferences of teachers in utilizing variety of teacher-led and technology-based interventions to teach reading comprehension to students with autism (Knight et al., 2018; Flores & Ganz, 2007; Drill & Bellini, 2022; Flores et al., 2013; Singh et al., 2017; Kim et al., 2018; Jackson &

Hanline, 2020; Klieman et al., 2021; Yaghmour & Obaidat, 2022, Browder et al. 2017). Most studies available have presented interventions that were utilized for a short period of time in addition to typical classroom instruction following individual district policies (Flores & Ganz, 2007; Drill & Bellini, 2022; Flores et al., 2013; Singh, et al., 2017; Kim et al., 2018; Jackson & Hanline, 2020; Klieman et al., 2021; Yaghmour & Obaidat, 2022). The use of multiple intervention strategies has been researched but less so than individual intervention strategies (El Zein, Gevarter, et al., 2016). The increase in the identification of students with autism has led to a greater need to provide appropriate instruction (cdc.gov, 2023; Maenner et al, 2023). The unique needs of this population indicate a need to identify effective instructional practices for this population. As students with autism present with varied characteristics and presentations of the disability, teachers must utilize a variety of methods to ensure success for each student (Davidson et al., 2018; Roycroft, 2015). When working with students with autism, teachers must work to ensure they are addressing the more complex needs of this subgroup (Saletta et al., 2019). The unique spectrum of characteristics and abilities requires that teachers implement a variety of effective strategies to ensure student success (Solis et al., 2022). Understanding the strategies teachers utilize effectively on a daily basis is necessary to bridge the gaps these students face in learning to read for understanding.

Theoretical Framework

The Theory of Instruction detailed by Englemann and Carnine (1982) provides the framework through which many intervention methods are designed. As Howard (1984) described, the principles defined in Theory of Instruction ensure that instruction is

governed by rules, not simply by trial and error. Englemann and Carnine's theory of instruction focuses on the use of direct instruction for the acquisition of new skills. Additionally, applied behavior analysis methodologies provide a framework that focuses on improving student performance through interventions focused on eliciting positive changes in performance (Plavnick & Ferreri, 2013). Both the Theory of Instruction and Applied Behavior Analysis focus on utilizing various instructional methods to improve performance.

CHAPTER II – LITERATURE REVIEW

There is an abundance of literature available for instructing students without disabilities in reading comprehension (Filderman et al., 2022). However, when focusing on reading comprehension research for teaching students with autism, research is less abundant (Carnahan & Williamson, 2016; Travers et al., 2011). Available research primarily focuses on intervention strategies for teaching the student population with autism. A review of that reading intervention research specific to students with autism is offered in this chapter.

A data search was conducted using the online library at the University of Southern Mississippi. An initial search was conducted using the search engines of Eric, Education Source, Academic Search Premier, Psychology and Behavioral Sciences Collection, and APA PsychInfo. The terms that were used included "Autism or ASD or autism spectrum disorder" and "Interventions" and "Reading Comprehension." Limiters of "peer reviewed," and "Boolean/phrase" were utilized for the search and only articles from 2002 to 2023 were included in the initial search (NCLB, 2002). The initial search produced 389 articles. The researcher also removed repeated articles, tutorial articles without a researched strategy, articles not primarily focused on reading comprehension strategies and literature reviews. Additionally, the researcher also eliminated articles without a primary focus of reading comprehension. These procedures decreased the number of articles significantly. Inclusionary criteria for studies included an age requirement of school-aged students with a primary diagnosis of autism from preschool to high- school aged (aged 4 to 19). Exclusionary criteria included those studies of students past high school as well as those studies pertaining to only those who were

classified as having a diagnosis of high-functioning autism. The additional criteria decreased relevant articles to 20 after all inclusion/exclusion criteria were applied.

An additional search was conducted utilizing the same search engines through the University of Southern Mississippi library with the same inclusionary and exclusionary criteria using the terms “Autism or ASD or autism spectrum disorder” and “Reading Comprehension Interventions or strategies or instruction.” This second search yielded two additional articles that met the inclusion criteria. Once selected, the 22 included articles were sorted based on the type of intervention that was conducted within the study. Interventions utilized within the articles included teacher-led interventions, technology-based interventions, and interventions that combined both teacher-led instruction and technology.

Teacher-Led Interventions

There are many methods of providing instruction and interventions to students with autism. Teacher-led interventions focus on improving student outcomes using direct instruction methods (Flores & Ganz, 2007). Direct instruction methods are small group or individualized lessons that provide explicit teaching and allow for guided practice opportunities (Flores et al., 2013). A variety of teacher-led intervention methods have been utilized to improve reading comprehension outcomes for students with autism spectrum disorder, including providing visual supports, introducing strategies utilized for neurotypical peers with modifications, and providing opportunities for repeated reading (Drill & Bellini, 2022; Flores et al., 2013; Bethune & Wood, 2013; Carnahan & Williamson, 2016). Technology-based interventions have grown in popularity for use with students with autism. As research indicates that students with autism struggle with

engagement in academic activities, providing reading comprehension instruction through a technology-based activity can be beneficial (El Zein, Gevarter, et al., 2016). Computer-based interventions are typically provided as an addition to classroom instruction. Direct instruction reading methods are frequently utilized by teachers to improve reading comprehension skills (Yaghmour & Obaidat, 2022). Research suggests that providing students with visual supports is beneficial in increasing overall reading comprehension (Bethune & Wood, 2013; Jackson & Hanline, 2020, Klieman et al., 2021).

Visual Supports

In a single-subject study with three elementary-aged students with autism, Bethune and Wood (2013) found that students demonstrated statistically significant growth in reading comprehension when using a graphic organizer and given novel reading passages. The researchers designed a simple "wh" question graphic organizer and asked students to sort key words based on "wh" questions. At the end of this intervention, students demonstrated statistically significant growth in answering reading comprehension questions. The authors also found that the students noted that they felt the graphic organizers were helpful (Bethune & Wood, 2013).

In addition to graphic organizers, simple visual supports, such as highlighting, providing pages with key words, or adding labels to texts can be beneficial in improving reading comprehension skills. Turner, Remington, and Hill (2017) focused on providing an intervention for students ages 11 to 15 with autism. In an experimental design study, with 8 males and 7 females with autism in the experimental group and 12 males and 2 females in the control group, the researchers provided interventions twice weekly for 6 weeks. The researchers focused interventions on prediction, clarification, questioning,

and summarizing while utilizing visual supports. The researchers found that the group of students receiving interventions demonstrated gains in understanding near the equivalent of three years of reading growth (Turner et al., 2017).

Venn Diagrams have also been found to produce statistically significant benefits for students with autism (Carnahan & Williamson, 2016). In their single-subject reversal design study, Carnahan and Williamson (2016) provided 3 middle school students with autism with graphic organizer visual supports. The students were provided with key words and allowed to sort the key words into compare/contrast graphic organizers prior to answering comprehension questions about informational science texts. Carnahan and Williamson found that the students' reading scores increased by at least 20% when provided the visual support of a graphic organizer.

Direct Instruction

The RECALL method, an intervention designed for parent implementation, has been studied recently to determine if it improved comprehension for students (Lo & Shum, 2021; Jackson & Hanline, 2020). Jackson and Hanline studied the effects of the RECALL method for two 5-year-old boys with autism in a single-case ABAB Reversal study. The authors implemented the study once daily for 5 days weekly for 12 weeks for one student and 2 sessions per day for four days per week for 8 weeks for a second student. In this intervention, the researchers instructed parents on how to implement the intervention and parents provided the intervention at home. The RECALL intervention, focused on shared reading with prompting and a strategic instructional sequence, was implemented by the researchers and was evaluated by students' ability to answer 10 comprehension questions about each novel reading passage each session (Jackson &

Hanline, 2020). Jackson and Hanline (2020) found that the number of correct responses increased significantly for both students with the use of the RECALL intervention. Lo and Shum (2021) also studied the effects of the RECALL method. The authors researched the RECALL intervention's effect with 26 boys and 5 girls with autism with an average age of 5 years old. The authors implemented the RECALL intervention, training parents in reading and questioning their children and having parents implement the intervention twice weekly for six weeks. Both control and experimental groups sent videos to researchers and researchers conducted an analysis of parent's data and found that the children who were in the intervention group were significantly more successful than their peers in the control group in demonstrating comprehension after having stories read to them (Lo & Shum, 2021).

Shared reading, a process of reading along with teacher support and guidance, is another method utilized as a reading intervention for students with autism. A study by Kim and colleagues (Kim et al., 2018) focused on shared reading for elementary students. The authors conducted a single-case multiple baseline study with 3 male students between the ages of 6 and 8. The authors conducted one-to-one sessions with each student, using a grade-level chapter book and working on a different chapter each session and adapting storybook to contain visual cues. The authors noted that the shared reading intervention with visual cues, including highlighting key words, improved reading comprehension by at least 70% for each student (Kim et al., 2018).

As many students with autism present with difficulties in central coherence, Engel and Ehri (2021) focused research on improving these deficits. The authors worked with 20 students with an average age of 7 years old. The intervention focused on giving direct

instruction in central coherence to students in the intervention group. The authors found that providing direct instruction in central coherence skills did not improve overall comprehension gains. However, the authors did note that using retelling with students was beneficial to both control and experimental groups (Engel & Ehri, 2021).

Behavioral Interventions

Researchers have also focused on interventions using behavior skills training (Singh et al., 2017). In a single-subject, multiple probe design across skills study, the authors focused on the reading comprehension skills of a 7th grade student with autism. The authors utilized behavior skills training, focused on instruction, modeling, rehearsal, and feedback to improve four components of reading comprehension, predicting, questioning, clarifying, and summarizing. The researchers noted that over the 18 sessions, with novel passages presented during each session, the intervention produced improved reading comprehension with skills maintained at a follow-up session, indicating that Behavior Skills Training is beneficial in improving reading comprehension skills for students with autism (Singh et al., 2017).

As perseverations on specific topics with atypical intensity is often a characteristic of students with autism, focusing instruction on topics of personal interest to the student with autism can be beneficial in increasing overall comprehension level (El Zein, Solis, et al., 2016; Solis et al., 2021; Solis et al., 2022). In one study, Solis and colleagues conducted a simultaneous replication single case design study with 5 middle school students. In this study, the researchers focused on providing texts that were of high interest to students. The researchers divided the appropriately-leveled, high-interest texts into three sections. In the first section, the teacher would model the text. In the second

section, the researcher would provide guided reading and in the third section, the student would read independently. The researchers trained the teachers to provide a visual support for vocabulary words from the passages and to teach a three-step main idea summarization strategy. Utilizing this intervention, the four students who completed the intervention demonstrated gains, but with some variability in scores.

In a different study, Solis and colleagues conducted two concurrent multiple baseline studies, with 3 male fourth grade students in study one and 4 students between fourth and eighth grade in study two (Solis et al., 2022). In both studies, the authors utilized an alternating treatment single case design focusing on the effects of a vocabulary-based reading intervention with students' interest areas included in the intervention. The authors found that all students in the first study, public school fourth graders, demonstrated gains in comprehension and that 3 of 4 students in the second study, private school students in grades four to eight, demonstrated gains in comprehension. El Zein, Solis, and colleagues focused on the use of perseverative interests when working with an 8-year-old male student. The researchers used an alternating treatment design method and modified half of 22 Reading A-Z grade level texts to include the student's perseverative interest. The researchers found that when perseverative interests were included, the student scored an average of 32% higher on comprehension quizzes (El Zein, Solis, et al., 2016).

Technology-Based Interventions

As children with autism are often highly interested in technology, delivering instruction via technology is often found to be beneficial to students with autism (Travers et al., 2011). One such example of a technology-based intervention is video self-

modeling. Egarr and Storey (2021) conducted a single-subject alternating treatments study with four students where they allowed the students to participate in video modeling and video self-modeling to work on improving reading fluency and comprehension skills. The authors noted favorable outcomes in response to the interventions, although fluency, not comprehension, saw greater gains (Egarr & Storey, 2021).

Howorth and Raimondi (2019) focused research on digital texts with three 11-year-old male students in a large urban school district. The authors focused their research on the TWA (Thinking before, While, and After) strategy on digital science texts. The researchers utilized a concurrent multiple probe single subject research design to determine the impact of the visual and auditory supports provided by the digital texts. Visual supports included color coding key details and auditory supports included read aloud of the text. The authors found that the intervention produced positive gains but significant growth was not identified overall, indicating that the digital strategy may be a beneficial addition to another classroom reading strategy (Howorth & Raimondi, 2019).

Macdonald, Luk, and Quintin (2021) conducted a study with 15 preschool students with autism as well as 15 of their neurotypical peers. In their repeated measures AB design study, the researchers implemented an intervention on an iPad or other iOS platform. The researchers trained parents to conduct interventions within the home and assessment activities were conducted by the researchers. Interventions required students to complete text to picture matching activities on the technology device, and the researchers assessed the growth in overall comprehension outcomes using symbol and text representation outcomes on the Woodcock Johnson. The authors noted that the subgroup of children with both autism and hyperlexia demonstrated significant growth in

reading comprehension relative to their typically developing peers. This indicates that increasing understanding of meaning of words using text to picture matching activities on the iPad may be a beneficial intervention for students with autism (Macdonald et al., 2021).

Kahveci and Kara (2023) conducted a study to determine the impact of utilizing iPads for three first grade students with autism to determine if the use of the iPad increased their overall on-task behavior and reading comprehension skills. The researchers first provided the students with a reading lesson with a pencil and paper comprehension assessment following. After collecting baseline data, the researchers implemented an intervention utilizing iPads, allowing students to read stories on the iPad independently and answer questions on the iPad with teacher support. The researchers found that, when the intervention was repeated, students with autism were more successful with comprehension of texts when utilizing the iPad (Kahveci & Kara, 2023).

Combined Interventions

Often in teaching, a combination of interventions is effective in improving student outcomes (Fenty et al., 2015). El Zein, Gevarter, and colleagues (2016), to determine the intervention with the greatest outcome, compared the use of iPads in an intervention to the use of a teacher directed intervention and found that both produced gains in overall reading comprehension. In their study, El Zein and colleagues utilized an alternating treatments design that was implemented in 35-minute daily sessions where the researchers utilized a graphic organizer of "wh" questions for teacher-led lessons and an iPad intervention focused on identifying main idea with three 9- and 10-year-old students. The authors noted that the use of teacher-directed interventions was overall

more successful in producing consistent growth than the iPad interventions, although both produced positive gains (El Zein, Gevarter, et al., 2016).

This study aimed to address the need for research in intervention methods utilized for teaching reading comprehension skills to students with autism (Flores et al., 2013; Knight et al., 2018; El Zein et al., 2016). The purpose of this study was to determine what strategies teachers reported utilizing most frequently and effectively to teach reading comprehension to students with autism. The researcher focused on teachers' use of both teacher-led and technology-based interventions and the benefits and drawbacks of each method.

CHAPTER III – METHODS

In order to identify teacher's experiences and preferences when providing reading comprehension interventions through teacher-led or technology-based methods for students with autism, the researcher conducted a study utilizing a mixed-methods design. The mixed-methods design allowed the researcher to collect both qualitative and quantitative data and derive the benefits of both while mitigating the negative results of conducting either study alone (Newman & Houchins, 2018; Hitchcock et al., 2018). For this study, the researcher conducted a survey identifying teacher reported effective teaching methods as well as semi-structured interviews focused on specific teacher experiences in teaching reading comprehension utilizing both teacher-led and technology-based interventions. All methods were approved by the Institutional Review Board of the University of Southern Mississippi. See Appendix A for approval letter from the Institutional Review Board of the University of Southern Mississippi.

Survey

The researcher conducted a survey through Qualtrics, collecting data that included teacher demographics, preferences, and classroom composition at the beginning of the survey. The purpose of this survey was to identify the strategies, teacher-led or technology-based, that teachers reported utilizing most frequently as well as which strategies teachers most preferred. It also sought to identify teachers' experiences with student performance when utilizing each strategy for reading comprehension instruction. To be included in the study, participants were required to teach reading/ELA for a portion of the day and were required to teach at least one student with autism. Anyone who did not meet these criteria, even if they completed the survey, was excluded.

Recruitment Procedures

Teachers for this study were recruited utilizing convenience sampling. The researcher targeted participation from a minimum of 50 and maximum of 100 participants. Emails were sent to the Special Education Directors at all 137 public school districts in the state of Mississippi. See Appendix B for the sample letter to directors. Directors' email contact information was identified through district and/or state websites with the request to forward to the appropriate teacher(s) within their district. After two weeks, a follow-up letter was sent to special education directors in each district. See Appendix C for the sample follow-up letter to directors. After two additional weeks, a letter was sent to Mississippi Professional Educators with a request to distribute the survey. See Appendix D for the sample letter to Mississippi Professional Educators.

Participants

Fifty-one special education teachers recruited from K-12 public schools in Mississippi met the inclusionary criteria and completed the survey. Of the 51 respondents, 29 respondents had been teaching 10 or more years, comprising over 57% of the participants. Two respondents, comprising 4% of the respondents, had been teaching less than two years. The remaining 39% of the respondents had been teaching between two and ten years. 47% of educators noted having an undergraduate degree in education, while 53% noted not having an undergraduate degree in education. 51% of the respondents, or 26 respondents, had an undergraduate or graduate degree in special education whereas 49%, or 25 respondents reported that they did not have an undergraduate or graduate degree in special education. Of the 51 respondents, 14

respondents, or 27% of respondents, highest degree earned was an undergraduate degree. The remaining 73% of respondents had obtained a master's or specialist degree.

Of the 51 respondents, six respondents had one to five students in their classrooms. A total of 22 respondents had six to ten students in their classroom. A total of 13 respondents had 11 to 15 students in their classroom and the remaining 10 respondents had more than 15 students in their classroom. Of the 51 respondents, 37 respondents had only one to three students with autism in their classroom and 13 respondents had four to six students with autism in their classroom. One teacher had seven or more students with autism in their classroom.

Of the 51 respondents who completed the survey, 34 stated that they had computers for students in their classrooms. Thirty teachers noted that they had one-to-one technology for students in their classrooms. The majority of teachers surveyed, 42 of 51, noted having smartboards in their classrooms. All teachers who completed the survey noted having at least one type of classroom technology available for instruction, with 45 teachers noting availability of 2 or more types of technology available. Demographic data from the 51 initial respondents is shown in Appendix E.

Survey Description and Administration

The researcher developed a survey utilizing literature on reading comprehension interventions as a foundation. Appendix F provides a list of the statements as well as the literature to which the statement is aligned. The purpose of the survey was to identify the strategies teachers reported utilizing effectively to teach reading comprehension to students with autism as well as identify the outcomes of students as reported by teachers with each strategy. The survey also aimed to identify teacher preferences between both

teacher-led instruction and technology-based instruction. Additionally, the survey collected demographic information to ensure those completing the survey met inclusionary criteria for the study and to provide descriptive information regarding participants, particularly experience level and classroom demographics. The survey was designed to identify level of agreement to statements related to teachers' views on how students perform with different teaching methods, the level of confidence teachers have in providing instruction, and teacher preferences. Appendix G provides a copy of the survey, including all demographic data.

Survey statements were developed following a review of relevant literature to identify teacher preferences and confidence level with instructional methods, whether teacher-led or technology-based. Statements were also developed from the literature to identify teacher experiences of student performance utilizing teacher-led, technology-based, or combined methods of instruction. The survey was administered utilizing Qualtrics. A Likert scale of 1-5 was utilized to determine level of agreement to a series of statements (Kusmaryono et al., 2022). A 5-point Likert scale was utilized, as odd-numbered scales are found to be more effective in ensuring reliability and validity in responses (Kusmaryono et al., 2022).

Emails were sent to special education directors in Mississippi and were forwarded to relevant special education teachers with a request to participate. Teachers who received the email requesting participation were directed to the survey link via Qualtrics where a letter of consent was first agreed to prior to completing the survey. No personally identifying information was requested from survey participants. Initial respondents who did not agree to the consent letter were redirected to the end of the survey without

responding to any demographic or survey statements. Inclusionary criteria to participate in survey included teaching reading/ELA to students with autism as well as having a valid teaching license with a special education endorsement. Individuals who did not answer "yes" to those identifiers at the start of the survey were directed to the end of the survey without responding to survey statements and any responses provided were excluded. See Appendix H for the Informed Consent for survey participation. Anonymity was guaranteed through the Qualtrics™ survey and information regarding anonymity was clarified in the consent letter.

At the end of eight weeks, 78 individuals responded to the survey. Of the 78 initial respondents, one did not consent to complete the survey. Of the 77 that consented, 61 met the inclusion criteria of teaching students with autism and teaching reading for a portion of the school day. Three of the 61 individuals who met inclusion criteria discontinued the survey after answering three demographic data questions. Of the 58 remaining, only 56 met the inclusion criteria of having a license in one of the Special Education endorsement areas. Two additional individuals dropped at this section of the survey, after answering four demographic data questions. A total of 54 respondents answered all seven demographic questions of the survey. Of the 54 participants who responded to the demographic data, 51 participants completed the remaining questions in the survey. One of the 51 participants did not enter a response for to two questions within the survey. Of the 20 statements in the survey, one of the statements had creator-errors in answer choices that invalidated scoring. This statement was discarded leaving 19 statements for analysis.

Survey Data Analysis

Following survey data collection, survey data was analyzed to determine level of agreement for each key topic. To analyze survey data, the surveys were first sorted by question. For each question, the total number of 1s, 2s, 3s, 4s, and 5s were counted and a percentage for each response was identified, completed automatically by Qualtrics™. The researcher utilized the Qualtrics™ data to calculate the mean score for each question to identify overall level of agreement with each statement, with scores closer to 5 indicating a high levels of agreement and scores closer to 1 indicating high levels of disagreement. Median scores were identified for each question, allowing the researcher to view the skew of the data, as the median score indicated whether the overall response was positive or negative. The mode was identified for each response to further verify how most participants responded. After calculating overall response mean, median, and mode, the questions were sorted based on level of agreement. Questions were identified as belonging to one of three categories: experiences with teacher-led interventions, experiences with technology-based interventions, and overall experiences. Mean scores, median scores, and the mode scores were compared between questions to allow the researcher to view overall reported experiences and views of teachers.

To address reliability and validity, a 5-point Likert scale was utilized. (Kusmaryono et al. 2022). Questions were reviewed by a special educator to ensure clarity and understanding prior to beginning the survey. The researcher assessed face validity through the peer review to ensure statements were aligned and addressed intended topics (Kazdin, 2021).

Semi-Structured Interviews

Semi-structured interviews were designed to identify which of the strategies, teacher-led or technology-based, teachers reported utilizing most effectively to teach reading comprehension to students with autism (Barriball & While, 1994). Additionally, the researcher wanted to explore teachers experiences with the benefits and drawbacks of each method. The researcher conducted interviews through Zoom to identify teachers' views on the instructional methods that work most effectively to teach reading comprehension to students with autism. Teachers volunteered to participate in the interviews following completion of the survey and informed consent was provided to ensure risks and benefits were outlined prior to beginning interviews.

Recruitment

Participants were recruited through the survey tool. At the end of the survey, participants were asked to provide their name and contact information if they were willing to participate in a Zoom interview. Four individuals initially responded to the survey indicating a willingness to participate in an interview following the first survey email request. Four additional individuals responded indicating willingness to participate in an interview following the follow-up survey request. All eight individuals were contacted. Of the eight contacted, six responded and agreed to interviews. Two additional participants indicated willingness to participate in an interview following the final survey request but were not contacted. Participants were special education teachers from K-12 public schools in Mississippi. To be included in the study, participants were required teach students with autism and to teach ELA/reading for at least a portion of the day. Participants who agreed to participate were provided an Informed Consent for

Participation that both informed participants of the purpose of the interviews as well as outlined the risks and benefits of participation. Signatures were obtained via DocuSign™ noting agreement to participate. See Appendix I for Informed Consent for Participation.

Participants

Five special education teachers participated in interviews. T1 participant had between 2 and 5 years of experience in the classroom held a Master's degree. T2 had between 2 and 5 years of experience in the classroom had an undergraduate degree. T3 had 10 or more years of experience in the classroom held a Master's degree. T4 had 2 to 5 years of experience and held a Master's degree. T5 had 10 or more years of experience in the classroom and held a Master's degree. Three participants, T1, T2, and T3, had between 1 and 3 students with autism in their classrooms. Two participants, T4 and T5, had between 4 and 6 students with autism in their classrooms. See Appendix J for demographic data for interview participants.

Interview Description and Administration

Seven questions were developed by the researcher based on the literature reviewed and utilizing the topics of teacher-led and technology-based instruction for teaching reading comprehension to students with autism. The interview questions aimed to identify what strategies teachers reported utilizing to teach reading comprehension to students with autism, focusing on the benefits and drawbacks of both teacher-led and technology-based instruction. Appendix K provides a list of the questions that were asked of each participant.

The interview was conducted in a semi-structured format to allow participants opportunities to provide additional information that extended the findings from the

survey. The semi-structured format acted as a control, ensuring that all participants were provided the same questions while allowing for varied responses (Barriball & While, 1994). All participants were also provided the same follow-up question and given an opportunity to provide additional information they found relevant and appropriate.

The participant interviews were conducted over an eight-day period. The first interview did not record in Zoom due to user error and was utilized as a pilot interview. Interviewer notes were sent to the participant via email; however, the participant did not provide feedback nor any follow-up response. Data from this initial interview was not included in the analysis. All five of the remaining respondents consented and participated in interviews. Interviews were conducted via Zoom™ at a time preferred by the participant. Interviews ranged in length from 15 to 35 minutes. Each semi-structured interview was recorded via the Zoom™ recording feature. Following the interview, the researcher reviewed the Zoom™ recording of the interview. All interviews were recorded and transcripts auto-populated by Zoom™. Once interviews were completed, the researcher reviewed the Zoom™ auto-populated transcript and corrected any errors in transcription by listening to the interview while reviewing the transcript. The transcripts were then sent back to the respondents for member checking to ensure accuracy of the interview data (McKim, 2023).

Thematic Analysis

Utilizing the inductive thematic analysis approach, the researcher took the information gathered from semi-structured interviews and use that data to identify overall themes (Gaona et al., 2018). After transcripts were member-checked by participants, the transcriptions of the interviews were reviewed by the researcher and key phrases were

coded by topics identified in each of the interviews. The coding process was as follows: the researcher identified phrases or groups of phrases that appeared recurringly throughout the transcripts (Sharp & Sanders, 2019). After highlighting recurring words and phrases, the researcher grouped these into four emerging themes, *Controlling the Learning Environment, Student Frustration and Inattention, Student Independence,* and *Student Interaction and Engagement*. Under each theme, sub-themes were identified through specific phrases, words, or expressions of concepts. In *Controlling the Learning Environment*, the following sub-themes were identified: leading, redirecting, one-on-one, engaging, as well as ideas of teacher led motivation for classroom activities. In *Student Frustration/Inattention*, the following sub themes were identified: frustration, outbursts, behavior, struggles, and pressure. In *Student Independence*, the following sub-themes were identified: independence, and the idea of technology-use for assistance. In *Student Interaction and Engagement*, the following sub-themes were identified: hands-on learning, interactive/interacting, and active listening. All five interview transcripts were printed and labeled as follows: T1, T2, T3, T4, and T5. Transcripts were then color-coded based on key phrases. Figure A1 shows a sample of a coded interview transcript.

Once highlighted, the researcher coded each by the stated emerging themes. The highlighted points were sorted into an Excel spreadsheet by theme and themes were ranked based on the number of responses for each. Each phrase was color-coded as it was entered into the Excel file to correspond with transcript number. Transcript phrases were color-coded red. Transcript two phrases were color-coded blue. Transcript three phrases were color-coded yellow. Transcript four phrases were color-coded green. Transcript five phrases were color-coded orange. Figure A2 shows a sample of the key phrases sorted

into the Excel file. Overall, four main themes emerged across interviews of what teachers found to be most notable in teaching reading comprehension to students with autism.

Triangulation and Trustworthiness

To ensure trustworthiness in interview data analysis, the researcher conducted member checks (McKim, 2023), by having each interview participant review and validate their interview transcript. Once interviews were member-checked and approved, two interviews were sent to a committee member for independent coding for cross-checking purposes to ensure agreement in overall identification of themes. The researcher further ensured trustworthiness of research by triangulating the data from multiple interview participants (Patton, 1999).

CHAPTER IV – RESULTS

The focus of this study was to identify the strategies teachers report utilizing to implement reading comprehension interventions for students with autism, with particular focus on technology-based and teacher-led instruction and the benefits and drawbacks of both methods. The study also focused on the teachers' report of implementation efficacy and outcome effectiveness of reading comprehension strategies. The researcher conducted an initial survey of 51 teachers followed by interviews with a smaller sample of five teachers to collect this data. The results of the survey and interviews are presented below in two parts: survey and interview results.

Survey Results

The survey listed 19 statements focused on reading comprehension and technology use. Participants responded to each statement by selecting a rating in a 5-point Likert scale. Mean, median, and mode were calculated for the 51 survey responses and sorted based on the following categories of teacher-led instruction, technology-based instruction, and overall experiences to allow the researcher to identify the respondents' overall level of agreement with each statement. The mean, median, and mode scores are shown in Table A1 and scores ranked by mean are shown in Table A2. Statements related to overall confidence and confidence when using teacher-led instruction were found to be the most highly agreed upon by all respondents. Results are presented below according to the following topics, teacher-led instruction, technology-based instruction, and overall experiences. Mean scores higher than three indicated that respondents had high levels of agreement with the statement, with mean scores closer to five indicating higher levels of agreement. Mean scores lower than three indicated that respondents had high levels of

disagreement with the statement, with mean scores closer to one indicating higher levels of disagreement with the statement.

Teacher-Led Instruction

The statements, “my students work best with the teacher in a one-to-one setting” and “my students work best with the teacher in a small group setting” obtained mean scores of 4.68 and 4.58, respectively. The statement “I prefer pencil/paper activities to support reading instruction” obtained a mean score of 3.9. However, the statement “my students work best when allowed to work independently with a pencil and paper” obtained a mean score of 2.9, with a median score of 3 and a mode of 2.

Technology-Based Instruction

The statements “I prefer using the computer or iPad to teach reading comprehension” and “My students learn best when allowed to work independently on a technology-based lesson” obtained the lowest mean scores, with scores of 2.88. The statement “I feel confident providing my students with computer-led reading instruction” obtained a mean score of 3.88 and a median and mode score of 4. The statement “I feel confident providing my students with computer-based activities to support reading instruction” obtained a score of 4.16 with median and mode scores of 5.

Overall Experiences

The statement “my students work best when given visual supports” obtained the highest average score, with a mean score of 4.74 with both a median and mode score of 5. The statement “I prefer hands-on activities to teach reading instruction” obtained a mean score of 4.49 with a median and mode score of 5. “My students learn best when provided both technology-based and teacher-led instruction” obtained a mean score of 4.27 with

both a median and mode score of 5. The statement “I feel confident using a variety of methods to teach reading comprehension to students with autism” obtained a mean score of 3.94 and median and mode scores of 4. The statement “I feel confident teaching reading comprehension to students with autism” obtained a mean score of 3.73 and median and mode scores of 4.

Interview Thematic Results

Five interviews were conducted utilizing video conferencing on Zoom. Based on the thematic analysis of the interviews, the results are presented in order of prevalence as determined by frequency of statements identified related to each theme. The most prevalent theme identified through the thematic analysis was *Command of the Learning Environment*. The second most prevalent theme was *Student Frustration/Pressure.* The third most prevalent theme was *Student Independence*. The final theme identified was *Student Interaction*.

Command of the Learning Environment

The most prevalent theme, and the first theme to emerge, was that of the structure of the learning environment. All five participants provided at least one comment related to teacher’s *Command of the Learning Environment*. Overall, 10 statements were identified that related to the *Command of the Learning Environment*. *Command of the Learning Environment* was defined as measures taken by teachers to keep students focused and engaged as well as the responses of the students in response to that structure when working with teachers in a teacher-led activity. Both positive and negative aspects of a teacher-led learning environment were discussed.

"You know they don't like reading, so I kinda had to find ways to not only get them motivated and reading, but also that they'll be successful." (T1Participant)

"The benefits are avoiding distractions or avoiding a bunny trail… that's what I feel like is the benefit of me leading it. I can redirect easy." (T2 Participant)

"They struggle to focus and that brings in that one-on-one aspect. They often need more guidance" (T3 Participant)

"I can tell when they're not paying attention or I can tell when I've lost them. And I can kind of change my voice to get them back on track." (T4 Participant)

"I guess the biggest benefit (of teacher-led instruction) is the interaction with the students. You know, being able to, because typically I work, one-on-one, and I spend one-on-one time, 20 min with this student and then move to the next student. Read them a story ask those typically "wh" questions, who, what, when, where, why, and how." (T5 Participant)

Student Frustration/Inattention

The second theme to emerge was that of *Student Frustration* or pressure along with a struggle to attend to a task. Four of five participants noted, at least once, the presence of behaviors that are not conducive to the learning environment with a total of 7 statements directly related to frustration and inattention. This theme is defined by the unproductive responses or reactions students have to classroom challenges presented by the different teaching methodologies.

"The biggest challenge would be, for me, behavior…when they do not wanna do anything they will flat tell me they don't wanna do. Or, you know, they'll just have outbursts" (T1 Participant)

"I love what I do, I love it. It's hard. It's challenging. I wanna scream and pull my hair out some days, but I understand that they want to do the same. They want to pull their hair out and scream and go running off and never come back" (T2 Participant)

"Maybe you're not what shook up the Pepsi. You're just the tab that popped it." (T2 Participant)

"The biggest challenge is a lot of them also have ADHD and those that are not medicated with autism, it just presents a difficulty because they struggle to focus and that brings in that one-on-one aspect" (T3 Participant)

"There are times when they become bored or it's not something they want to do so they'll just completely disengage from the lesson. But other times, when it's teacher led, I'm able to structure it and section it in breaks that I know would help and be beneficial for them" (T4 Participant)

Student Independence

The third theme to emerge was that of *Student Independence*. Four of five participants discussed student independence with classroom activities with a total of 7 statements identified related to student independence. This theme is defined by the students need for support when utilizing different teaching methodologies, whether more or less support is needed. Additionally, it covers how students respond when given opportunities for independent learning.

"The benefit (of technology) is, if it can read the text for them. You know. even if they're reading like, I will suggest when it when you need help, and you have your

device talk for you. Read it, for you follow along. And I feel like that is a huge thing." (T2 Participant)

"You may highlight, kind of scaffold, the document and color code it with the question and that just like, allows them to find the answer within a time and then they highlight it and then they write their answer on the paper and that teaches them that foundational skill of looking into their passage for their answer." (T3 Participant)

"Using technology, using the iPads, or maybe they like put headphones on and do it themselves. It is much harder to see if they're still actively listening" (T4 Participant)

"Biggest drawback… typically technology has been used as a babysitter for these kids. So they go to YouTube, and they may play the same 15 second clip 50,000 times. But to get them to go to…I use Unique Learning. I use also use Google classroom. I also use Learning A to Z… to get them to go on there and choose that and complete the activities…Yeah. You got to stay on them. Otherwise they're out and into YouTube. So that's probably the biggest drawback. One of the positives though is that they are learning that technology can be used for more than just a 15 Second YouTube video clip." (T5 Participant)

Student Interaction and Engagement

The final theme to emerge was that of *Student Interaction and Engagement*. Four of five participants provided input as to *Student Interaction and Engagement* with a total of five statements focused primarily on interaction and engagement. This theme is defined by the positive and negative aspects of teacher led versus technology-based

learning with regards to the opportunities for students to interact with their learning environment, including social interaction with peers in the classroom learning environment as well as interaction with hands-on learning opportunities in the classroom setting and focuses more on students' ability to interact with or without direct teacher support.

> *"Well, they don't build the social (with technology led). It still is, kind of, like a catch. 22. They lack the skills of interacting with person to person. You know that that is a drawback. That is the plus and the drawback sometimes. and then is sometimes their preferred device, you know." (T2 Participant)*
>
> *"I'm trained in Orton Gillingham. I love love, love, love, love, Orton Gillingham for any student with disability in reading that hands-on aspect just changes the lives of many students. It does, and even if you do it in the simplest form of writing the sight words 3 times each and writing them in sand, or, you know. doing them on a magnetic letter board. That is it's a tremendous help for all of my students with disabilities, just anything hands-on" (T3 Participant)*
>
> *"And it's (highlighting) hands on. So they always like that." (T3 Participant)*

Outliers

Additional notable statements arose less frequently surrounding teaching reading comprehension to students with autism. These statements were unique to one participant.

> *"Reading as a whole has been a struggle just like for me personally, just because I again like I had no classes like I'm taking like a phonics course now to teach them. but I don't remember how I learned phonics, and so I can't teach them, and I had no classes, like all the classes that I had were focused on the different*

disabilities, and how you identify those. And they were focused on how to write an IEP. But they weren't focused necessarily on different strategies and interventions that you can use to teach a student. A certain thing. So reading has been a big struggle." (T4 Participant)

"I think the biggest thing is we have to teach them how to communicate. And I teach a middle school age range from seventh grade to ninth grade and the functional communication skills should be taught at the elementary level and it should move up with the kids." (T5 Participant)

Teacher Preferences

One additional focus of the interviews was that of teacher preference in teaching methodology. Teachers noted their preferences between teacher-led and technology-based instruction. All five participants answered the question and four of five elaborated on their reasoning for their decision.

"A little bit of both… I do not use iReady much in class and they use it in their general education class. So when they come to me, we don't really use that component. I use it for progress monitoring" *(T1 Participant)*

"I prefer teacher led" (T2 Participant)

"Honestly, I'm gonna have to go with a combination there. Because…I know that third grade Gate. My babies struggle with that, my inclusion babies struggle with that, so I know that they're gonna have to see that presented on a computer format." (T3 Participant)

"I think I prefer teacher led because I have seen it's easier, I feel like, to gauge when they disassociate. I can tell when they're not paying attention, or I can tell when I've lost them" (T4 Participant)

"My preference, because I'm old school, I'm old, is teacher led. However, I do find great benefit in utilizing technology." (T5 Participant)

CHAPTER V – DISCUSSION

The purpose of the study was to identify the strategies teachers utilize most to provide reading comprehension interventions to students with autism. Additionally, the researcher aimed to identify which type of intervention, teacher-led or technology-based, was utilized more frequently and what outcomes teachers reported when utilizing either type of intervention. Students with autism struggle with reading comprehension throughout school (Westerveld et al., 2017). Previous research has focused on specific intervention outcomes for students with autism (Drill & Bellini, 2022; Flores et al., 2013; Bethune & Wood, 2013; Carnahan and Williamson, 2016; El Zein, Solis, et al., 2016; El Zein, Gevarter, et al., 2016). However, in the review of the literature, no studies on teacher experiences with a variety of strategies, only studies that focused on specific intervention strategies, such as the use of visual supports (Bethune & Wood, 2013, Klieman et al., 2021).

Research has identified the benefits of teacher-led instruction, including visual supports, repeated reading, and guided practice (Drill & Bellini, 2022, Flores et al., 2013, Bethune & Wood, 2013, Carnahan & Williamson, 2016; Carnahan et al., 2016). Studies have also identified the benefits of technology-based instruction, including video self-modeling, digital texts, and specially designed reading programs found online (Egarr & Storey, 2021; Howorth & Raimondi, 2019; Macdonald et al., 2022). Additionally, Kahveci and Kara (2023) noted the benefits of including behavioral interventions to improve overall reading success. Previous research focused primarily on specific intervention methods. This study focused on teachers' reports of intervention strategies used to improve reading comprehension for students with autism. This study identified

teachers' confidence levels with different teaching strategies as well as preferences within the classroom.

Findings

The findings of this study support previous research regarding the benefits of both teacher-led and technology-based interventions as well as the benefits of a combination of interventions (El Zein, Gevarter, et al., 2016). The results of this study found that teachers are able to control the learning environment best when providing teacher-led instruction. Additionally, data indicated that teachers felt their students learned most effectively when provided teacher-led instruction, whether individually or in small groups.

Teacher Led Interventions

The findings of the study identified that teachers are most confident in their teaching practices when they are able to have *Command of the Learning Environment*. Both interviews and survey data identified that teachers feel they obtain the best results in reading comprehension instruction, when they are able to provide the structure from direct, teacher-led instruction. As stated in teacher interviews, students with autism often need more guidance and teachers feel they can redirect the students more easily when they are teaching in direct instruction (T2 and T3 Participants). This data supports the research of Yaghmour and Obaidat (2022), Bethune and Wood (2013), and Jackson and Hanline (2020) who all noted the benefits of providing direct instruction and found that a teacher-led intervention method produced positive results. Mean agreement with statements for direct instruction was positive for all statements related to teacher-led instruction was positively skewed with statements such as "My students work best with

the teacher in a one-to-one setting" obtaining mean scores of 4.68 with both median and mode scores of 5. The statement "my students work best when working with the teacher in a small group setting" obtained a mean score of 4.58 with both median and mode scores of 5. Research shows that working with students in one-to-one settings can significantly improve reading comprehension scores (Kim et al., 2018).

The T3 Participant noted the benefits of increasing independence with teaching students to highlight and color-code reading passages, providing students key skills to become more independent in their reading skills. The survey statement, "my students work best when given visual supports" was also positively skewed, indicating a strong agreement from most survey respondents, with a mean score of 4.74 and median and mode scores of 5. This data supports the research of Kim and colleagues (2018), who found that interventions, including visual cues such as highlighting key words, improved reading comprehension in individual settings. The survey statement, I feel confident using graphic organizers to teach reading comprehension, was also positively skewed, with a mean score of 3.94, and a median score of 4 with a mode of 5. This data supports the research of Bethune and Wood (2013) who found that students demonstrated significant growth using graphic organizers and that students also felt they were helpful.

Interview data from the T5 participant indicated that one method utilized with students that they found beneficial was reading a passage for the student then asking direct questions. This parallels the findings of Jackson and Hanline (2020), who found that asking direct "wh" questions after having a passage read aloud increased reading comprehension scores significantly. Another interview participant noted that the overall benefit of teacher-led instruction was the benefit of being able to motivate students in a

direct instruction setting to get them engaged (T1 Participant). T1 Participant also noted the need to use high interest activities to increase engagement. Survey data indicated that teachers feel confident using a variety of methods to teach reading comprehension to students with autism, with data positively skewed, with a mean of 3.94 and both median and mode scores of 4. This data supports the research of El Zein, Solis, and colleagues (2016) who noted that students performed significantly higher on reading comprehension activities when perseverative interests were included. It also supports the research of Solis and colleagues (2022), who also focused on engagement and the use of student interests to increase student outcomes.

Technology-Based Interventions

The survey statement "I feel confident providing my students with computer-led reading instruction" obtained a positively skewed result, with a mean score of 3.88 and median and mode scores of 4. Additionally, the statement "I feel confident providing my students with computer-based activities to support reading instruction" obtained a highly positive skew with a mean score of 4.16 with median and mode scores of 5. This supports prior research focused on the use of computer-based or iPad-based interventions (Egarr & Storey, 2021; Howorth & Raimondi, 2019; Macdonald et al., 2022).

Throughout the interviews, although teachers commented on their preference for the teacher-led approach while acknowledging the need for the inclusion of technology. As one interviewee noted, all major state-wide assessments are given on the computer and students with autism should be prepared in the same ways as their general education peers to face those challenges (T3 Participant). Additionally, it was noted throughout interviews that students often prefer working with technology-based lessons as it

decreases demands for social interaction and is a preferred activity (T2 Participant, T4 Participant, T5 Participant). This finding aligns with the research of Kahveci and Kara (2023) who found that the use of the iPad increased on-task behavior as it was preferred. This research also aligns with the research of Travers and colleagues (2011), who noted that students with autism are often highly interested in technology and that often ensures that instruction will be beneficial. Additionally, this data also supports the research of Macdonald, Luk, and Quintin, (2022), who found that the use of the iPad for instruction was also beneficial in increasing reading skills.

The survey statement "my students work best when allowed to work independently on a pencil and paper activity" obtained a slightly negative mean score, with a score of 2.9 and a neutral skew with both median and mode scores of 3. The survey statement, "my students work best when allowed to work independently on a technology-based lesson" also obtained a slightly negative mean score, with a score of 2.88 and a neutral skew with both median and mode scores of 3. Interview participants noted concerns with providing students opportunities for independent time on the computer, noting concerns of inattention and off-task behaviors (T3 Participant, T4 Participant, T5 Participant). These findings indicate that technology-based interventions are best provided when students are given close supervision and behavioral supports to improve off-task behaviors, such as the use of perseverative interests to increase engagement as noted in El Zein (2016) and colleagues' research.

Combined Interventions

Throughout the interviews, teachers noted that they utilized progress monitoring via technology-based instruction as well as through teacher-led instruction. Neither

practice was noted to have a greater outcome based on teacher interviews. It was noted, however, that teacher-led instruction allowed for more awareness of student engagement and that technology-based instruction allowed for more independence in learning activities. This supports the research of Kahveci and Kara (2023) focused on an iPad intervention to increase reading comprehension skills after first giving students assessments with pencil and paper and noted that iPad instruction increased scores on pencil and paper activities but utilized direct instruction to implement the intervention. These findings also support the research of El Zein and colleagues (2016) who used both graphic organizers with teacher-led instruction and iPad interventions to achieve student growth in reading comprehension.

Limitations

There are several limitations to this study. The primary limitation is the small sample size and geographical range, as the sample of 51 survey respondents and 5 interview participants is comprised of only Mississippi teachers from public schools. The small sample size of only 51 survey respondents did not allow for statistical analysis that might have ruled out all threats to validity within survey design and responses. Although data was collected determining teachers' years of experience, no data was collected related to age of respondents. This omission in data collection presents a limitation as it prevented the researcher from being able to determine if there was a correlation in teacher preferences for either direct instruction or technology relative to age.

An additional limitation is that item analysis was not completed for each survey question to ensure item validity. Also, the attrition rate from the beginning of demographic data collection through the completion of the survey was problematic.

Inclusion criteria may have also limited responses as some teachers are in the classroom on emergency licenses and were excluded from participation due to not having appropriate licensure. Finally, as the researcher only sent emails to the Special Education Director for each district, some teachers may not have received the opportunity to participate, at the director's discretion.

Implications for Practice

The findings of this study are among the first to assess teacher perceptions for teaching reading comprehension to students with autism. Previous research has focused on one or more specific intervention method and has focused more on student outcomes (Bethune & Wood, 2013; Jackson & Hanline, 2020; El Zein, 2016; Yaghmour & Obaidat, 2022; Kim et al., 2018; Solis, et al., 2022).

The findings of this study suggest that teacher-led instruction is preferred to technology-based instruction and that teachers experience greater benefit from utilizing teacher-led instruction methods. Research has found that teacher-led instruction produces consistent positive outcomes (Flores & Ganz, 2007; Drill & Bellini, 2022; Flores et al., 2013; Bethune & Wood, 2013; Carnahan & Williamson, 2016; Carnahan et al., 2016; Turner, Remington, & Hill, 2017). These findings suggest that teachers should employ a variety of direct instruction methods to provide reading comprehension to their students with autism, including the use of graphic organizers and visual supports.

Further, the findings indicate that technology-based instruction is beneficial when provided within structured learning settings (Howorth & Raimondi, 2019l Egarr & Storey, 2021; Macdonald, Luk, & Quintin, 2022; Kahveci & Kara, 2023). Inattention and perseverative interests factor into student outcomes as well (El Zein et al., 2016; Solis et

al., 2021; Solis et al., 2022). These findings suggest that perseverative interests should be included in reading comprehension interventions for students with autism when possible, to increase engagement.

The findings of this study indicate that teacher experiences of student outcomes for students with autism are higher when provided direct instruction in one-to-one or small group settings. Research supports this finding, as Kim and colleagues (2018) found improvements in scores through direct instruction in a one-to-one setting. This finding supports need for opportunities to be embedded into the teachers' schedule to allow for small group and one-to-one instruction opportunities.

Additionally, findings indicate that teachers feel confident in teaching students with autism but less confident in teaching reading comprehension skills to students with autism. Research has found that students with autism often present with deficits that impact their ability to acquire reading comprehension skills and require specialized instruction to remediate these deficits (Armstrong & Hughes, 2012, Travers et al., 2011). These findings indicate that supports are needed to ensure that teachers have adequate training and materials to provide appropriate reading comprehension instruction.

Implications for Future Research

There are several implications for future research. Research with a larger sample size would be beneficial to identify the areas where teachers are most confident and where more training and instruction is needed as this study consisted of only 51 survey respondents and five interview participants. Additionally, of the 51 respondents, 25 respondents identified not having either an undergraduate or a graduate degree in special education. This indicates that 49% of respondents obtained licensure in special education

through alternate routes. As research indicates that teachers trained through alternate routes lack appropriate training, additional research is needed to identify whether those trained alternately felt more or less prepared relative to their traditionally trained peers (Bruno et al., 2018).

Additional research is also needed in providing reading comprehension interventions within an inclusion setting as teachers' responses focused primarily on instruction in the resource or self-contained classroom in both small group and one-to-one settings (T1 Participant, T2 Participant, T3 Participant, T4 Participant, T5 Participant). Existing literature also focused primarily on small group or individual settings outside of the inclusion setting (Flores et al., 2013; Bethune & Wood, 2013; Carnahan & Williamson, 2016; Kim et al., 2018; Singh et al., 2017). Expanding to different types of service delivery would be useful to fully understand reading instruction delivery for these students.

Future research in the areas of effective technology-based instruction for students with autism who also present with behavioral deficits, to include inattention and off-task behaviors, is needed. This research should focus on addressing the impacts of behavioral deficits in maintaining engagement with instructional lessons, as interview participants noted inattention and negative behaviors impacting student learning. Interview participants also noted the use of specific strategies to improve behavior and allow the student to refocus on lessons, such as the use of first-then strategies or mirroring techniques (T1 Participant, T2 Participant, T3 Participant, T4 Participant, T5 Participant). Previous studies have examined specific interventions, including video modeling, relative to certain behavioral deficits and teaching reading comprehension. However, more

research is needed, particularly focusing on various strategies that allow for a return to learning activities (El Zein, Gevarter, et al., 2016; Solis et al., 2021; Solis et al., 2022)

As 72% of survey respondents possessed at least a master's degree and 57% had been teaching for 10 years or more, it is worth consideration that the data collected may be slightly skewed based on the responses of experienced teachers. One interview participant, who noted that she had been in education less than 5 years, commented on her lack of experience and training in teaching reading and noted that she needed more training (T4 Participant). Future research, focusing on the differences in teaching reading comprehension to students with autism for those who have more years in education versus those who are in their first few years of teaching would be beneficial. This data would help better guide principals and special education directors in identifying the appropriate trainings needed for inexperienced teachers of students with autism.

Additionally, future research in the area of teacher preferences and experiences would also be beneficial taking into account teachers' age. Research including this area would allow researchers to determine if younger teachers, who have had more access to technology throughout their own school experiences, feel differently than older teachers, who, as one interview participant noted, are often "old school" in their preferences for teaching interventions (Torff & Kimmons, 2021; T5 participant).

In addition, future research should be considered in the area of additional sources of technology available for student use. This study only focused on classroom technology including computers, iPads, smartboards, and individual student Augmentative and Alternative Communication (AAC) devices. Additional research, focused on the integration of other technology such as Artificial Intelligence (AI) or Virtual Reality

(VR) would be beneficial. Previous research notes students are often more interested in technology (Solis et al. 2021, El Zein, Solis, et al. 2016). Interview participants also noted that students often prefer technology (T2 Participant, T4 Participant, T5 Participant). Research focused on integration of VR into reading comprehension interventions could be beneficial as VR is an immersive experience and would also allow educators the opportunity to provide instruction in perseverative interests (Walstra et al., 2024).

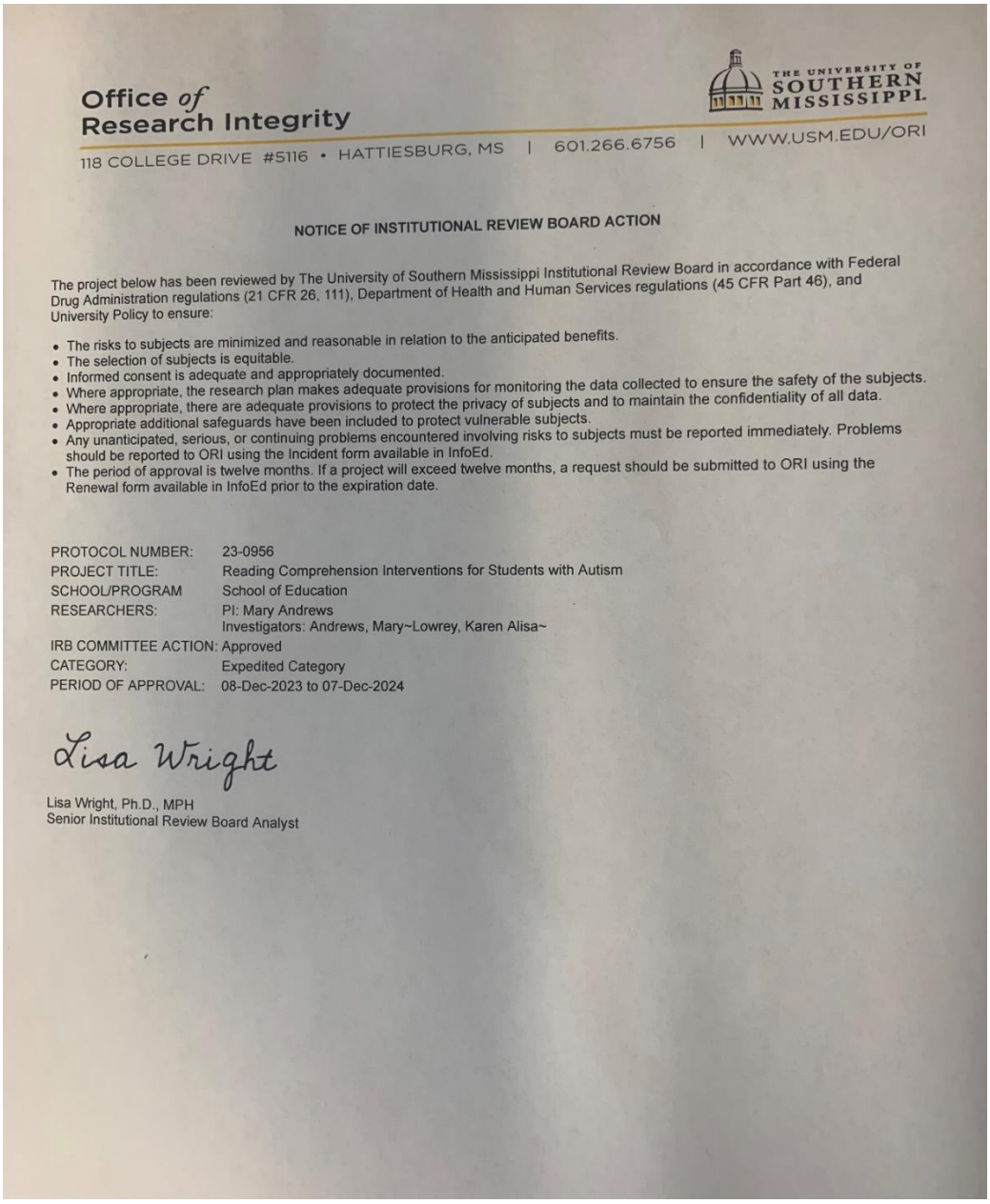
Conclusion

Previous research supports the need for small group and one-to-one instruction for these students to acquire new skills as most growth was consistent when students were instructed in small group settings (Bethune & Wood, 2013; Jackson & Hanline, 2020; Kim et al., 2018). The results of this study indicate that teachers feel most confident teaching students with autism when they feel they can control the learning environment to ensure that students are able to attend to task. The results of this study also indicate that technology use can also be beneficial when provided with support, which aligns to previous research in the use of technology for teaching reading comprehension (Howorth & Raimondi, 2019; Kahveci & Kara, 2023; Macdonald et al., 2022).

Although this study consisted of a small sample size, the findings of this study can be used to inform teachers entering the field of special education of beneficial practices for teaching reading comprehension to students with autism. The research can also be used to inform administrators and other stakeholders of areas where additional supports are needed for teaching reading comprehension to students with autism. Future research is suggested in this area, focused on a larger sample size from a broader location

range to further investigate the benefits and drawbacks of teacher-led and technology-based reading comprehension interventions for students with autism.

APPENDIX A – IRB Approval



Office *of*
Research Integrity

THE UNIVERSITY OF SOUTHERN MISSISSIPPI

118 COLLEGE DRIVE #5116 • HATTIESBURG, MS | 601.266.6756 | WWW.USM.EDU/ORI

NOTICE OF INSTITUTIONAL REVIEW BOARD ACTION

The project below has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services regulations (45 CFR Part 46), and University Policy to ensure:

- The risks to subjects are minimized and reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered involving risks to subjects must be reported immediately. Problems should be reported to ORI using the Incident form available in InfoEd.
- The period of approval is twelve months. If a project will exceed twelve months, a request should be submitted to ORI using the Renewal form available in InfoEd prior to the expiration date.

PROTOCOL NUMBER:	23-0956
PROJECT TITLE:	Reading Comprehension Interventions for Students with Autism
SCHOOL/PROGRAM	School of Education
RESEARCHERS:	PI: Mary Andrews Investigators: Andrews, Mary~Lowrey, Karen Alisa~
IRB COMMITTEE ACTION:	Approved
CATEGORY:	Expedited Category
PERIOD OF APPROVAL:	08-Dec-2023 to 07-Dec-2024

Lisa Wright

Lisa Wright, Ph.D., MPH
Senior Institutional Review Board Analyst

APPENDIX B – Initial Recruitment Letter

Dear Special Education Director,

My name is Mary Whitley Andrews. I am a PhD candidate in the Special Education Department at the University of Southern Mississippi. I am currently working on my dissertation identifying the strategies utilized by teachers to provide reading comprehension instruction to students with autism. I would very much appreciate your help in gathering data. If you will, please forward the survey link below to your special education teachers who teach students with autism and teach or co-teach reading/ELA for a portion of the day.

https://usmep.co1.qualtrics.com/jfe/form/SV_bOOcmkdvUS6FYHA

The researcher requests non-identifying demographic information, such as age-range of students, approximate class size, and approximate number of students with autism on caseload. No signatures are required for participation nor will any identifying information be linked to survey responses unless participants choose to self-identify for participation in a follow-up interview.

A summary of the results of the survey will be provided upon request upon completion of the study. Your assistance is greatly appreciated. Please reach out with any questions, comments, or concerns at mary.c.andrews@usm.edu.

Thank you,

Mary Andrews

Participant's Assurance: This project and this consent form have been reviewed by the Institutional Review Board, Proposal # 23-0956, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research participant should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5125, Hattiesburg, MS 39406-0001, 601-266-5997

APPENDIX C – Follow Up Letter

Dear Special Education Director,

I hope this email finds you well. I am following up to my previous email from [date]. My name is Mary Whitley Andrews and I am a PhD candidate in the Special Education Department at the University of Southern Mississippi. As previously stated, I am currently working on my dissertation identifying the strategies utilized by teachers to provide reading comprehension instruction to students with autism. I would very much appreciate your help in gathering data. If you will, please forward the survey link below to your special education teachers who teach students with autism and teach or co-teach reading for a portion of the day.

https://usmep.co1.qualtrics.com/jfe/form/SV_bOOcmkdvUS6FYHA

A summary of the results of the survey will be provided upon request upon completion of the study. Your assistance is greatly appreciated. Please reach out with any questions, comments, or concerns at mary.c.andrews@usm.edu.

Thank you,

Mary Andrews

Participant's Assurance: This project and this consent form have been reviewed by the Institutional Review Board, Proposal # 23-0956, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research participant should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5125, Hattiesburg, MS 39406-0001, 601-266-5997

APPENDIX D – Mississippi Professional Educators Request Letter

Dear Mississippi Professional Educators Director,

My name is Mary Whitley Andrews. I am a PhD candidate in the Special Education Department at the University of Southern Mississippi. I am currently working on my dissertation identifying the strategies utilized by teachers to provide reading comprehension instruction to students with autism. I would very much appreciate your help in gathering data. If you will, please share the attached notice through your email listserv.

The researcher requests non-identifying demographic information, such as age-range of students, approximate class size, and approximate number of students with autism on caseload. No signatures are required for participation nor will any identifying information be linked to survey responses unless participants choose to self-identify for participation in a follow-up interview.

Your assistance is greatly appreciated. Please reach out with any questions, comments, or concerns at mary.c.andrews@usm.edu.

Thank you,

Mary Andrews

Participant's Assurance: This project and this consent form have been reviewed by the Institutional Review Board, Proposal # 23-0956, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research participant should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5125, Hattiesburg, MS 39406-0001, 601-266-5997

APPENDIX E – Survey Demographics

Variable	Frequency	%
Total Years Teaching		
Less than Two Years	2	4%
Two to Five Years	12	23%
Six to Ten Years	8	16%
Ten or More Years	29	57%
Undergraduate Degree in Education		
Yes	24	47%
No	27	53%
Undergraduate or Graduate Degree in Special Education		
Yes	26	51%
No	25	49%
Highest Degree Earned		
Undergraduate Degree	14	27%
Master's Degree	29	57%
Specialist Degree	8	16%
Doctoral Degree	0	0%
Number of Students in Classroom		
1-5	6	12%
6-10	22	43%
11-15	13	25%

More than 15	10	20%
Number of Students with Autism in Classroom		
1-3	37	73%
4-6	13	25%
7 or More	1	2%
Technology in Classroom (CHECK ALL THAT APPLY)		
Computers available for Student Use	34	67%
One-to-One Technology	30	59%
iPads for Student Use	17	33%
Smartboards	42	82%
Individual Student AAC Devices	5	10%

APPENDIX F – Survey Literature Alignment

Connections to Literature	
I have adequate resources to teach reading comprehension to students with autism.	Hunt, et al., 2022 Nation, Clark, Wright, and Williams, 2006 Macdonald, Luk & Quintin, 2022
I feel confident teaching students with reading comprehension deficits.	Solis et al., 2021
I feel confident teaching students with autism.	Solis et al., 2021
I feel confident teaching reading comprehension to students with autism.	Solis et al., 2022
I feel confident using a variety of methods to teach reading comprehension to students with autism.	El Zein, Gevarter, et al., 2016
I feel confident using graphic organizers to teach reading comprehension.	Bethune & Wood, 2013 Carnahan & Williamson, 2016
I feel confident using visual supports with my students to teach reading comprehension.	Bethune & Wood, 2013 Carnahan & Williamson, 2016 Carnahan et al., 2016 Kahveci & Kara, 2023
I feel confident providing my students with computer-based activities to support reading instruction.	Kahveci & Kara, 2023
I feel confident providing my students with computer-led reading instruction.	El Zein, Gevarter et al., 2016
I prefer using the computer or iPad to teach reading comprehension.	El Zein, Gevarter et al., 2016
I prefer to allow my students to work independently on technology-based activities to complete reading activities.	El Zein, Gevarter et al., 2016
I prefer hands-on activities to teach reading comprehension.	Bethune & Wood, 2013 Kahveci & Kara, 2023
I prefer pencil/paper activities to support reading comprehension instruction.	Carnahan & Williamson, 2016
My students learn best when provided both technology-based and teacher-led instruction in reading.	Solis et al., 2021 Newman & Houchins, 2018
My students learn best when allowed to work independently on a technology-based lesson.	El Zein, Gevarter, et al., 2016

My students learn best when given visual supports.	Bethune & Wood, 2013
My students learn best when working with the teacher in a one-to-one setting.	Bethune & Wood, 2013
My students learn best when working with the teacher in a small group setting.	Flores et al., 2013

APPENDIX G – Survey Questions

Reading Comprehension Interventions for Students with Autism Survey

Directions: Please answer the following questions about your classroom. Select the most appropriate response.

1. How many years have you been teaching?
   ( ) Less than 2 years
   ( ) Two to Five Years
   ( ) Six to Ten Years
   ( ) Ten or More Years

2. Do you have an undergraduate degree in Education?
   ( ) No
   ( ) Yes

3. Do you have an undergraduate or graduate degree in Special Education?

   ( ) No
   ( ) Yes

4. What is your highest degree earned?
   ( ) Undergraduate Degree
   ( ) Master's Degree
   ( ) Specialist Degree
   ( ) Doctoral Degree

5. How many students are in your class?

   ( ) 1 – 5
   ( ) 6 – 10
   ( ) 11 – 15
   ( ) 16 or more

6. How many students have a diagnosis of Autism in your classroom?
   ( ) 1 – 3
   ( ) 4 – 6
   ( ) 7 – 9
   ( ) 10 or more

7. What technology do you have available in your classroom? Check all that apply.

   ( ) Computers available for classroom use
   ( ) One-to-one technology
   ( ) iPads for student use
   ( ) Smartboards
   ( ) Individual student AAC devices

Please rate the following statements based on your level of agreement with each.

1 = Strongly Disagree
2 = Somewhat Disagree
3 = Neutral
4 = Somewhat Agree
5 = Strongly Agree

I have adequate resources to teach reading comprehension to students with autism.	**1**	**2**	**3**	**4**	**5**
I feel confident teaching students with reading comprehension deficits.	**1**	**2**	**3**	**4**	**5**
I feel confident teaching students with autism.	**1**	**2**	**3**	**4**	**5**
I feel confident teaching reading comprehension to students with autism.	**1**	**2**	**3**	**4**	**5**
I feel confident using a variety of methods to teach reading comprehension to students with autism.	**1**	**2**	**3**	**4**	**5**
I feel confident using graphic organizers to teach reading comprehension.	**1**	**2**	**3**	**4**	**5**
I feel confident using visual supports with my students to teach reading comprehension.	**1**	**2**	**3**	**4**	**5**
I feel confident providing my students with computer-based activities to support reading instruction.	**1**	**2**	**3**	**4**	**5**
I feel confident providing my students with computer-led reading instruction.	**1**	**2**	**3**	**4**	**5**
I prefer using the computer or iPad to teach reading comprehension.	**1**	**2**	**3**	**4**	**5**
I prefer to allow my students to work independently on technology-based activities to complete reading activities.	**1**	**2**	**3**	**4**	**5**
I prefer hands-on activities to teach reading comprehension.	**1**	**2**	**3**	**4**	**5**

I prefer pencil/paper activities to support reading comprehension instruction.	**1**	**2**	**3**	**4**	**5**
My students learn best when provided both technology-based and teacher-led instruction in reading.	**1**	**2**	**3**	**4**	**5**
My students learn best when allowed to work independently on a technology-based lesson.	**1**	**2**	**3**	**4**	**5**
My students learn best when allowed to work independently on a pencil and paper activity.	**1**	**2**	**3**	**4**	**5**
My students learn best when given visual supports.	**1**	**2**	**3**	**4**	**5**
My students learn best when working with the teacher in a one-to-one setting.	**1**	**2**	**3**	**4**	**5**
My students learn best when working with the teacher in a small group setting.	**1**	**2**	**3**	**4**	**5**
My students learn best when working in peer-assisted learning groups.	**1**	**2**	**3**	**4**	**5**

APPENDIX H – Survey Consent

Survey Consent

I am asking you to participate in a research study titled Reading Comprehension Interventions for Students with Autism. I will describe this study to you and answer any of your questions. This study is being led by Mary Andrews, from the Special Education Department at The University of Southern Mississippi. The Faculty Advisor for this study is Alisa Lowrey, Special Education Department at The University of Southern Mississippi. This study has been approved by USM's Institutional Review Board (IRB protocol #23-0956).

1. Purpose: The purpose of this study is to identify the interventions that are most frequently and effectively utilized within the classroom to teach reading comprehension to students with autism, as defined by IDEA 2004. Research in teaching reading comprehension skills for students with autism is limited (Flores et al., 2013; Knight, Blacher, & Eisenhower, 2018). Westerveld and colleagues (2017) noted that studies have concluded that students with autism struggle with reading comprehension skills throughout school. It is important to understand the interventions that are being utilized with success by teachers within classrooms (Burke et al., 2016; Filderman et al., 2022) As reading comprehension is vital to success throughout school and life, effective interventions are needed for these students with autism and reading comprehension difficulties (Grindle et al., 2020). This research will be beneficial in increasing teacher knowledge of effective practices within the classroom.

2. Description of Study: Consenting participants will be special education teachers who teach reading/ELA for at least a portion of the day and who have at least one student with an eligibility of autism, as defined by IDEA, on caseload. Participants will be asked to respond to 20 statements using a Likert scale of agreement. The survey will aim to identify what interventions, teacher-led or technology-based are most frequently and effectively utilized within the classroom.

3. Benefits: Participants in this study will be contributing to the body of knowledge of teaching students with an IDEA eligibility of autism in the area of reading comprehension. Participants will also be sharing their knowledge and skills with the larger special education community.

4. Risks and Discomforts: While expected risks for survey participation are minimal, participants may feel some discomfort in reflecting on teaching practices and experiences. Participants may discontinue participation at any time. If at any time during or after participation, you experience discomfort requiring support, you may call the Mississippi Department of Mental Health Helpline at 1-877-210-8513 or the National Mental Health Hotline at 1-866-903-3787, free of charge.

5. Privacy/Confidentiality/Data Security: No personally identifying information will be

collected through the surveys unless participants self-report willingness to participate in the follow-up interview. For those participants, please note that email communication is neither private nor secure. Though I am taking precautions to protect your privacy, you should be aware that information sent through e-mail could be read by a third party. Your confidentiality will be kept to the degree permitted by the technology being used. We cannot guarantee against interception of data sent via the internet by third parties.

6. Alternative Procedures: There are no alternative procedures. Participation is voluntary and any participant who wishes to discontinue participation may do so at any time.

7. Participant's Assurance: The main researcher conducting this study is Mary Andrews, a graduate student at The University of Southern Mississippi. Please ask any questions you may have by contacting Mary Andrews at mary.c.andrews@usm.edu or at (662)213-7535. This project and this consent form have been approved by The University of Southern Mississippi's Institutional Review Board, which ensures that research projects involving human subjects follow federal regulations. If you have any questions or concerns regarding your rights as a subject in this study, you may contact the Institutional Review Board (IRB) by phone at 601-266-5997 or by mail at: Chair of the Institutional Review Board The University of Southern Mississippi 118 College Dr. #5116 Hattiesburg, MS 39406 Statement of Consent I have read the above information, and have received answers to any questions I asked. I consent to take part in the study.

APPENDIX I – Online Informed Consent for Interviews

ONLINE INFORMED CONSENT

Today's date:12/1/2023		
Project Title: Reading Comprehension Interventions for Students with Autism		
Protocol Number: 23-0956		
Principal Investigator: Mary Andrews	Phone: (662)213-7535	Email: mary.c.andrews@usm.edu
College: Education and Human Sciences	School and Program: Education	

I am asking you to participate in a research study titled Reading Comprehension Interventions for Students with Autism. I will describe this study to you and answer any of your questions. This study is being led by Mary Andrews, from the Special Education Department at The University of Southern Mississippi. The Faculty Advisor for this study is Alisa Lowrey, Special Education Department at The University of Southern Mississippi. This study has been approved by USM's Institutional Review Board (IRB protocol #23-0956).

1. **Purpose:**
   The purpose of this study is to identify the interventions that are most frequently and effectively utilized within the classroom to teach reading comprehension to students with autism, as defined by IDEA. Research in teaching reading comprehension skills for students with autism is limited (Flores et al., 2013; Knight, Blacher, & Eisenhower, 2018). Westerveld and colleagues (2017) noted that studies have concluded that students with autism spectrum disorder struggle with reading comprehension skills throughout school. It is important to understand the

interventions that are being utilized with success by teachers within classrooms (Burke, Hsieh, Lopez-Reyna, & Servilio, 2016; Filderman et al., 2022) As reading comprehension is vital to success throughout school and life, effective interventions are needed for these students with autism spectrum disorder and reading comprehension difficulties (Grindle et al., 2020). This research will be beneficial in increasing teacher knowledge of effective practices within the classroom.

2. **Description of Study:**
   A semi-structured interview will be conducted with consenting participants. Participants must be special education teachers who teach reading/ELA for at least a portion of the day and who have at least one student with autism, as defined by IDEA, on caseload. The interview will be conducted via Zoom and will be recorded for data collection purposes only. Qualitative data will be collected through this recording process and ensuing transcripts. The participants will be asked 7 open-ended questions regarding classroom experiences teaching reading comprehension to students with autism. After the interview is complete, the researcher will review the Zoom transcription of the interview. Transcripts will then be member-checked to increase trustworthiness. Participants will be able to review transcripts and add information but will not be permitted to remove information. Digital copies of transcripts will be stored on a password-protected USB drive and digitally shredded once project is completed. After transcripts are member-checked and approved by participants, Zoom session videos will be deleted.

3. **Benefits:**
   Participants in this study will be contributing to the body of knowledge of teaching students with an IDEA eligibility of autism in the area of reading comprehension. Participants will also be sharing their knowledge and skills with the larger special education community.

4. **Risks and Discomforts:**
   While expected risks for interview participation are also minimal, interview participants may feel some discomfort in reflecting on teaching practices and experiences. The discomfort should be minimal. To mitigate risks, all data collected will be stored in a secure location. Additionally, participants do not have to utilize cameras during zoom sessions if they choose not to do so. Once the interview is completed, the researcher will provide the participant with a transcript of the interview. The participant will have the opportunity to edit transcripts to add any additional explanation. However, the participant will not be permitted to delete information. All transcripts will be coded with no personally identifying information on the transcript. All efforts will be made to minimize discomfort and risk during the interview process.

5. **Privacy/Confidentiality/Data Security:**

Zoom sessions will be deleted after approval of transcripts by participants. Interview transcripts will be coded to protect identity of participant. Participants will have the opportunity to edit transcript to add any additional **i**nformation. All data will be kept on a password protected USB drive and will be digitally shredded once project is completed.

We will do our best to keep your participation in this research study confidential to the extent permitted by law; however, it is possible that other people may need to review the research records and may find out about your participation in this study. For example, the following people/groups may check and copy records about this research:

- The Office for Human Research Protections in the U. S. Department of Health and Human Services
- The University of Southern Mississippi's Institutional Review Board (a committee that reviews and approves research studies) and the Office for Research Integrity

Please note that email communication is neither private nor secure. Though I am taking precautions to protect your privacy, you should be aware that information sent through e-mail could be read by a third party.

Your confidentiality will be kept to the degree permitted by the technology being used. We cannot guarantee against interception of data sent via the internet by third parties.

6. Alternative Procedures:

There are no alternative procedures. Participation is voluntary and any participant who wishes to discontinue participation may do so at any time.

7. Participant's Assurance:

The main researcher conducting this study is Mary Andrews, a graduate student at The University of Southern Mississippi. Please ask any questions you may have by contacting Mary Andrews at mary.c.andrews@usm.edu or at (662)213-7535.

This project and this consent form have been approved by The University of Southern Mississippi's Institutional Review Board, which ensures that research projects involving human subjects follow federal regulations. If you have any questions or concerns regarding your rights as a subject in this study, you may contact the Institutional Review Board (IRB) by phone at 601-266-5997 or by mail at:

Chair of the Institutional Review Board
The University of Southern Mississippi
118 College Dr. #5116
Hattiesburg, MS 39406

Statement of Consent

I have read the above information and have received answers to any questions I asked. I consent to take part in the study.

APPENDIX J – Demographic Data for Interview Participants

Variable	Frequency	%
Total Years Teaching		
Less than Two Years	0	0%
Two to Five Years	2	40%
Six to Ten Years	0	0%
Ten or More Years	3	60%
Undergraduate Degree in Education		
Yes	3	60%
No	2	40%
Undergraduate or Graduate Degree in Special Education		
Yes	3	60%
No	2	40%
Highest Degree Earned		
Undergraduate Degree	1	20%
Master's Degree	4	80%
Specialist Degree	0	0%
Doctoral Degree	0	0%
Number of Students in Classroom		
1-5	0	0%
6-10	1	20%
11-15	3	60%

More than 15	1	20%
Number of Students with Autism in Classroom		
1-3	3	60%
4-6	2	40%
7 or More	0	0%
Technology in Classroom (CHECK ALL THAT APPLY)		
Computers available for Student Use	4	80%
One-to-One Technology	4	80%
iPads for Student Use	3	60%
Smartboards	4	80%
Individual Student AAC Devices	2	40%

APPENDIX K – Semi-Structured Interview Questions

Semi-Structured Interview Questions

Thank you for agreeing to participate in the interview. This interview will be recorded. Within the next two weeks, you will receive a copy of the transcript of today's interview. Please review the interview transcript. You may make any additions at this time. You may not, however, remove any statements from the interview transcript. If a statement is transcribed incorrectly, please note the corrections. If at any point in the interview, you need to take a break, you may do so. Additionally, you may stop the interview completely at any time if you experience any discomfort. Thank you again for your time today.

1. What strategies do you use in the classroom to teach reading comprehension skills to your students, particularly those with autism?

2. When utilizing teacher-led reading comprehension interventions, what do you find to be the benefits? What do you find to be the drawbacks?

3. When utilizing technology-based reading comprehension interventions, what do you find to be the benefits? What do you find to be the drawbacks?

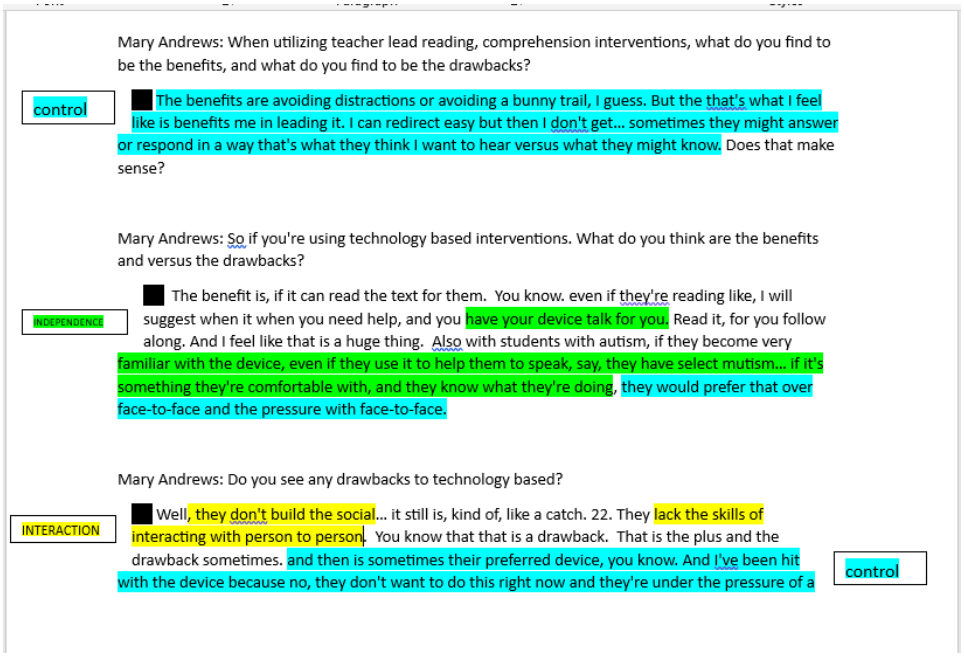
4. What is the biggest challenge teaching reading to students with autism? What strategies have you utilized to address those challenges?

5. Do you prefer teacher-led instruction or technology-based instruction when teaching reading comprehension skills or a combination of both?

6. How do you assess the effectiveness of the strategies you utilize in your classroom?

7. Do you have any additional information that you would like to share about your experiences providing reading comprehension interventions to students with autism?

Figure A1. – *Coded Transcript*



Mary Andrews: When utilizing teacher lead reading, comprehension interventions, what do you find to be the benefits, and what do you find to be the drawbacks?

control

[redacted] The benefits are avoiding distractions or avoiding a bunny trail, I guess. But the that's what I feel like is benefits me in leading it. I can redirect easy but then I don't get... sometimes they might answer or respond in a way that's what they think I want to hear versus what they might know. Does that make sense?

Mary Andrews: So if you're using technology based interventions. What do you think are the benefits and versus the drawbacks?

INDEPENDENCE

[redacted] The benefit is, if it can read the text for them. You know. even if they're reading like, I will suggest when it when you need help, and you have your device talk for you. Read it, for you follow along. And I feel like that is a huge thing. Also with students with autism, if they become very familiar with the device, even if they use it to help them to speak, say, they have select mutism... if it's something they're comfortable with, and they know what they're doing, they would prefer that over face-to-face and the pressure with face-to-face.

Mary Andrews: Do you see any drawbacks to technology based?

INTERACTION

[redacted] Well, they don't build the social... it still is, kind of, like a catch. 22. They lack the skills of interacting with person to person. You know that that is a drawback. That is the plus and the drawback sometimes. and then is sometimes their preferred device, you know. And I've been hit with the device because no, they don't want to do this right now and they're under the pressure of a

control

Figure A2. – *Coded Excel File*

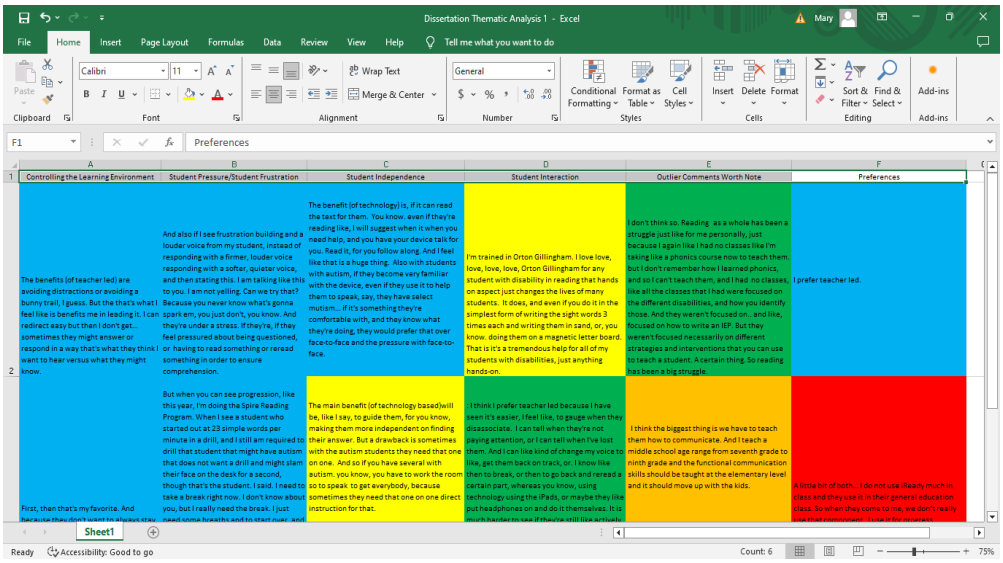


Table A1. – *Mean, Median, & Mode for Survey*

Statement	*Mean*	*Median*	*Mode*
I have adequate resources to teach reading comprehension to students with autism.	3.69	4	5
I feel confident teaching students with reading comprehension deficits.	3.98	4	4
I feel confident teaching students with autism.	4.06	4	4
I feel confident teaching reading comprehension to students with autism.	3.73	4	4
I feel confident using a variety of methods to teach reading comprehension to students with autism.	3.94	4	4
I feel confident using graphic organizers to teach reading comprehension.	3.94	4	5
I feel confident providing my students with computer-based activities to support reading instruction.	4.16	5	5
I feel confident providing my students with computer-led reading instruction.	3.88	4	4
I prefer using the computer or iPad to teach reading comprehension.	2.88	3	3
I prefer to allow my students to work independently on technology-based activities to complete reading activities.	3.18	3	3
I prefer hands-on activities to teach reading comprehension.	4.49	5	5
I prefer pencil/paper activities to support reading comprehension instruction.	3.90	4	5
My students learn best when provided both technology-based and teacher-led instruction in reading.	4.27	5	5

My students learn best when allowed to work independently on a technology-based lesson.	2.88	3	3
My students learn best when allowed to work independently on a pencil and paper activity.	**2.9	3	2
My students work best when given visual supports.	**4.74	5	5
My students work best when working with the teacher in a one-to-one setting.	4.68	5	5
My students work best when working with the teacher in a small group setting.	4.58	5	5
My students work best when working in peer assisted learning groups.	3.20	3	4/2

** = *one respondent omitted question –numbers based on 50 total respondents.*

Table A2. – *Ranked Means*

Statement	Mean Level of Agreement
My students work best when given visual supports.	4.74
My students work best with the teacher in a one-to-one setting	4.68
My students work best when working with the teacher in a small group setting.	4.58
I prefer hands-on activities to teach reading comprehension.	4.49
My students learn best when provided both technology-based and teacher led instruction in reading.	4.27
I feel confident providing my students with computer-based activities to support reading instruction.	4.16
I feel confident teaching students with autism.	4.06
I feel confident teaching students with reading comprehension deficits.	3.98
I feel confident using a variety of methods to teach reading comprehension to students with autism.	3.94
I feel confident using graphic organizers to teach reading comprehension.	3.94
I prefer pencil/paper activities to support reading comprehension instruction.	3.90
I feel confident providing my students with computer-led reading instruction.	3.88
I feel confident teaching reading comprehension to students with autism	3.73
I have adequate resources to teach reading comprehension to students with autism	3.69
My students learn best when working in peer-assisted learning groups.	3.20
I prefer to allow my students to work independently on technology-based activities to complete reading activities.	3.18
My students learn best when allowed to work independently on a pencil and paper activity	2.9
I prefer using the computer or iPad to teach reading comprehension	2.88
My students learn best when allowed to work independently on a technology-based lesson	2.88

REFERENCES

Arcuili, J. & Bailey, B. (2021) The promise of comprehensive early reading instruction for children with autism and recommendations for future directions. *Language, Speech, and Hearing Services, 52*, 225-238.

Armstrong, T. K., & Hughes, M. T. (2012). Exploring computer and storybook interventions for children with high functioning autism. *International Journal of Special Education, 27,* 88-99.

Barriball, K. L. & While, A. (1994). Collecting data using a semi-structured interview: a discussion paper. *Journal of Advanced Nursing, 19,* 328-335.

Bethune, K. S., & Wood, C. L. (2013). Effects of Wh-Question Graphic Organizers on Reading Comprehension Skills of Students with Autism Spectrum Disorders. Education and Training in Autism and Developmental Disabilities, 48(2), 236–244.

Browder, D. M., Root, J. R., Wood, L., & Allison, C. (2017). Effects of story-mapping procedure using the iPad on the comprehension of narrative texts by students with autism spectrum disorder. *Focus on Autism and Developmental Disabilities, 32*(4), 243-255.

Bruno, L. P., Scott, L. A., & Willis, C. (2018). A survey of alternative and traditional special education teachers' perceptions of preparedness. *International Journal of Special Education, 33*(2), 295-312.

Burke, L., Hsieh, W. Y., Lopez-Reyna, N., & Servilio, K. (2016). Teaching reading comprehension to students with autism spectrum disorders in social studies

classrooms: middle school teacher perceptions. *Journal of the American Academy of Special Education Professionals,* 60-78.

Carnahan, C. R. & Williamson, P. (2016). Systematically teaching students with autism spectrum disorder about expository text structures. *Intervention in School and Clinic 51*(5), 293-300.

Carnahan, C. R., Williamson, P., Birri, N., Swoboda, C., & Snyder, K.K. (2016). Increasing comprehension of expository science text for students with autism spectrum disorder. *Focus on Autism and Other Developmental Disabilities, 31*(3), 208-220.

Centers for Disease Control and Prevention (2023). Autism Spectrum Disorder. Retrieved from https://www.cdc.gov/ncbddd/autism/index.html.

Chia, N.K.H. & Kee, N. K. N. (2013). Effectiveness of scaffolding interrogatives method: Teaching reading comprehension to young children with hyperlexia in Singapore. *The Journal of the International Association of Special Education, 14*(1), 67-78

Davidson, M. M., Kaushanskaya, M., & Weismer, S. E. (2018). Reading comprehension in children with and without ASD: the role of word reading, oral language, and working memory. *Journal of Autism and Developmental Disorders, 48,* 3524-3541.

Drill, R. B. & Bellini, S. (2022). Combining readers theater, story mapping, and video self-modeling interventions to improve narrative reading comprehension in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 52*(1), 1-15.

Egarr, R. & Storey, C. (2022). Model teachers or model students? A comparison of video modeling interventions for improving reading fluency and comprehension for children with autism. *Journal of Autism and Developmental Disorders, 52,* 3366-3382.

El Zein, F., Solis, M., Lang, R., & Kim, M. K. (2016). Embedding perseverative interest of a child with autism in text may result in improved reading comprehension: A pilot study. Developmental Neurorehabilitation, 19(3), 141–145.

El Zein, F. E., Gevarter, C., Bryant, B., Son, S. H., Bryant, D., Kim, M., & Solis, M. (2016). A comparison between iPad-assisted and teacher-directed reading instruction for students with autism spectrum disorder (ASD). *Journal of Developmental and Physical Disabilities*, *28,* 195-215.

Engel, K. S. & Ehri, L. C. (2021). Reading comprehension instruction for young students with autism: Forming contextual connections. *Journal of Autism and Developmental Disorders, 51,* 1266-1280.

Fenty, N., Mulcahy, C. & Washburn, E. (2015). Effects of computer-assisted and teacher-led fluency instruction on students at risk for reading failure. *Learning Disabilities: A Contemporary Journal 13*(2), 141-156.

Filderman, M. J., Austin, C. R., Boucher, A. N., O'Donnell, K. & Swanson, E. A. (2022) A meta-analysis of the effects of reading comprehension interventions on reading comprehension outcomes of struggling readers in third through 12th grades. *Exceptional Children, 88*(2), 163-184.

Flores, M. M. & Ganz, J. B. (2007). Effectiveness of direct instruction for teaching statement inference, use of facts, and analogies to students with developmental disabilities and reading delays. Focus on Autism and Developmental Disabilities, 22(4), 244-251.

Flores, M. M., Nelson, C., Hinton, V., Franklin, T. M., Strozier, S. D., Terry, L., & Franklin, S. (2013). Teaching reading comprehension and language skills to students with autism spectrum disorders and developmental disabilities using direct instruction. Education and Training in Autism and Developmental Disabilities, 48(1), 41–48.

Gaona, C., Palikara, O., & Castro, S. (2018). 'I'm ready for a new chapter.' The voices of young people with autism spectrum disorder in transition to post-16 education and employment. *British Educational Research Journal, 45*(2), 340-355.

Grindle, C., Kurzeja, O., Tyler, E., Saville, M., Hughes, J. C., Hastings, R. P., & Brown, F. J. (2020). Teaching children with autism reading comprehension skills using online reading instruction: preliminary evaluation of Headsprout Reading Comprehension. *Journal of International Special Needs Education, 23*(1), 1-12.

Head, C. N., Flores, M. M., & Shippen, M. E. (2018). Effects of direct instruction on reading comprehension for individuals with autism or developmental disabilities. Education and Training in Autism and Developmental Disabilities, 53(2), 176-191.

Hitchcock, J. H., Johnson, R. B., Schoonenboom, J. (2018). Idiographic and nomothetic causal inference in special education research and practice: mixed methods perspectives. *Research in the Schools, 25*(2), 56-67.

Howard, J. S. (1984). A review of theory of instruction by Seigfried Engelmann and Douglas Carnine. *The Behavior Analyst, 7*(2), 340-355.

Howorth, S. K., & Raimondi, S. (2019). Effects of TWA-supported digitally on comprehension of students with autism spectrum disorder, level 1. *Journal of Special Education Technology, 34*(3), 162-175.

Hunt, P., Mortier, K., Aramburo, C., Fleming, D., & Balasubramanian, L. (2022). Identifying commonly used literacy instructional practices for students with extensive support needs: Implications from a control group analysis, *Education and Training in Autism and Developmental Disabilities, 57*(3), 272-286

Individuals with Disabilities Education Act. (2020, March 3). OSEP fast facts: Children identified with autism.

Isik, A. D. (2023). Reading environment and fluent reading skills. *Pedagogical Research, 8*(1), 1-9.

Jackson, E. M. & Hanline, M. F. (2020). Using a concept map with RECALL to increase comprehension of science texts for students with autism. *Focus on Autism and Other Developmental Disabilities, 35*(2), 90-100.

Kahveci, G., & Kara, D. N. (2023). The effect of the use of assistive technology on reading comprehension in students with autism spectrum disorder. *International Online Journal of Education and teaching (IOJET), 10*(3). 2154-2165.

Kazdin, A. E. (2021). Single-case research designs: Methods for clinical and applied settings. Oxford University Press.

Kim, J. S., Burkhauser, M. A., Relyea, J. E., Gilbert, J. B., Scherer, E., Fitzgerald, J., Mosher, D., & McIntyre, J. (2023). A longitudinal randomized trial of sustained

content literacy intervention from first to second grade: transfer effects on students' reading comprehension. *Journal of Educational Psychology, 115*(1), 73-98.

Knight, E., Blacher, J., Eisenhower, A. (2019). Predicting reading comprehension in young children with autism spectrum disorders. *School Psychology 34*(2), 168-177.

Kliemann, K. R., Boesch, M. C., & Lindo, E. J. (2021). Answering "Wh"-questions with the support of graphic organizers: effects on 8th graders with autism spectrum disorder. *Journal of the American Academy of Special Education Professionals*, 89–109.

Kusmaryono, I., Wijayanti, D., & Maharani, H.R. (2022). Number of response options, reliability, validity, & potential bias in the use of the Likert scale education and social science research: a literature review. *International Journal of Educational Methodology, 8*(4), 625-637.

Lo, J. Y., & Shum, K. K. (2021). Brief report: A randomized controlled trial of the effects of RECALL (reading to engage children with autism in language and learning) for preschoolers with autism spectrum disorder, *Journal of Autism and Developmental Disorders, 51,* 2146-2154.

Maenner M. J., Warren Z. , Williams A. R., Amoakohene, E., Bakian, A. V., Bilder, D. A., Durkin, M. S., Fitzgerald, R. T., Furnier, S. M., Hughes, M. M., Ladd Acosta, C. M., McArthur, D., Pas, E. T., Salinas, A., Vehorn, A., Williams, S., Esler, A., Grzybowski, A., Hall-Lande, J., …Shaw, K. A. (2023) Prevalence and characteristics of autism spectrum disorder among children aged 8 years- Autism

and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2020. *MMWR Surveillance Summary*, 72(2), 1–14

Macdonald, D., Luk, G., Quintin, E. M. (2021) Early reading comprehension intervention for preschoolers with autism spectrum disorder and hyperlexia. *Journal of Autism and Developmental Disorders, 51*(5), 1598-1612.

McKim, C. Meaningful member-checking: a structured approach to member checking. *American Journal of Qualitative Research, 7*(2), 41-52.

Nation, K., Clarke, P., Wright, B. & Williams, C. (2006). Patterns of reading ability in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 36*, 911-919.

Newman, I. & Houchins, D. E. (2018). Conceptualizing mixed methods questions in special education research. *Research in the Schools, 25*(2), 23-33.

Office of Special Education and Rehabilitative Services (2023). 44th Annual Report to Congress on the Implementation of the Individuals with Disabilities Act, 2022. United States Department of Education.

Patton, M. Q. (1999). Enhancing the quality and credibility of qualitative analysis. *Health Service Research, 34*(5), 1189-1208.

Plavnick, J. B. & Ferreri, S. J., (2013). Single-case experimental designs in educational research: a methodology for causal analyses in teaching and learning, *Educational Psychology Review, 25*, 549-569.

Roycroft, H. (2015). Autism spectrum disorder and reading comprehension: Challenges and implications in the primary school. *Journal of Special Needs Education in Ireland, 29*(1), 55-65.

Saletta, M., Kaldenberg, E., Rivera, K. & Wood, A. (2019). Do illustrations promote reading comprehension in adults with intellectual and developmental disabilities? *Education and Training in Autism and Developmental Disabilities, 54*(3), 225-236.

Scharp, K. M. & Sanders, M. L. (2019). What is a theme? Teaching thematic analysis in qualitative communication research methods. *Communication Teacher 33*(2), 117-121.

Singh, B. D., Moore, D. W., Furlonger, B. E., Anderson, A., Busacca, M. C., & English, D. L. (2017). Teaching reading comprehension skills to a child with autism using behavior skills training, *Journal of Autism and Developmental Disorders, 47*n 3049-4055.

Solis, M., Reutebuch, C. K., Falcomata, T., Jimenez, Z., Cravahlo, D. (2022). Reading intervention for students with ASD in middle grades: an alternating treatment study of embedded interests reading expository text conditions. *Developmental Neurorehabilitation, 25*(1), 45-58.

Solis, M., Reutebuch, C. K., Falcomata, T., Steinle, P. K., Miller, V. L., & Vaughan, S. (2021). Vocabulary and main idea reading intervention using text choice to improve content knowledge and reading comprehension of adolescents with autism spectrum disorder. *Behavior Modification, 45*(1), 1-43.

Torff, B & Kimmons, K. (2021). Learning to be a responsive, authoritative teacher: effects of experience and age on teachers' interactional styles. *Educational Forum 85*(1), 77-88.

Travers, J., Higgins, K., Pierce, T., Boone, R., Miller, S., & Tandy, R. (2011) Emergent literacy skills of preschool students with autism: a comparison of teacher-led and computer-assisted instruction. *Educational Training in Autism and Developmental Disabilities 46*(3), 326-338.

Turner, H., Remington, A. & Hill, V. (2017). Developing an intervention to improve reading comprehension for children and young children with autism spectrum disorders. Educational and Child Psychology, 34(2), 13-26.

Walstra, K. A., Cronje, J., & Vandeyar, T. (2024). A review of virtual reality from primary teachers' perspectives. *Electronic Journal of E-Learning, 22*(3), 1-11.

Westerveld, M., Paynter, J., Trembath, D., Webster, A., Hodge, A., & Roberts, J. (2017). The Emergent Literacy Skills of Preschool Children with Autism Spectrum Disorder. Journal of Autism & Developmental Disorders, 47(2), 424–438.

Williamson, P., Carnahan, C. R., & Jacobs, J. A. (2012). Reading Comprehension Profiles of High-Functioning Students on the Autism Spectrum: A Grounded Theory. Exceptional Children, 78(4), 449–469.

Yaghmour, K. S., & Obaidat, L. T. (2022). The Effectiveness of Using Direct Instruction in Teaching Comprehension Skill of Third-Grade Students. International Journal of Instruction, 15(2), 373–392.