



A Literature Review:

Reading comprehension strategies or interventions for students with Autism Spectrum Disorder

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Abstract: As more and more students with autism or pervasive developmental delay are integrated and mainstreamed into the general education curriculum, teachers are faced with the issue of individualizing for this population. The realm of reading is particularly challenging and in particular, reading comprehension. This paper reviews some of the past endeavors in this realm, that is enhancing reading comprehension within a certain population and the issues involved in the assessment of reading comprehension.

Keywords: Reading, reading comprehension, autism, pervasive developmental delay.

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Review of Literature

This literature review focuses on reading comprehension strategies or interventions involving students with Autism Spectrum Disorder. Reading comprehension is essential to almost every aspect of academics, even math requires reading comprehension. There are gaps in this area due to minimal understanding as to why ASD students struggle with comprehension, limited research, and word calling being taken as comprehension or understanding. Teaching reading comprehension is a normal part of education, but teaching this to students on the spectrum can be slightly more difficult, since individuals with autism exhibit a detail-focused cognitive style of processing information that overlooks connections and shows weak central coherence (Engel & Ehri, 2020). With the growing demand in this area, it is crucial for educators and researchers to continue to investigate strategies or interventions that target enhancing reading comprehension in students with Autism Spectrum Disorder.

Reading Comprehension Instruction for Young Students with Autism: Forming Contextual Connections

Purpose and Population

Engel and Ehri's (2020) study was to find instructional interventions to facilitate student's use of comprehension strategies. Participants were from two New York City schools, retaining a diagnosis of autism, in first and second grade, English proficient, and an average range of vocabulary knowledge.

Procedure and Intervention Method

Using quantitative data from pre and post-test from three subtests of the WRMT-R; Word Identification, Word Attack, and the Passage Comprehension. The Peabody Picture Vocabulary Test for receptive vocabulary and Fountas and Pinnell Reading

Comprehension Assessment were also used (pg. 1269). Control group participants received three, 20-30 minutes of small group instruction sessions over a six week period, in which they engaged in play-based activities. The coherence group received six intervention session, consisting of two students. Instructors provided explicit instruction, encouraged students to stop and think, and utilized thinking questions with visuals. Each week targeted a strategy to build contextual connections; ambiguous words and sentences, detecting matches and mismatches using homographs, anaphor resolution: people and objects, story sequencing with and without illustrations, retelling stories using sequence words, and making casual inferences in stories (pg. 1271-1272).

Findings/Conclusion/Limitations/Implications

The coherence group showed significant improvement in their quality of retelling narratives, but there was no data to support improvements in the other areas of reading comprehension. It is clear from this study that more research needs to be conducted the area of Reading Comprehension in students with Autism Spectrum Disorder. This study was limited by the size of the participant group and the length of the intervention. Changes to these areas could render different results. Engel and Ehri point out that reading comprehension for students with Autism Spectrum Disorder is limited and more research is needed.

Examining Teachers Practices: Enhancing Reading Comprehension for Students with Autism Spectrum Disorder

Purpose and Population

Braun and Hughes (2020) research targeted two main questions. What practices and instructional activities do special education teachers with ASD students grades 4-8 implement during comprehension instruction and how do they individualize those

practices to support students with ASD (pg. 292)? Participants included four special education teachers, in their fifth year of teaching and each holding a Masters in Special Education. Student participants criteria: diagnosed with ASD, grades 4-8, received specialized reading services, and at least two reading levels behind grade level peers (pg. 292).

Procedure and Intervention Method

Qualitative data was collected through observations and interviews. Teachers underwent six formal observation and at least three information visits over six to nine weeks. An adapted version of the Instructional Content Emphasis-Revised was used during formal observations to record and code teachers' literacy instruction (pg. 292). Informal visits focused on teaching practices regarding the focal students.

Findings/Conclusion/Limitations/Implications

Braun and Hughes (2020) found, all four teachers showed main areas of focus for comprehension to be vocabulary/oral language, predicting/prior knowledge, and comprehension monitoring (pgs. 294-295).

Braun and Hughes (2020) concluded that reading comprehension is complex and though teachers are knowledgeable, they struggle with implementation of practices with ASD students (pg. 302). Implications demonstrate a need for targeted trainings, support, ways of assessing, and individualizing instruction for ASD students. The study suggest that practices should be embedded into education programs to ensure teachers are prepared to provide explicit instruction for ASD students (303).

Reading Comprehension Interventions for Students with Autism Spectrum Disorders: A Synthesis of Research

Purpose and Population information

This research study looked at multiple reading comprehension interventions for students with ASD. Zein et al. (2014) researched how effective reading comprehension interventions are in improving reading comprehension outcomes for students identified with ASD. Since this was a synthesis of other research, they narrowed the field to twelve studies, using the following criteria. Studies targeted reading comprehension interventions in a quasi-experimental, single subject manner. Participants were in grades K-12 and 50% of the students had to have a diagnosis of autism, Asperger's, or Pervasive Developmental Disorder.

Procedure and Intervention Method

To assess the data from all twelve studies Zein et al. (2014) coded the data, participants, evidence, etc. to allow for evaluation. Quantitative and qualitative data was shown depending on the intervention. Duration of intervention ranged from 15-60 minutes and contained 9-65 session. One study held one sixty-minute intervention. Four studies focused on strategy instruction: scaffolding, reciprocal questioning, SCORE. Two studies on anaphoric cueing: prereading, questions, and cloze completion. Explicit instruction was researched by three of the studies and the final group of three, researched student grouping practices, cooperative learning groups and class wide peer tutoring.

Findings/Conclusion/Limitations/Implications

Zein et al. synthesis found that instructional interventions for student comprehension may improve reading comprehension in

students with ASD. More rigorous research to enhance reading comprehension in ASD students is in high need. Future research should target areas affecting reading comprehension in students with ASD.

The Effectiveness of Direct Instruction in Teaching Students with Autism Spectrum Disorder to Answer "Wh-" Questions

Purpose and Population information

Cadette et al. (2016) conducted research on Direct Instruction (DI) in a group format regarding its impact on acquisition and maintenance of answering "Wh-" questions. Participants were three high school students who received instruction in self-contained classrooms, scored less than 50% on who, what, where questions, and passed the first portion of the Science Research Associates Reading Mastery Signature Edition: SRA DI (2970).

Procedure and Intervention Method

Pre and post-test data from the WH Question Comprehension Test was utilized, at weeks 2 and 4 following DI. Cadette et al. (2016) used scripted SRA lessons, consisting of basic actions, description of objects, information and background knowledge, instructional words and problem-solving concepts, classifications, and problem-solving concepts and applications. During lessons, books were presented to students, verbal cues were provided, references to pictures, students were asked question related to the target skill, and given hand signal to cue responses. Feedback for responses were given immediately, verbal praise for correct responses and modeling for incorrect responses (2972).

Findings/Conclusion/Limitations/Implications

Cadette et al. (2016) found that Direct Instruction improved participants ability to answer "who" and "what" questions and were able to maintain growth at the 2- and 4-week post assessments, but still struggled with "where" questions, possibly due to inaccurate use of prepositions. Direct Instruction could be an effective intervention for ASD students especially in extremely small group settings. Limitation for the study include; modification made to lesson curriculum, limited participants, and generalizing their use of question types to different people or other instructional materials.

Teaching Reading Comprehension and Language Skills to Students with Autism Spectrum Disorders and Developmental Disabilities Using Direct Instruction

Purpose and Population information

Flores et al. (2013) research tested the results of direction instruction comprehension and language programs for students with autism spectrum disorder and developmental delays. Participants in grades one through seven were given the Corrective Reading Comprehension: A Thinking Basics (CR) placement test. Eighteen male students scored in the appropriate range, seven were determined to be Language Learners, thus two groups were formed. Seven students diagnosed with ASD and four with DD (pg. 43).

Procedure and Intervention Method

Homogeneous groups were formed for instruction sessions based on CR data. Instructors met with students five days a week for thirty minutes. The eleven receiving CR instruction received lessons in appropriate use of terms, classifications of

objects, deductive reasoning, statement inferences, using facts to provide evidence, and general information. Feedback was given immediately, through modeling, leading, and independent student responses (pg. 44). Flores et al. (2013) used quantitative data collected at three points in the lessons; the first CR, then after 2 weeks, a modified test covering only completed lessons, and finally the CR mastery test without modification.

Findings/Conclusion/Limitations/Implications

Flores et al. (2013) study indicated that the direct instruction method made a significant impact on student growth (pg. 46). This study supported previous studies on direct instruction and this intervention supports ASD students with reading comprehension. Flores et al. (2013) points out that ASD students can succeed in both group and one-on-one instructions, but sustained attention is required. Time restraints limited this study and further research should be done to compare this intervention to others.

Enhancing Reading Comprehension Among Students with High-Functioning Autism Spectrum Disorder: A Randomized Pilot Study

Purpose and Population information

Roux et al. (2015) tests the hypothesis that high-functioning ASD students improve reading comprehension through explicit and systematic instruction (pg. 5). Participants had to have a diagnosis of ASD, a normative range perceptual IQ, mastered basic reading skills based on score scales of word and nonword reading, general vocabulary score, and an age equivalent score of at least 3.5. Thirteen, 9-year-old students (two full-time general education and 11 special education) met the criteria (pg. 6).

Procedure and Intervention Method

Participants were divided into two groups: control and intervention. Division was made based on data from the pretests. Similar scored students were paired and then one put in each group. Intervention took place over a 10-week period, with instruction 3 times a week for 30 minutes (pg. 8). Vocabulary and text reading covered 27 of the 30 sessions this focused on word taught, story reading, main idea identification, and identification of text structures. Anaphoric relations were the focus of the other 3 sessions. Pre-test was taken in January and post-test in May. Multiple sources of quantitative data was utilized; Biemiller and Slonim's (2001) root word vocabulary, Jitendra, Hoppes, and Xin (2000) enhancing main idea assessment, and Fuchs, Fuchs, and Maxwell's (1988) validity of information reading comprehension measure to name a few (pgs. 9-11).

Findings/Conclusion/Limitations/Implications

Roux et al. (2015) study found slightly higher numbers were scored in the intervention group compared to the control group. While there was growth, a larger sample size is needed, but this does show potential as a useful intervention for reading comprehension in ASD students (pg. 13).

Discourse Comprehension Intervention for High-Functioning Students with Autism Spectrum Disorders: Preliminary Finding from a School-Based Study

Purpose and Population information

Asberg and Sandberg's (2010) study focused on two areas, providing teachers and students with explicit concepts for

comprehension activities and the impact of scaffolding and modeling on discourse comprehension (ability to locate information within a text). Five teachers and twelve Swedish students with a diagnosis of ASD participated in the study (92).

Procedure and Intervention Method

Baseline data was collected from Wechsler Abbreviated Scales of Intelligence, Peabody Picture Vocabulary Test (92). Teacher participants attended a lecture and seminars for comprehension training and materials. A booklet containing thirteen stories increasing in length, as a takeaway. Questions followed each story and were designed in three ways, right there (pulled from story), reflect and search (text connecting), and on my own (inference). Lessons were structured in a gradual release method, first with teacher led instruction then transitions to small group (as much as could be tolerated). Intervention was 4 weeks long, with 20-30 minute sessions, 2-3 days a week (pg. 93-94).

Findings/Conclusion/Limitations/Implications

Pre and post-test data was from the Discourse Comprehension Test, 4 texts for each. Most of the data was quantitative, but qualitative data (teachers and students reflecting on the process) was used also. The study found ASD students improved discourse comprehension scores from pre to post test (pg. 95). Asberg and Sandberg (2010) study shows understanding words in isolations does not automatically lead to proficient discourse comprehension in students with ASD (pg. 96). Some limitations of the study were small sample size and lack of training for some participants. Further research is required to target the cause of comprehension difficulties in ASD students.

Vocabulary and Main Idea Reading Intervention Using Text Choice to Improve Content Knowledge and Reading Comprehension of Adolescents with Autism Spectrum Disorder

Purpose and Population information

Solis et al. (2021) focused their study on the effects of multicomponent vocabulary and reading comprehension in students with ASD. Participants consisted of five males, 4 being in eighth grade and 1 sixth grader, all with a diagnosis of ASD. Participants also struggled in reading and documented as not passing state reading test or IEP goals.

Procedure and Intervention Method

Students were given a multitude of assessment, but curriculum-based measures were the main data point. Other assessments were used for baselines for grouping. Nine categories of reading materials were selected based on Lexile levels. The intervention consisted of 40 lessons, 20-30 minutes a day, five days a week. Each session followed four-steps, students selected passage, teacher presents target words with related visuals and definitions, then reading of the first section of text with teacher modeling "right there" questions, and finally reading of the second section with interventionist prompting questions and facilitating discussion (79).

Findings/Conclusion/Limitations/Implications

Solis et al. (2021) found quantitative data from participants CBM's improved from baseline to end of intervention in both groups. Results from this study confirmed their hypothesis.

Findings from this study support Solis et al. (2021) idea that multicomponent reading comprehension with vocabulary

instruction is a relevant strategy in teaching reading comprehension to students with ASD. The study was limited by sample size and the impact of reading choices and topics on the participants, motivations vs. performance. Providing instructional practices for teachers even if only modest improvements are made, still guides teacher instruction (92).

Early Reading Comprehension Intervention for Preschoolers with Autism Spectrum Disorder and Hyperlexia

Purpose and Population information

Macdonald et al. (2022) study focused on early reading comprehension efficacy using a tablet-based intervention with ASD and Hyperlexia (HPL: reading comprehension disorder commonly associated with ASD). Participants in the study consisted of 15 Typical Development students and 15 ASD students (8 with HPL and 7 without) with ages in the range of 3-5 years old.

Procedure and Intervention Method

A variety of tests were given as a baseline, but for reading comprehension, Macdonald et al. (2022) utilized the WJPC for pre and post-test quantitative data. Participants engaged in a six-week period (Time 1), with no intervention to get a baseline for normal growth. During time 2, the six-week intervention began. Participants utilized the tablet intervention 5 days a week for 15 minutes a day. The tablet intervention consisted of two phases: Oral Language Comprehension and Reading Comprehension. Each phase had 3 levels of difficulty: word, phrase, and sentence picture matching, consisting of 145 nouns, 100 verbs, 48 adjectives, 24 concepts, and 11 pronouns. Setting allowed for you to switch between each phase and prompt type, verbal or nonverbal. Feedback was given immediately, if you got it wrong 1 time you got to try again with all answer choices, if you missed it again, only the correct answer was given. Time 3 was the post intervention assessment (1656-1658).

Findings/Conclusion/Limitations/Implications

The study showed significant improvement, following the tablet intervention (1660). Macdonald's et al. (2022) study shows that intervening in reading comprehension early could be a key component for students with ASD. A limitation of this study was parent involvement, the study is unclear to what degree each parent participated in the tablet intervention process (1665-1666).

The Effects of Shared Reading Intervention on Narrative Story Comprehension and Task Engagement of Students with Autism Spectrum Disorder

Purpose and Population information

This study focused on three key ideas, the main one being, the effects of shared reading on narrative story reading comprehension (3609). Participants had to meet the following criteria: diagnosed with ASD, communicated verbally, read short sentences, required additional support for reading comprehension, had difficulty engaging in reading for more than 30 minutes, and never exposed to shared story reading intervention. Kim et al. (2018) had 3 participants that met the parameters, three boys ages 6-8 years old.

Procedure and Intervention Method

Kim et al. (2018) utilized quantitative data based on the participants ability to answer ten; who, what, when, where, why, and how multiple choice questions. Intervention session took

place about 40 minutes a day, three days a week (pg. 3612). Intervention setup followed the before, during, and after reading strategy. Before reading, participants were asked to reflect (using visuals) on the previous reading and make predictions about what could happen next. During reading, participants were required to answer "Wh-" questions and prompted to reread sections if they could not answer. After reading, participants sequenced picture cards and then retold the story.

Findings/Conclusion/Limitations/Implications

The effects of shared reading intervention demonstrated improvement in all participants (pg. 3616). Though this study had limitations, the main one being that it is not generalized since ASD is a spectrum of different levels and capabilities and only one was focused on. However, this study supports that shared reading intervention could benefit students with ASD with reading comprehension.

Although there have been studies and research done on targeted reading comprehension strategies or interventions for students with Autism Spectrum Disorder, there is still not a defined strategy or intervention. This literature review proved that explicit instruction, anaphoric reasoning intervention, and "Wh-" Questioning improved reading comprehension but results were not consistent or long-term. The main limitations of these studies were sample size, length of the study, and the fact that every student with ASD is different and the amount of research that has been completed is not substantial enough to have a definitive strategy or intervention. The fact remains more research is needed to ensure reading comprehension growth in students with ASD.

This is an area of need that is ever growing in demand and it is our responsibility to find the most successful strategies or interventions to ensure our students with ASD can comprehend their reading. Research on reading comprehension for this young population is limited and thus deserves more attention in the future (Engel & Ehri, 2020). Hypothesis from this literature review is that there is no clear strategies, interventions, or resources designed to accelerate growth in reading comprehension in students with Autism Spectrum Disorder. Additional research is needed in the future. It is hoped that this review will assist others in their research formulations.

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