EFFECTIVE READING COMPREHENSION STRATEGIES FOR STUDENTS WITH AUTISM SPECTRUM DISORDERS IN THE ELEMENTARY GENERAL EDUCATION CLASSROOM

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Abstract

The purpose of this literature review is to focus on the research centered on effective reading comprehension strategies for students with Autism Spectrum Disorders (ASD) in the elementary general education classroom. The literature review includes studies focusing on the commonalities and characteristics of students with ASD by highlighting weaknesses in metacognitive skills as well as describing three reading comprehension profiles. The literature review then goes on to present research and studies describing effective reading comprehension strategies such as Direct Instruction, assistive technology and computer assisted instruction, classwide peer tutoring, activating prior knowledge, think aloud, and retelling. Results and conclusions from the various reading comprehension studies indicated that all of the discussed strategies proved to be effective to the various small groupings of participants. Recommendations for improving effectiveness of reading comprehension strategies for students with ASD in the elementary general education classroom include the concept that no single isolated reading diagnosis can be given to all children with ASD.
Chapter I: Introduction

General education elementary classrooms that contain students with Autism Spectrum Disorder (ASD) are a trend on the rise. Given that the population of students with ASD may continue to grow, educators must meet the diverse learning needs of such students. The No Child Left Behind Act of 2001 and the Individuals with Disabilities Education Improvement Act of 2004 have changed the traditional structure of a general education classroom in the United States. The ethical duty of school districts across this nation to identify, understand, and meet the academic needs of students with ASD is critical.

Background

Autism Spectrum Disorders are on the rise in our society at an alarming rate. In 2011, the Centers for Disease Control and Prevention estimated one in 88 children have been identified with an Autism Spectrum Disorder (ASD) (“New Data on Autism Spectrum Disorders”). Schools in the United States have reported an 800% increase since 1992 serving students with ASD (Crosland & Dunlap, 2012). ASD can be defined as a group of neurodevelopmental disorders that occur in early childhood, usually by three years of age. Characteristics of ASD are impairments in verbal and non-verbal communication, reciprocal social interaction, and an occurrence of repetitive behaviors and constrained interests. Asperger’s Syndrome, autism, and pervasive developmental disorder (PDD) are all included within the ASD diagnosis. No cure exists and ASD is more prevalent in males, but the sex ratio varies (M:F autism 4:1, Asperger’s 10:1) (Raznahan & Bolton, 2008).

Students with ASD have parallel characteristics of weak reading comprehension skills which were first documented by Leo Kanner in 1943. Kanner was one of the first to observe relative weaknesses in the realm of reading comprehension and children with autism. In
Kanner’s 1943 observations of reading behaviors with autistic children he wrote, “The children read monotonously, and a story... is experienced in unrelated portions rather than its coherent totality” (Kanner, 1973, p.42). Kanner’s observations expressing “unrelated portions” and “coherent totality” align with the theory of Weak Central Coherence (WCC). Uta Firth of the University College London was the first to pursue this theory in the late 1980s. Firth synthesized that individuals with ASD generally see things in the smallest part possible and are extremely strong at seeing little details but cannot mentally gather many little pieces in order to see a much grander picture or big idea (Weak Central Coherence Theory). The comprehension element is being blocked because so much mental capacity is spent on minor details that memory for the global and context-based meaning is lost (Asberg, 2010).

**Hyperlexia.** Another characteristic found in many children diagnosed with ASD and weak reading comprehension skills is hyperlexia (HPL). HPL is a term used to describe individuals who have exceptional word-reading abilities far above IQ and at a level higher than the individual is able to comprehend. (Newman, Macomber, Naples, Babitz, Volkmar, & Grigorenko, 2006). Many individuals with HPL have a large discrepancy between word-decoding capacities and comprehension of what is being read. HPL has been known to occur in children with ASD as well as in children with other developmental delays (Flores & Ganz, 2007). A hyperlexia case was documented where a child began reading as early as two and a half years and writing at 18 months. In second grade, this same child demonstrated superior decoding-skills and reading fluency (95th and 84th percentiles) but showed greatly delayed reading comprehension abilities (16th percentile) (Craig & Telfer, 2005). Substantial disagreement exists as to whether HPL is specific to only individuals with ASD or perhaps HPL can be extended to individuals with a wide variety of other delayed cognitive development.
Uncertainty continues to exist as to how and why some children with HPL have such exceptional word-reading capacities and limited comprehension abilities (Newman et. al., 2006). Functional magnetic resonance imaging (fMRI) documented brain activity while reading. Hyperlexic reading occurs by drawing upon both the left hemisphere’s phonological and the right hemisphere’s visual processing systems at the same time (Turkeltaub, Flowers, Verbalis, Miranda, Gareau, & Eden, 2004).

**Reading comprehension profiles.** The idea that no single isolated reading diagnosis can be given to all children with ASD is critical to remember. What researchers can do, however, is find commonality in characteristics of students with ASD struggling with reading comprehension. Understanding each unique learner with ASD is a key component in discovering appropriate strategies and interventions to help guide the learning process. Three reading comprehension profiles emerged in a study conducted by Williamson, Carnahan, and Jacobs (2012): Text Bound Comprehenders (TBCs), Strategic Comprehenders (SCs), and Imaginative Comprehenders (ICs). Using the Constructivist grounded theory approach, 13 participants were recruited from a private school in the Midwest that provided services for students with ASD. Of the 13 participants, the age range was from seven to 13 years and all had verbal communication skills sufficient to participate in the study, a medical diagnosis of an ASD or Asperger’s Syndrome, and a reading comprehension level of preprimer or higher. Data collection varied in form from parent and teacher questionnaires to using a think-aloud procedure where the 13 students with ASD read 16 passages at the various instructional reading levels. The passages were unique to each individual learner and varied by length, genre, and picture cues. During the think-aloud procedure, the reader paused at either the sentence level or paragraph level to dictate to the researcher what the reader was thinking about (the think-aloud procedure was modeled to
each child by watching a video of another student modeling the expectations). During analysis, the researchers followed analytical procedures including open coding, axial coding, and select coding. Three distinctive reading comprehension profiles for the 13 participants with ASD were formed: Text Bound Comprehenders, Strategic Comprehenders, and Imaginative Comprehenders.

Text Bound Comprehenders (TBCs) brought meaning to the text, but did not make any deeper interpretations. Explicit comprehension questions were answered correctly 75% of the time compared to implicit questions 34% of the time and responses were generally short in nature (around three words in length). Genre and picture clues did not influence comprehension with TBCs. In high-comprehension passages, TBCs made inferences in relation to what was explicitly stated by the author in the text; inferences occurred around eight times per passage. In low-comprehension passages, TBCs made inaccurate text related inferences. In response, TBCs expressed thoughts or produced a drawing or writing about the very last object read in a passage without any explicit inferring. In low-comprehension passages, TBCs also showed characteristics of hyperlexia by over-attending to small details and text-related inferences were inaccurate.

Strategic Comprehenders (SCs) were successful to answer both explicit (93%) and implicit (73%) comprehension questions regardless of text features and background knowledge. SCs had many academic interests and enjoyed reading. Comprehension questions were answered in great length (18 words was the mean in a random sample) and during these reflections, SCs often invented words or used words in a novel way (e.g., a child used the words *pranker* and *sneaker pants* to describe what a trickster is). Researchers observed productive reading behaviors and noticed that SCs were making personal connections to characters, situations and world knowledge as well as asking questions, and visualizing what was being read. Comprehension
difficulties arose in the area of language differences. SCs struggled to respond to prediction questions as well as determining emotional states of characters in unfamiliar situations (e.g., Student was asked to describe how a character felt when given a pony as a gift. Student focused on the literal implications such as the need for a barn instead of the emotional aspects). One interesting observation with the SCs was the tendency for these students to connect what was being read to personal favorite topics or items.

Imaginative Comprehenders (ICs) were extremely visually oriented and relied heavily on picture clues to generate responses to comprehension questions. Passages that were in sentence form and supported by pictures about familiar topics produced the most success (75% comprehension). ICs did not seem to be influenced by genre and were the least vocal of the three comprehension profiles. ICs preferred to relate what was comprehended by using pictures.

Language difficulties were observed in the area of syntax, semantics, and prepositions. Researchers observed elaborate inferences when familiar texts supported by pictures were read. One student read a story that included an owl looking for his sister. In response, the student drew a picture of an owl flying over a tree; the owl flying over the tree was never explicitly stated in the text or pictures. Difficulties were observed when unfamiliar passages were read in paragraph form. ICs struggled greatly and reverted back to scripting from previous texts read or just invented a new story incorporating a detail or two from the target passage. One interesting characteristic about the invented stories is the ICs incorporated connections to favorite topics or items, similar to SCs.

The three comprehension profiles are a great reminder to educators that even students not diagnosed is ASD could fit the profiles (Williamson et al., 2012). Educators must remember the importance of the unique learner and approach teaching reading comprehension with the mind
frame of taking the time to understand the learner first and then dive into the effective strategies that may help promote growth in reading comprehension.

From Kanner’s work in the early 1940’s to the current research of the twenty-first century, much is unknown about ASD. Because of ASD being on a vast spectrum, researchers are unable to make concrete diagnoses about reading comprehension for all children with ASD. What researchers are able to do is to make generalizations about similar characteristics that students with ASD face from years of studying, observing, and analyzing the data.

**Statement of the Problem**

With the No Child Left Behind (NCLB) Act of 2001 and the Individuals with Disabilities Education Improvement Act (IDEIA) of 2004, general education teachers are teaching a much more diverse set of pupils, now than ever before. General education teachers are now balancing meeting the needs of the general education population and the needs of students with special needs such as ASD.

Widely accepted is the concept that any student with poor oral language skills will be at-risk for becoming a struggling reader. Unfortunately, with many ASD students having impaired language skills, we also find these same students struggling to read (Nation, Clarke, Wright, & Williams, 2006). A collection of suggestive evidence from studies indicate reading skills of students with ASD often show relative strengths in the area of decoding, but have difficulty in the area of language and reading comprehension (Whalon, Otaiba, & Delano, 2009).

Comprehension means getting meaning from what is read. Comprehension can be thought of as the heart of reading. Knowledge of letter-sound relations and comprehension go hand-in-hand. If a student can decode all the words on a page, but does not make meaning or connections to the text, the student is really not reading. Students with ASD struggling with reading comprehension
have difficulty using metacognition during the reading process. Successful readers are able to use a variety of metacognitive strategies to help build comprehension while reading. Seven metacognitive strategies good readers use while engaged in a text are as follows: monitoring for meaning, using and creating schema, asking questions, determining importance, inferring, using sensory and emotional images, and synthesizing (Keene & Zimmermann, 2007). Students with ASD struggle immensely with the various seven metacognitive strategies that promote reading comprehension, especially making inferences (Asberg, 2010; Flores & Ganz, 2007; Henderson, Clarke & Snowling, 2011; Nation et al., 2006; Whalon et al., 2009).

**Making inferences.** Inference is a critical skill for readers to have developed. To make an inference while reading, the reader must pull background knowledge and combine this knowledge with information from a text for the purpose of making predictions, conclusions, judgments, and interpretations (Tompkins, 2007). Students with ASD often struggle to make inferences while reading narrative text, especially when the inference is abstract. Narrative text is a greater challenge to read and comprehend for students with ASD compared to an expository text where definitions, sets of rules, and descriptions of processes do not make the reader to rely heavily on inference making (Randi et al., 2010). In narrative texts, the reader must engage in a storyline which includes characters and emotions. The reader must draw conclusions and synthesize what has been read with prior knowledge to interpret and create world knowledge also referred to as discourse comprehension (Asberg, 2010). Even beyond narrative text, Johnson and Rakison (2006) found making inferences at the abstract level to be evident while studying preschool children with ASD. The preschool students were able to put animate and inanimate objects based on surface features into categories. The students used inductive inference to help
guide the categorization of the objects (e.g., things that have arms, things that have legs), but led to some incorrect groupings (e.g., placing a table with an animal because both have legs).

The high consistency of students with ASD and those having comprehension difficulties guided Jakob Asberg (2010) to further examine patterns of discourse comprehension and language skills. Asberg’s directional hypotheses were guided by the Theory of Weak Central Coherence (WCC) in relation to difficulties comprehending inferential meaning that relate to the main idea and difficulties in discourse comprehension. The study took place in Sweden and involved two groups of sixteen participants. 16 students (five girls and 11 boys) diagnosed with ASD were recruited from different schools for students with ASD and other disabilities, as well as from regular mainstream schools. The age range of the participants with ASD ranged from ten years nine months of age to 15 years eight months. The comparison group, (made up of general education students with no known disabilities), was also made up of 16 children (five boys and 11 girls) and were recruited from regular schools in western Sweden. The age range of the comparison group was from seven years seven months to 14 years eight months. The groups were matched by taking into consideration raw scores from subtests from the Wechsler Abbreviated Scales of Intelligence test (WASI). The testing was done one-on-one in various locations (e.g., schools, homes, Department of Psychology in Gothenburg). Three tests were administered: matrices subtest from WASI (used to measure non-verbal cognitive ability), a Swedish translation of the Peabody Vocabulary Test (PPVT) (used to assess oral receptive vocabulary knowledge), and a Discourse Comprehension Test (DCT) (eight texts 180-210 words in length which were read to the students). The DCT was broken into two parallel tests, version A & B, each using four texts and eight comprehension questions of four different types after the reading. The results showed the students with ASD and the comparison groups’ scores were
quite similar on the PPVT receptive vocabulary and receptive grammar. Participants of the ASD group scored significantly lower in narrative discourse comprehension compared to the comparison group and the findings suggest that discourse comprehension seems to be difficult for children with ASD. The need is critical for teachers to find the unique learning styles of each student with ASD in order to ensure quality instruction and strategies are used to meet the individual learning needs.

**Research Question**

What methods used in teaching reading comprehension significantly improve students with Autism Spectrum Disorder to comprehend text?

**Definition of the Terms**

The following terms have been selected to ensure that the reader understands the major concepts that are woven throughout the entire literature review. All terms will be discussed and applied in relation to various research studies that explore students with ASD and reading comprehension difficulties.

**Assistive technology (AT):** “Technology that enables an individual with a learning disability to compensate for specific problems/deficits. It empowers children and adults who have learning disabilities with new abilities to communicate without speech or sight, to manipulate their environment, and to demonstrate cognitive abilities in non-traditional ways” (Tuedor, 2006, p. 294).

**Autism Spectrum Disorder (ASD):** “Refers to a group of childhood onset neurodevelopmental disorders characterized by problems with social communication and repetitive behaviors. Includes the diagnoses of autism, Asperger’s syndrome and atypical autism
which fall within the pervasive developmental disorder (PDD)” (Raznahan & Bolton, 2008, p. 489).

**Decoding:** “Using word identification strategies to pronounce and attach meaning to an unfamiliar word” (Tompkins, 2003, p. 505).

**Hyperlexia:** “Generally used to refer to individuals who read early and without explicit instruction and who have stronger word recognition abilities than would be expected based on their intellectual abilities” (Flores & Ganz, 2007, p.244). Students with hyperlexia have extremely strong word-decoding skills but often times very weak comprehension skills.

**Inferential comprehension:** “Using background knowledge and determining relationships between objects and events in a text to draw conclusions not explicitly stated in the text” (Tompkins, 2003, p. 506).

**Metacognition:** The ability to think about one’s own thought process (Tompkins, 2003, p. 507).

**Reading Comprehension:** “A complex cognitive process… drawing upon a wide range of cognitive abilities, such as inferencing and attention, motivational strategies, such as setting the purpose for reading, and knowledge, such as vocabulary and prior knowledge of the topic” (Randi, Newman, & Grigorenko, 2010, p. 892).

**Synthesizing:** “Creating an evolution of meaning by combining understanding with knowledge from other texts/sources” (Keene & Zimmerman, 2007, p. 14).
Theoretical Framework

Creating a single profile for a reader with ASD is virtually impossible because of the vast spectrum and varying degree of impairments ASD students have (Randi et al., 2010). From high-functioning students with Asperger’s syndrome to the severely impaired with very limited oral language, ASD is complicated for researchers to study, but at the same time, because of the vast spectrum, ASD is all the more intriguing.

Metacognitive comprehension strategies are what good readers use while reading. Think of the metacognitive strategies as if one were listening to the voice inside the mind that is speaking while reading (Tompkins, 2007). Monitoring for meaning, using and creating schema, asking questions, determining importance, inferring, using sensory and emotional images, and synthesizing are the seven metacognitive strategies that all good readers must have developed and consistently use in order for the end result of strong reading comprehension. Various research studies suggest many students with ASD have deficits with the various seven metacognitive comprehension strategies (Asberg, 2010; Henderson et al., 2011; Nation et al., 2006; Williamson et al, 2012).

The Weak Central Coherence Theory can be connected with students with Autism Spectrum Disorder and metacognitive reading comprehension difficulties. Weak Central Coherence Theory (WCC), also called the central coherence theory (CC) refers to the difficulty individuals with ASD experience when trying to understand context or synthesizing material to make meaning (finding the “big idea/big picture”). WCC attempts to explain how some people labeled with ASD can excel in areas of math and sciences for example, but at the same time struggle greatly with oral language skills and reading comprehension. In regards to reading, WCC tries to describe how individuals with ASD are often detached and very detailed-focused.
Memory for what is being read is lost, which is a necessary skill in order for the reader to make global and context-meaning (Asberg, 2010). WCC Theory suggests a close association between Autism Spectrum Disorder and inadequate reading comprehension skills, which proposes the pedagogical research question of interest in this literature review.

Summary

Many students with Autism Spectrum Disorders struggle with reading comprehension and are rapidly increasing in numbers in general education classroom communities across the nation. To meet the needs of students with Autism Spectrum Disorders under the NCLB Act of 2001 and IDEIA of 2004, general education teachers must understand and practice effective intervention strategies to strengthen reading comprehension. The literature review will explore the research centering on reading comprehension strategies such as Direct Instruction, assistive technology and computer assisted instruction, and classwide peer tutoring which can be used by a general education teacher to effectively improve the reading comprehension of students with ASD.
Chapter II: Literature Review

This chapter of the literature review will explore effective reading comprehension strategies to use in the general education classroom for students with ASD.

Effective Strategies for Improving Reading Comprehension

Students with ASD are a part of the general education curriculum more and more with full inclusion. Full inclusion stresses the importance of presence, participation, acceptance, and achievement. Students with ASD should be moved from the typical “exclusive” approach to a more progressive “inclusive” approach in the general education classroom (Humphrey, 2008). Inclusion at an early age provides an enriching experience for children to grow and learn beside their peers. “A supportive environment in the early years stimulates learning, and reinforces the synaptic connections which enhance development” (Vakil, S., Welton, E., O’Connor, B., & Kline, L., 2009, p. 321). Full inclusion settings for students with ASD allow for the opportunity for incidental learning as well as an opportunity for Direct Instruction (DI) by the general education teacher. Skills taught in an inclusive environment have a greater chance of being generalized by students with ASD (Vakil et al., 2009).

**Direct Instruction.** Direct Instruction (DI) is a model of reading instruction. DI usually begins with an analysis of what is to be taught and breaking the components of the material to be taught in the smallest fraction possible for better understanding. DI is usually used when teaching complex skills and the student is taught each small component as an isolated skill and in combination with other components. The DI teacher models the desired behavior and guides instruction each step of the way spiraling back to small components when necessary (Harp & Brewer, 2005).
Direct Instruction (DI) has been suggested as a method of effective reading comprehension intervention for students with ASD (Flores & Ganz, 2007). Two purposes evolved for a study of the effectiveness of DI for teaching statement inference, use of facts, and analogies to students with developmental disabilities and reading delays. The first purpose was to investigate the delays of mechanisms in reading comprehension for students with ASD and other developmental delays (DD). The second purpose was to evaluate the components of DI in relation to specific instruction of statement inference, using facts, and analogies. A private school for individuals with ASD and other intellectual impairments was the setting and the study involved four elementary participants: Chris, 14 years old, sixth grade diagnosed with ASD; Hali, 11 years old, fifth grade diagnosed with ASD; Jean, 13 years old, fifth grade diagnosed with mental retardation; Sara, ten years old, fifth grade diagnosed with ADHD. Jean and Sara were included in the study because of the lack of current research of reading comprehension intervention and DI in this population. Reading comprehension instruction was guided by the Direct Instruction program Corrective Reading Thinking Basics: Comprehension Level A (Engelmann, Haddox, Hanner, & Osborn, 2002). Three strands of the program were chosen and implemented: statement inference, using facts, and analogies. Baseline data were collected until each of the students produced scores consistent across three consecutive data points. Daily DI intervention was implemented by the researchers and provided for 20 minutes a day; all four children received equal amounts of DI in a group format. Instruction began with statement inference and continued until all students were able to reach the criterion of three consecutive probes at 100%. Once 100% was reached, the strand of inference statement was weaned to one to two times per week and using facts was the next focus strand. The pattern continued through all three chosen strands. A multiple-probe-across-behaviors design was used and the results
produced exceptional growth in all three strands for all four participants. Participants of the study maintained performance in all three strands after the frequency of the DI decreased and also maintained performance after one month of no DI. Though the study was small in size, the results suggest that a connection with reading comprehension intervention effectiveness for students with ASD and other developmental delays and Direct Instruction exists (Flores & Ganz, 2007).

**Assistive technology and computer assisted instruction.** Assistive technology and computer based instruction are becoming more prevalent in full inclusion classrooms for students with ASD as an intervention strategy. The use of technology, such as computers, has been shown to fascinate children with ASD. Because of the fascination, technology can be used as a link to academic enrichment (Tuedor, 2006). Students with ASD focusing on computer screens allows for consistency and predictability. Computer assisted instruction (CAI) can be adapted to meet the individual needs of students with ASD and the learning conditions can be modified (e.g., volume control and limited information being presented at one time) (Williams, Wright, Callaghan, & Coughlan, 2006). Reading comprehension skills such as making inferences, distinguishing relevant information, and cause and effect relationships can all be supported by visual cues reinforced by the use of CAI for students with ASD. The effectiveness of CAI for students with ASD learning to read prompted a study focusing on whether students with ASD learned to read more eagerly using CAI or by using the traditional method of books (Williams et al., 2006). The CAI study is connected to reading comprehension because to teach reading comprehension strategies to students with ASD, the general education teacher must be able to motivate the learner with material that is engaging so that foundational skills can be established.
Eight children diagnosed with ASD ranging in age from three years one month to five years nine months were recruited from a local autism specialist unit within a special school. The students were matched by a number of factors: severity of autism, age, and number of reported spoken words. Participants were broken into two groups, the computer assisted instruction (CAI) group and the personal instruction (PI) group and received ten weeks of instruction in each condition and then switched for another ten weeks. The book based PI consisted of each child receiving reading books and given scripted instruction from a teacher. The books were made to be as colorful and eye appealing as possible and physical attributes were added to create motivation (e.g., bells, horns, and animal sound buttons to press). The computer based instruction consisted of the exact same books as the PI group but scanned into a computer version. Similar sounds were added as well as voice-over reading of highlighted words and characters talking when clicked on. The students were also given the ability to turn the pages and an auto-narrator was also a feature of the computer based instruction. A matched sample, crossover design was used and children worked one-to-one in the specific condition located in a quiet setting for approximately 15 minutes, five days a week, for ten weeks per condition with the same teacher. Assessment measures were performed prior to the study, during the study, at the crossover, and at the completion of the study. Results showed that all children spent less time on task in the book condition (mean 2.8 minutes) than in the computer condition (mean 9.9 minutes). To put these figures in perspective, in the course of a school year, students who receive 15 minutes of attempted reading instruction per day would read for about 30.5 hours using a computer and only 8.5 hours using a book (Williams et al., 2006). Results indicate that students in the computer condition spoke twice as many words as students in the book condition. All students showed growth from the beginning baseline scores. In a majority of the cases, students
scored one to two steps higher than the baseline score, but in the area of concentration, reading for meaning, phonological awareness, three students gained more than two steps. The improvement was greatest in the CAI condition, where overall improvements in concentration and reading for meaning were the highest. This study suggests students with ASD may potentially spend more time reading material that is presented in computer form than the traditional method of book instruction. Also suggested was the potential for CAI to distract students with ASD from obsessional and self-stimulatory behaviors (Williams et al., 2006).

**Classwide peer tutoring.** Classwide peer tutoring is another effective strategy beneficial for students with ASD included in the general education classroom and has shown to be effective for developing increases in academic development, social growth, and on-task behaviors (Harrower & Dunlap, 2001; Kamps, Barbeta, Leonard, & Delquadri, 1994; Whalon et al., 2009). Classwide peer tutoring (CWPT) is a peer-mediated teaching strategy in which all students involved work together in tutor-learner pairs inside the classroom (Kamps et al., 1994). The effects of CWPT in combination with traditional reading instruction prompted a multiple baseline design across subjects study. The purpose of the study was to first measure the effects of the CWPT program on reading skills of students with ASD and second, to measure the effects of social interactions during the unstructured free-time that followed CWPT. Three high-functioning male students with autism were selected (Mike age eight, Adam age eight and Pete age nine) from three different suburban elementary schools. The study was conducted inside the general education classroom, with researchers circulating as monitors. During the CWPT, the learner read for eight to ten minutes while the tutor provided guidance and feedback, both constructive and positive, on the reading. Upon completion of the reading, the tutor asked comprehension questions for three minutes. Immediately following the CWPT, researchers
conducted a two minute timed reading with each of the three students with autism. Immediately following the timed read, five comprehension questions were asked (who, what, when, where, why) and students orally replied. The reading comprehension portion of the CWPT results strongly suggests the effectiveness of such a program in the general education classroom. Prior to CWPT, the three students scored approximately 47%, 24%, and 67% correct responses on reading comprehension questions, but during CWPT, were able to increase correct comprehension responses to 85%, 85%, and 100%. Limitations to the study exist because of the small size of participants, but the observations made suggest that CWPT has the potential to be an effective strategy inside the general education classroom for teaching reading skills for students with ASD. The simplicity to implement such a program makes CWPT even more of a valuable strategy for general education teachers to use.

**Activating prior knowledge.** Comprehension for students with ASD can be increased with the simple tasks of activating prior knowledge and building background information. Students with disabilities are often excluded from many in-school and out-of-school activities which general education children often take for granted which naturally build extensive background knowledge (e.g., recess, art club, locker routines, bus routines, book clubs, and sports teams). By building background knowledge about a topic, students with ASD will be given specific information that may trigger any existing prior knowledge that has been stored away (Kluth & Chandler-Olcott, 2008). Classroom teachers can use a variety of approaches to help students with ASD retrieve what is known about a topic or to help intake new information to enrich comprehension. Strategies such as telling a story from a personal experience to connecting the focus topic to related media students may have prior connections to (information
retrieved from a television show, Internet, computer game or movie) are all strategies classroom teachers can use to help with reading comprehension (Kluth & Chandler-Olcott, 2008).

Using a K-W-L chart is another strategy to help students with ASD connect what is being taught to personal experiences. In a K-W-L chart, the teacher will record what the student already knows about the focus topic, what the student wants to know about the focus topic, and finally what the student has learned about the focus topic. Having the information presented in a graphic organizer such as a K-W-L chart is an activity which allows for students with ASD to have something visually concrete and gives a sense of ownership of the focus topic (Kluth & Chandler-Olcott, 2008).

**Think aloud.** Thinking aloud is another practical strategy to help students with ASD develop reading comprehension skills. Think alouds are highly effective in helping students with ASD to develop the seven metacognitive comprehension strategies while engaging in the reading process (Kluth & Chandler-Olcott, 2008). During a think aloud, the teacher models how to stop periodically throughout a text and authentically reflect aloud what is being mentally processed and understood. Preparing and modeling an effective think aloud has four important steps (Tovani, 2000). First, choose a short piece of text that will be of high interest to students and one that will allow for the modeling of a specific metacognitive strategy of choice. Second, anticipate which areas within the text may challenge the reader’s comprehension and make a note to highlight portions in the think aloud. Third, read the text aloud to students as well as having a paper copy of the text for each child or have on a projector so the text reaches auditory and visual learners combined. Lastly, highlight specific words that instantly trigger a thought or emotion and authentically explain what is mentally being processed. While modeling a think aloud, it is also important the teacher uses body language as a cueing system to distinguish
between thinking aloud and reading the text aloud (e.g., touch and look at the overhead when reading aloud, step away from overhead and look at pupils when thinking aloud). Students with ASD will respond to body language as a cueing system because it makes the concept of a think aloud more explicit (Kluth & Chandler-Olcott, 2008). Non-verbal students with ASD can still participate in a think aloud by communicating using drawings, symbols, inventive spelling, or various assistive technology devices.

**Retelling.** Retelling is another effective strategy inclusive classroom teachers can use to help students with ASD develop proficient reading comprehension skills. Direct question and answer assessments for reading comprehension are difficult for students with ASD due such factors as language barriers and inferential “why” questions (Asberg, 2012; Flores & Ganz, 2007; Kluth & Chandler-Olcott, 2008; Nation et al., 2006). Students with ASD may respond better when asked to *retell* a story rather than being *asked* about a story. Multi-sensory graphic retelling can help students with ASD better understand how to map out a story. Cards with visual cues (e.g., a card with the word **who** and a picture of a face below and question mark) help the learner retrieve information from the text and help to place events in chronological order. Multi-sensory tools such as using feltboards or stickers, drawing an actual map with a road to order events with concrete objects and drawings are all examples to build comprehension (Kluth & Olcott, 2008). The multi-sensory approach can even be used with classwide peer tutoring. Tutors can assist writing-impaired students with ASD by recording retold events and the learner illustrates beside the dictation.
Summary

The research presented in this literature review suggests that not one single strategy or method of teaching reading comprehension will be 100% effective for each and every child with ASD. ASD is very complex and each student diagnosed with ASD has unique learning needs and styles. The research shows that educators should utilize a variety of effective reading comprehension strategies based on the way each individual student with ASD learns best. From understanding the characteristics of weak metacognitive comprehension skills students with ASD often have, to identifying reading comprehension profiles, the general education teacher must remember the critical need to understand the learner before effective strategies can take place. Suggestions have been made that highly promote full inclusion for students with ASD. The benefits of an inclusive placement are endless for academic and social skill development. Inside the inclusive general education classroom, students with ASD have responded positively to reading comprehension strategies as Direct Instruction, computer assisted instruction, and classwide peer tutoring, as well as various other comprehension strategies noted in this literature review (Flores & Ganz, 2007; Williams et al., 2002; Kamps et al., 1994).
Chapter III: Results and Analysis Relative to the Problem

The population of general education classrooms has been rapidly changing in recent years and with this change brings full inclusion for students with special needs such as ASD. With the increasing population of students with ASD joining general education classrooms, general education teachers have to adapt teaching methods to meet the needs of diverse learners. The focus of this literature review is grounded in the Weak Central Coherence (WCC) Theory and guided by the pedagogical research question exploring what specific methods used in teaching reading comprehension significantly improves readers with ASD to comprehend text.

Researchers have identified various effective reading comprehension strategies that have shown to positively influence comprehension for small groups of students with ASD. It is important to note that because ASD is such a broad spectrum, each child with ASD must be taken into consideration because there is not one single learning label or reading diagnosis that fits all students with ASD. Instead, researchers finding commonalities in the characteristics of students with ASD struggling with reading comprehension allow for a better understanding of the dissimilar learning needs.

A common theme woven throughout the literature review and throughout the research studies is the notion that students with ASD struggling with reading comprehension have troubles using metacognition during the reading process, especially the metacognitive skill of inference making (Asberg, 2010; Flores & Ganz, 2007; Henderson, Clarke & Snowling, 2011; Nation et al., 2006; Whalon et al., 2009; Williamson et al., 2012). All of the effective reading comprehension strategies that were expanded upon in this literature review (DI, AT/CAI, CWPT, activating prior knowledge, think aloud, and retelling) are strategies that have the potential to build and strengthen the metacognitive skills necessary for building reading comprehension.
Also observed, is that all six effective reading comprehension strategies covered in this literature review can be adapted and/or modified to meet the diverse individual needs of students with ASD in the general education classroom. As stated over and over, students with ASD are so diverse in learning styles that the importance for adaptable teaching methods is imperative for their success. No one single program or strategy is going to work for every child with ASD.
Chapter IV: Recommendations and Conclusion

The final chapter of the literature review will present recommendations, possible areas of further research as well as a final summary and conclusion.

Recommendation

One of the most important recommendations suggested from this literature review is the importance of understanding and recognizing the diverse spectrum of ASD. Since reading comprehension is such an important skill for all students to acquire, general and special education teachers must work together to develop and implement a wide variety of reading comprehension strategies that are appropriate for success and growth for students with ASD. The general education classroom must provide a balanced approach to implement a wide variety of the discussed reading comprehension strategies for the overall development of metacognition in students with ASD. A balance between Direct Instruction, assistive technology and computer assisted instruction, whole group instruction, and peer interactions are all elements that the research has suggested will help in the development of reading comprehension. Ample research can be found regarding all the comprehension strategies discussed, but what is going to determine effectiveness is how the individual learner with ASD responds to the strategy or technique being used.

Areas for Further Research

Because ASD is such a vast spectrum, more research in the field of reading comprehension is needed, especially research studies involving larger numbers of participants from public schools across the United States. In a majority of the studies highlighted in this literature review, the number of participants was limited. A possible area for further research would be a quantitative study focusing on the effectiveness of the researched-based computer
program MimioReading™ Comprehension (previously called HeadSprout® Comprehension program) (“MimioReading Comprehension Suite”). The subjects tested would be students diagnosed with ASD that are currently reading at a third to fourth grade reading level and randomly selected from public schools across the United States. The study would include at least 20 participants and conducted over a nine week period. The first week would be spent collecting baseline data in the area of finding facts, making inferences, identifying themes and the main idea, and learning vocabulary in context for each of the 20 participants in the study. Remaining weeks would be spent administering the computer-based program MimioReading™ Comprehension 30 minutes a day and using the program’s measurement tools to record results of student growth in the four areas of reading comprehension covered by the program. MimioReading™ Comprehension would produce automated progress reports showing student growth. Data would be analyzed by comparing baseline scores to that of the automated progress reports showing the exact pace and progress towards mastery of the four areas of reading comprehension which correlate to the metacognitive reading comprehension skills discussed in this literature review. Observations would be made determining how effective the program was to each individual participant in regards to the percentage of growth shown over an eight week period. Researchers could also use data collected from the MimioReading™ Comprehension program to observe any possible trends or commonalities that may exist while studying the data gathered by the program and anecdotal notes taken by the administrator of the study (this could be the general education teacher, special education teacher, etc.). A study of this size would be of great value. Even though 20 participants may seem limited in number, it is double the size of most current research studying effects on reading comprehension for students with ASD. A study does exist measuring the effects of the computer-based early reading program, HeadSprout®, on
accurate reading of word lists and connected text with a single child with ASD (Whitcomb, Bass & Luiselli, 2011). Currently, no studies are published about the effectiveness of the researched-based computer program MimioReading™ Comprehension on a large group of students with ASD.

Summary and Conclusion

General education teachers are now teaching a more diverse population than ever before and balancing meeting the needs of many diverse learners. With NCLB Act of 2001 and IDEIA of 2004, students with ASD are now a part of the general education classroom and curriculum. The theoretical framework of Weak Central Coherence Theory (WCC) is woven throughout this literature review suggesting a strong association between ASD and inadequate reading comprehension skills. Students with ASD face many social challenges, but face academic challenges as well, especially in the area of reading comprehension as the WCC Theory implies (Asberg, 2010; Flores & Ganz, 2007; Nation et al., 2006; Whalon et al., 2009; Williamson et al., 2012). Teaching effective reading comprehension strategies in an inclusive classroom is no easy task, but the most important aspect to remember is to presume competence when trying to meet students’ needs with ASD. Reading comprehension characteristics of students with ASD are never going to be able to be categorized into clean-cut labels because of the vast spectrum, but what is known are some of the strategies that have been shown to work for small groups of students with ASD (Direct Instruction, computer assisted instruction, and classwide peer tutoring) (Flores & Ganz, 2007; Williams et al., 2002; Kamps et al., 1994). For the future of a literate society, critical is the need that all children be instructed with effective reading curricula which is appropriate for the dissimilar individual needs of each and every student (Whitcomb, Bass, & Luiselli, 2011). Much is still unknown about ASD, but what is important is for educators
to never give up when teaching students with ASD because all children deserve to be members of our nation’s future literate society, too.
References


