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The dissertation of Jenelle M. Abnett entitled *The Effectiveness of Instructional Strategies in Reading Comprehension for Students with Autism Spectrum Disorder and Hyperlexia* submitted to the School of Education in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Instructional Leadership for Changing Populations at Notre Dame of Maryland University has been read and approved by the committee.

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Effectiveness of Instructional Strategies in Reading Comprehension for Students with Autism Spectrum Disorder and Hyperlexia

by

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A Dissertation

Submitted in Partial Fulfillment of

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Abstract

Children with Autism Spectrum Disorders (ASD) commonly show deficits in social and communication skills, as well as in interpreting metaphorical meaning of language. These deficits often make reading comprehension more difficult for students with ASD. Past research has primarily focused on decoding rather than on comprehension skill interventions; only recently has there been an upswing in research to support reading comprehension skill deficits. The purpose of this study was to examine instructional strategies that are used for students with ASD, specifically students who exhibit Hyperlexia—a significant discrepancy in reading identified by high decoding skills and low comprehension abilities. Using the Special Educational Elementary Longitudinal Study database (SEELS), this study was able to analyze information on over 1,000 students with ASD. The study found that students with ASD are included in the language arts general education classroom 39.5% of the time, have goals that are working toward reading on grade level, and use instructional strategies such as peer tutoring, questioning strategies, classroom discussions and participation in presentations and projects on a regular basis. Looking further at this population, the study examined the relationship between reading comprehension and decoding skills according to their inclusion on the Simple View of Reading framework. Sixty-four students were identified as having Hyperlexia in the first wave of data collection gathered during the 2000-2001 school year, referred to as wave one. There were 92 students in wave three, gathered 3 years later during the 2003-2004 school year that were identified as having Hyperlexia.

Through regression models and ANOVAs, the study concluded that three of the four instructional strategies (peer tutoring, presenting to the class, and questioning strategies) were not significant predictors of academic growth for students with ASD and with Hyperlexia. Only one instructional strategy (participation in class discussions) was found to have a significant impact on reading growth. This study does bring to light that there are large numbers of students with ASD who would benefit from more research on ways to teach reading comprehension.

Dedication

This dissertation is dedicated to my brother, Lucian P. Pagano. He was my business partner, my brother, my friend, and now my guardian angel. I can see now how our roads diverged in the woods, and we both took different paths, and thanks to you for leading me down the one less traveled by. It truly has made all the difference. With love, till we meet again in Heaven! - Jen

Acknowledgements

Although I refer to this as “my accomplishment” and “my dissertation”, in truth I could not have done it without the combined efforts of a number of wonderful people who walked with me on my road through the woods. I am so blessed to have so many wonderful people who supported me on my journey.

First I would like to acknowledge the love and support of my family. To my husband and best friend, Wade Ren Abnett: You were there with words of encouragement, helping hands and all the support I needed to complete this degree. I love you with all my heart. To my daughters, Gwen and Nicole Abnett, may this inspire you to reach for your dreams and let no obstacles obstruct your path.

I want to thank my parents, Nick and Marie Pagano who let me be who I was, knowing I was still headed in the right direction. To my brothers, Nick, Lucian, Matthew and Andrew: Thanks for the words of encouragement though this process.

I would like to acknowledge Mr. William Black, the best teacher I could ever have. Thanks for the first push toward “The Impossible Dream.” To the rest of my “Royal” cheering section, Laura McCann, Sandy Smith, Jeff Aquino, Scotty Kaczmarczyk, Rachael Snider and Sandra Abnett, thank you for keeping me on track while keeping me balanced.

I am sincerely indebted to Dr. Angela Snyder, my advisor, for her unending support and enormous amount of time to help me reach my goal. I cannot thank you enough for your time and sacrifice. On to our next project together! To the rest of my committee members, Dr. Sarah Eckart and Dr. Mark Fenster, thank you for jumping on this quick moving train and supporting me to the end.

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List of Abbreviations

ASD- Autism Spectrum Disorder

AYP- Adequate Yearly Progress

DSM-IV-TR- Diagnostic and Statistical Manual 4th Edition- Text Revision

EF- Executive Functioning

FAPE- Free and Appropriate Education

HFA- High Functioning Autism

HYP- Hyperlexia

IDEA- Individuals with Disabilities Act

IEP- Individual Education Plan

LRE- Least Restrictive Environment

NCLB- No Child Left Behind

OSEP- Office of Special Education Programs

PDD-NOS- Pervasive developmental disorder not otherwise specified

SEELS- Special Education Elementary Longitudinal Study

SVR- Simple View of Reading

ToM- Theory of Mind

TYP Typically Developing Peers

WCC- Weak Central Coherence

WJR - Woodcock-Johnson Research Edition

Chapter I

INTRODUCTION

In today's increasingly diverse classrooms, teaching all children, regardless of abilities, to read and write competently is a significant task. Due to the increase of students with ASD, educators are looking to the research for more information about how these students learn and what strategies have been successful. Since the implementation of the No Child Left Behind Act of 2001 (NCLB), research has focused on more effective strategies to teach students to read and to comprehend text including students with ASD (Adcock & Cuvo, 2009; Allor, Mathes, Roberts, Jones, & Champlin, 2010; Bonfiglio, Daly,Edward J., I.,II, Persampieri, & Andersen, 2006; Broun, 2004; Chiang & Lin, 2007; Cotter, 2011; Cronin, 2008; Frith & Snowling, 1983; Åsberg, Kopp, Berg-Kelly, & Gillberg, 2010) New intervention reading programs are being implemented in the classrooms today, but commonly focus on decoding skills more than comprehension skills (Huemer & Mann, 2010; C. Norbury & Nation, 2011; Åsberg et al., 2010).

NCLB and the Individuals with Disabilities Education Act (IDEA) clearly mandate that students with disabilities, such as autism, be educated in the least restrictive environment and have access to the general education curriculum. NCLB and IDEA ignited an increase in research on how typically developing children learn to read and then how to modify the curriculum for the special education population so they can be

taught together in an inclusive classroom (Humphrey, 2008; Obiakor, 2011; K. R. Taylor, 2011). Active inclusion offers the opportunity for peers to learn together and from each other.

Students with ASD and other disabilities commonly have difficulties in reading, both in decoding the text and then in comprehending what the text is about (Huemer & Mann, 2010). ASD adversely affects a student's reading abilities due to delays in language, cognition and social skills (Nation & Norbury, 2005; Rehfeldt, Latimore, & Stromer, 2003; Ricketts, 2011). The research has shown that while students with ASD can have difficulty in decoding, they seem to struggle more with reading comprehension (Nation & Norbury, 2005; Newman et al., 2007; C. Norbury & Nation, 2011). Students with ASD who have extreme difficulties in reading comprehension, but who have no difficulties in decoding can be identified as having Hyperlexia (Cardoso-Martins & da Silva, 2010; Craig & Telfer, 2005; Newman et al., 2007). The purpose of this study was to identify the reading abilities of students with ASD as they pertain to skills in decoding and reading comprehension. It then identifies which instructional strategies promote active inclusion for students with ASD and ultimately lead to academic growth.

Background

Education for students with disabilities prior to 1975 was the burden of the parents and not the responsibility of the school systems. The Education of all Handicapped Children, PL-94-142, implemented in 1975, dramatically changed the educational opportunities for special needs students. It stated that students with disabilities are entitled to a free and appropriate education and mandated that these students be given similar educational experiences to their typically developing peers.

The act, renamed the Individuals with Disabilities Education Act or IDEA, was reauthorized in 1991, 1997 and most recently in 2004, giving students with disabilities the right to a free and appropriate education (FAPE) in their least restricted environment (LRE). This act allowed for the inclusion of students with disabilities in the general education classroom and required teachers to change their instructional strategies to incorporate multiple levels of learners within one environment. Unfortunately, general education teachers are not always equipped or trained to make these changes effectively (Naraian, 2011a; Naraian, 2011b; Obiakor, 2011). This study fills a gap in the research of effective strategies for including students with disabilities in the classroom while making academic gains in the multitude of different learners.

Following the implementation of NCLB in 2001 and amendment of the IDEA in 2004, schools were held accountable to teach all children regardless of race, language or academic abilities. Schools became accountable for helping each child make adequate yearly progress (AYP) (Chiang & Lin, 2007) in reading, math and science, and NCLB incorporated significant penalties when this progress was not met. Teachers began to use new instructional strategies to help children learn to read and to write that coincided with the National Reading Panel (NRP) standards designed to improve reading skills in all students. These standards were released in a report from the National Institute of Child Health and Human Development in 2000. The report summarized research in eight areas relating to literacy instruction: phonemic awareness, phonics, fluency, vocabulary, text comprehension, independent reading, computer-assisted instruction, and teacher professional development (NRP, 2000) and provided some guidance to educators in delivering these approaches. Given that academic achievement on state assessments

relies on the students' ability to not only decode the text but be able to comprehend meaning, policymakers are looking to the research to promote tools and strategies that create gains in reading comprehension for all students, including those with reading disabilities.

ASD and Autism

At the same time as the rise in new policies implemented by NCLB and IDEA, the incidence of Autism Spectrum Disorders (ASD) has risen. According to the Centers for Disease Control and Prevention (2012), it is estimated that each year, on average, 1 in 88 children in the United States is diagnosed with an Autism Spectrum Disorder by the age of 8. This is an increase from 1 in 110 in 2009 (U.S. Department of Health and Human Services, 2012). While ASD is not gender, race, or socioeconomic status (SES) specific, it is more prevalent in white boys from a higher SES background (Fombonne, 2003; Fombonne, 2005; Myles & Simpson, 2002). Diagnosis of ASD usually occurs after the child has turned 3 or 4 years of age, but symptoms can develop as early as 18 months (Kasari, 2002). Deficits in communication and language skills, such as the use of questioning words, generally start to become noticeable by age 3 (Volden et al., 2011). Children with ASD often exhibit delays in the development of these early language skills and commonly display communication dysfunction even though the profile of the dysfunction may vary significantly for each child (Lanter & Watson, 2008; Volden et al., 2011).

Autism and Autism Spectrum Disorder are terms commonly used interchangeably based on the author or field of research. In clinical terms, Autism, sometimes called atypical autism is a subset of ASD along with other subsets such as Asperger Syndrome,

and Persuasive Developmental Disorders--Not Otherwise Specified (PDD-NOS) (C. R. Carnahan, Williamson, & Haydon, 2009; C. R. Carnahan, Williamson, & Christman, 2011; Chiang & Lin, 2007; Kurth & Mastergeorge, 2010; Rehfeldt, Dillen, Ziomek, & Kowalchuk, 2007; Whitby & Mancil, 2009). Students with Autism, Asperger Syndrome, and PDD-NOS are plotted on the Autism Spectrum based on the severity and degree of effect the impairment has on their lives (Huemer & Mann, 2010; Kamp-Becker et al., 2010; LaBarbera & Soto-Hinman, 2009; Nation, Clarke, Wright, & Williams, 2006). Persuasive Developmental Disorders used to be the broadest category that ASD, autism and PDD-NOS were classifications under (Grinker, 2008). According to the Diagnostic and Statistical Manual (referred to as DSM-IV-TR), ASD is diagnosed by a severe and pervasive impairment or limitation in several areas of development: reciprocal social interaction skills, communication skills, or the presence of stereotyped behavior, interests and activities (Newman et al., 2007; K. Whalon & Hart, 2011; Whitby & Mancil, 2009). Communication and socialization skills are common areas of deficits in children with ASD, but vary in occurrence and intensity making it a spectrum disorder (Cardoso-Martins & da Silva, 2010; Whitby & Mancil, 2009).

In academic settings, IDEA uses the term Autism to identify all students who fall on the ASD continuum to qualify them for services under an Individual Education Plan (IEP). Autism is one of the 13 IDEA disability codes for special education services in a school setting. According to DSM-5 revision website (http://www.psychDSM5.org/practice/dsm), ASD will become the universal term for these developmental disorders. For this study, the term ASD and autism were used

interchangeably as a cover term for all students who qualify for special education services under the coding of Autism.

Neuropsychological Theories

Cognitive and language deficits are typical in students with ASD which manifest when trying to understand social cues, communicate feelings, or understand social relationships among people (Cotter, 2011; Hart & Whalon, 2011a; Lombardo & Baron-Cohen, 2011). These deficits can cause difficulties for students with ASD when trying to comprehend a text past a literal level. Three different neuropsychological theories of why students with ASD struggle in reading include Theory of Mind (ToM), Weak Central Coherence (WCC) and Executive Functioning (EF) deficits (Lanter & Watson, 2008; Nation et al., 2006; Randi, Newman, & Grigorenko, 2010; St. Clair, Durkin, Conti-Ramsden, & Pickles, 2010). Understanding these theories can help identify the reasons for deficits in reading and ultimately help create instructional strategies to improve reading comprehension.

Theory of Mind (ToM) states that students with ASD have a diminished ability to make inferences about the emotional states of others (C. R. Carnahan et al., 2011; Frith, Happé, & Siddons, 1994; Randi et al., 2010; White, Hill, Happe, & Frith, 2009).

This deficit becomes difficult in literacy when trying to understand decisions or actions made by a character in a story (Colle, Baron-Cohen, Wheelwright, & van, 2008). For example, to understand why Snow White is apprehensive when taking the apple from the old lady, the reader has to have background knowledge of the danger of taking food from a stranger, and then realize that Snow White is feeling this stranger may be suspicious (Walt Disney Co, 1937). Students with ASD commonly do not see the point

of view of the characters in a book which weakens their comprehension of the text (Colle et al., 2008; Lombardo & Baron-Cohen, 2011).

Weak Central Coherence (W) posits that students with ASD display extreme attention to detail at the expense of the bigger picture (C. R. Carnahan et al., 2011; Plaisted, Saksida, Alcántara, & Weisblatt, 2003).

Students with ASD who struggle with WCC will be able to sequence a story or list the different elements of a story, but do not see the message behind the text or understand the overall theme or purpose of the text. It is seeing the trees despite the forest. For example, a child with WCC would spend too much time describing the different positions the gingerbread boy takes on the fox's back as they cross the water in the classic fairytale *The Gingerbread Boy (1875)*. He would focus on where the gingerbread stood rather than the understanding that the fox is trying to move the gingerbread boy closer to its mouth to eat it. WCC causes many elements of the story to be overlooked and therefore true comprehension is missed.

The final theory, Executive Functioning (EF) deficits, indicates that students with ASD display a deficit in executive functioning which is defined by the inability to identify a goal and carry out the steps to achieve that goal using self-monitoring and self-corrections (Chiang & Lin, 2007; Griswold, Barnhill, Myles, Hagiwara, & Simpson, 2002; ÅSBERG, 2010).

When reading for meaning, EF deficits in students with ASD create an inability to read for meaning or purpose (C. R. Carnahan et al., 2011). Students with deficits in EF will read on even if the text does not make sense. The process of stopping, checking and rereading if necessary does not work for a child with ASD and deficits in EF.

All of these functions are essential in the movement beyond pronunciation of the words into a more meaningful interaction with the text. Since reading is defined as a process of constructing meaning from written language (Allington & Cunningham, 2002) these theories of deficits can halt reading comprehension. Deficits in these three areas, along with language impairments, can cause students to struggle with reading and other academic skills (C. R. Carnahan et al., 2011; Lombardo & Baron-Cohen, 2011; Loth, Gomez, & Happe, 2008). Given the variety of these symptoms and range of severity students with ASD display, there is a paucity of research on the academic skills of these students. This study will add to the research on reading difficulties for students with ASD.

Simple View of Reading

Research has shown that students need strength in both decoding and reading comprehension skills to read, but at different levels (C. Carnahan, Musti-Rao, & Bailey, 2009; Grigorenok et al., 2002; Mirenda, 2003). For independent reading, students first must be able to decode text, and then be able to comprehend what is read into meaning (Allington & Cunningham, 2002). For years the focus has been to first teach reading in terms of decoding skills and then work towards comprehension skills after decoding has been mastered (Gustafson, Falth, Svensson, Tjus, & Heimann, 2011; Guthrie et al., 2009). However, based on research of reading to young children, language development and listening comprehension skills can be nurtured prior to mastery of decoding skills (Gustafson et al., 2011).

Understanding where the deficits lie in students learning to read can help teachers plan lessons and use interventions to teach to the child's deficit areas. The Simple View

of Reading (SVR) (Figure 1, pg.12) is a conceptual framework helpful to understanding how reading is learned and has been used to assist in categorizing where deficits can arise (Nation & Norbury, 2005; Ricketts, 2011). The formula equates reading comprehension (RC) as a product of listening comprehension (LC) and decoding (D), sometimes displayed as RC=LC x D. The Simple View of Reading divides reading into two skills; comprehension and decoding which combined create literacy. Strengths and deficits in these skills create a four box model of impairments: identifying students with high decoding and high comprehension; high decoding and low comprehension; low decoding and high comprehension; and low comprehension and low decoding (Figure 1). Plotting students within the four categories identifies where the students' discrepancies in reading are, whether comprehension, decoding or both.

The four box model (Figure 1) puts students with strengths in listening comprehension skills on top and students who struggle with listening comprehension on the bottom. To the left of the center line are the students who have poor decoding skills. To the right of the center are students who have strengths in decoding skills. Box A represents good comprehension skills, but poor decoding skills. These students are commonly diagnosed with Dyslexia. Box B represents students who have high decoding and high comprehension and therefore are commonly good readers. The students in Box C are lacking skills in both and need both decoding and comprehension support. The final box is D. Students who land in box D have good decoding skills but poor comprehension. Students with Hyperlexia fall in this category.

ASD and Hyperlexia

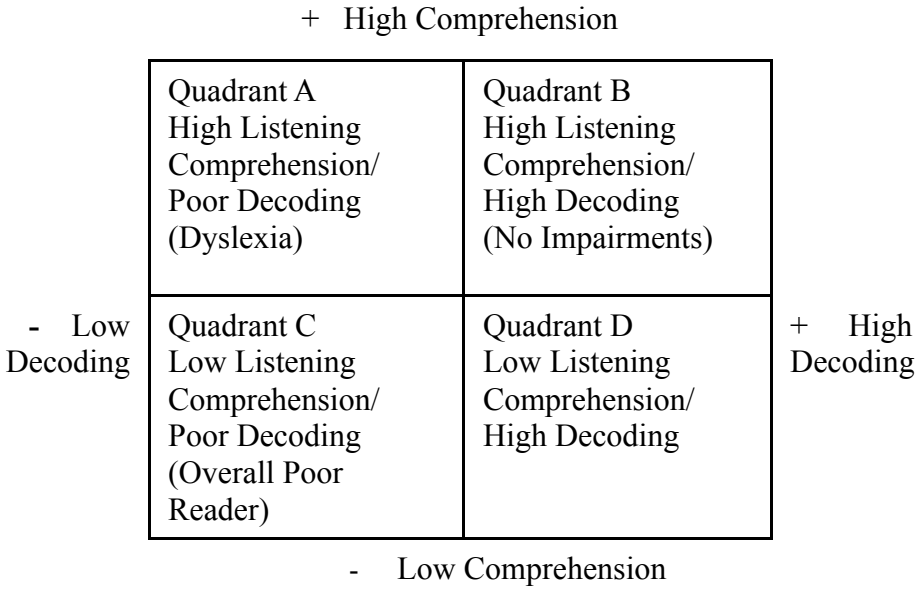
Students with ASD commonly show deficits in communication skills and metaphorical meanings of language on top of the neuropsychological issues causing them to have more difficulty developing reading comprehension skills than decoding skills (C. Carnahan et al., 2009; Catts, Adlof, & Weismer, 2006). Studies have shown that decoding skills can develop normally in students in with ASD, commonly due to strengths in systematic patterns in phonemic skills (Huemer & Mann, 2010). Yet, studies show that possessing the ability to decode text does not guarantee that students have the ability to read for meaning (K. Whalon & Hart, 2011). The academic demands of being able to read for meaning increase as children enter grade 3 and continues to increase throughout their school career (Allington & Cunningham, 2002).

Hyperlexia is a relatively unknown term in special education. Researchers are still trying to find a universal definition. Silberberg and Silberberg coined the term in 1967, and indicated that students displaying Hyperlexia have the ability to decode but not comprehend the written word. The syndrome was first described as having an early onset ability to decode that was not consistent with the ability to comprehend words (Craig & Telfer, 2005; Silberberg & Silberberg, 1968; Silberberg & Silberberg, 1971). Since then, there has been some discussion whether Hyperlexia is its own disorder or a characteristic of many developmentally delayed disorders such as ASD (Grigorenok et al., 2002; Newman et al., 2007). Grigorenok et. al (2002) set out to evaluate 80 students with a developmental delay against the criteria for Hyperlexia. They found that students with disorders other than ASD did not have Hyperlexia (Grigorenok et al., 2002). They also found that children with Hyperlexia range in IQs in the same statistical span as those

without Hyperlexia. Needleman (1982) listed five criteria for Hyperlexia which include 1) presence of a developmental delay; 2) early single word reading; 3) self-generated decoding ability without instruction; 4) compulsive reading behavior; and 5) higher reading/ decoding ability than expected by cognitive intelligence. A consensus of a basic definition of Hyperlexia has risen in clinical and research fields as a characterization of superior word-reading skills above the reading comprehensions, verbal functioning level, or general cognitive functioning (Newman et al., 2007).

For this study, students with ASD and difficulties in reading comprehension were identified to see which instructional strategies could support this population of students. Students with ASD who displayed high decoding skills and low comprehension skills were identified as having Hyperlexia. This more general definition of a significant discrepancy between decoding skills and comprehension skills based on the students' placement in quadrant D of the SVR framework was used for the study. The early onset of the decoding component, stated in some definitions of Hyperlexia was not included in this definition of Hyperlexia because there is still discussion on this early onset and its connection to ASD (Lanter & Watson, 2008).

Figure 1: Simple View of Reading Four Box Framework



The NRP recommends that more research be conducted on students with ASD in the area of word decoding and reading comprehension (Chiang & Lin, 2007; Nation & Norbury, 2005; Newman et al., 2007). Students with ASD commonly have discrepancies between their decoding and comprehension skills and fall in quadrant D of the Simple View of Reading, because they can decode text, but have difficulty grasping meaning from text (Chiang & Lin, 2007; Mirenda, 2003; Nation & Norbury, 2005). Many studies on children with ASD found their decoding skills to be average or close to average when compared to their typical peers, yet score significantly lower on text comprehension (Grigorenok et al., 2002; Huemer & Mann, 2010; Myles et al., 2002). Most of these studies were done with students with high functioning autism or Asperger Syndrome. The goal of many of the studies was to increase the understanding of students with ASD

and Hyperlexia, and to discover how these impact their learning (C. R. Carnahan et al., 2009; C. R. Carnahan et al., 2011; Flores & Ganz, 2009).

Text Integration

The difficulty in comprehension for students with ASD may be due to difficulties with text integration or oral language skills (Nation & Norbury, 2005; Nation et al., 2006). Text integration is the ability to make connections from the reader's personal experience to the characters and events in the book. Students with ASD may have low vocabulary, minimum prior knowledge or lack of experiences to support oral language skills (Nation & Norbury, 2005; C. F. Norbury, Griffiths, & Nation, 2010). Fluent reading for meaning can require higher order skills of cognitive ability (Huemer & Mann, 2010; Ricketts, 2011) such as ToM, WCC or EF. While research has increased on students with ASD and Hyperlexia, the literature still quests for a better understanding of the discrepancy between decoding and comprehension (Nation & Norbury, 2005; Nation & Norbury, 2005; Newman et al., 2007; O'Connor & Klein, 2004; Randi et al., 2010; Simpson, de Boer-Ott, & Smith-Myles, 2003), the understanding of Hyperlexia in students with ASD, and instructional strategies to help these students be able to read independently (C. R. Carnahan et al., 2011; Lanter & Watson, 2008; K. J. Whalon & Hart, 2011).

Active Inclusion

Since the updates made to IDEA (2004), more and more students with disabilities are being placed back in the general education classroom (Chan & O'Reilly, 2008; Hart & Whalon, 2011a). Allowing students with disabilities to learn and to participate with their nondisabled peers fosters an inclusive environment. According to a study by Chandler-

Olcott and Paula Kluth (2009), everyone benefits from inclusion. They looked at the benefits of inclusion for the nondisabled peers and the teachers. They state the following results occur when students are meaningfully included: 1) literacy concepts expand, 2) multiple ways of participation are valued, 3) instructional planning changes to focus on outcomes, and finally 4) teachers change their views and embrace all students (Chandler-Olcott & Kluth, 2009).

Teachers commonly have difficulty including these students in their classrooms not because they do not want to, but more because they do not know how to teach inclusion students. A study conducted by Taylor, Richards, Goldstein and Schilit (1997) on teachers' perceptions of inclusive settings showed that teachers like the philosophy of inclusion but have difficulty modifying the curriculum to meet all children's needs in the time given. Classroom teachers commonly do not know how to teach them and therefore do not give these students the instruction they need. The inabilities lead to students who need extra support getting less support than the average students.

While many classrooms are being listed as inclusive classrooms, the question arises if the teachers are truly including the special education students. There is a difference between physical inclusion and active inclusion. Prior to 1997, inclusion was used to describe a location of services (mainstream or special education classrooms (Humphrey, 2008). Humphrey (2008) described inclusion as one that includes the promotion of presence, participation, acceptance, and achievement. This idea of inclusion will be described as active inclusion for this study.

Students with ASD benefit from active inclusion. ASD adversely affects a student's education due to delays in language, cognition, and social skills (C. R.

Carnahan et al., 2009; C. R. Carnahan et al., 2011; Flores & Ganz, 2009; Infantino & Hempenstall, 2006; Iovannone, Dunlap, Huber, & Kincaid, 2003; D. Kamps et al., 2002; St. Clair et al., 2010; Volden et al., 2011; Whitby & Mancil, 2009). These discrepancies can make learning to read very difficult, and general education teachers are commonly untrained in teaching reading and writing skills to students with ASD (Chiang & Lin, 2007). Using Humphrey's (2008) model of active inclusion would allow for students to be involved in language rich environments (Moores-Abdool, 2010; O'Connor & Klein, 2004; Simpson et al., 2003; K. J. Whalon & Hart, 2011). These environments foster social skills and modeling can support students with ASD in academic achievement, especially in the area of reading (K. J. Whalon & Hart, 2011).

IDEA and NCLB have helped place students with special needs back into the classroom, and inclusive settings have been shown to support language development for students with ASD (Chandler-Olcott & Kluth, 2009; Kliewer et al., 2004). For example, Chandler-Olcott & Kluth (2009) highlighted two studies where the students who were actively included in a language-rich environment showed positive benefits in their own language development. Active inclusion does not mean just physical presence in the classroom, but having the student take an active role in the learning process and classroom activities. Humphrey (2008) described the idea of active inclusion as one that stresses presence, participation, acceptance, and achievement. The research shows that when active, participatory inclusion is being used in the general education classroom, students with ASD benefit with academic gains in the area of reading (Chandler-Olcott & Kluth, 2009; Humphrey, 2008; Kliewer et al., 2004; Simpson et al., 2003; K. J. Whalon & Hart, 2011).

Even with the increase in studies pertaining to students with disabilities and inclusion, few studies focus on clear instructional strategies for reading that could be generalized from the small sample to the large population to be used within the classroom. Of the small sample studies pertaining to students with ASD and reading strategies, interventions, or modifications, only a few researchers have focused on general classroom strategies that have shown success in supporting students with ASD in reading achievement, especially in the area of reading comprehension. They include classroom participation and discussion groups (Chandler-Olcott & Kluth, 2009; LaBarbera & Soto-Hinman, 2009; Simpson et al., 2003), questioning strategies (Iovannone et al., 2003; Jones, 2007; Randi et al., 2010), and peer tutoring (Jones, 2007; Lanter & Watson, 2008; Petursdottir, McComas, McMaster, & Horner, 2007). All of these instructional strategies displayed positive results for students with ASD. This current study identified three reading strategies that support reading comprehension skills in an inclusive setting. They are questioning strategies, peer tutoring, and discussion groups. The study analyzed the use of these strategies on students with ASD during reading to see if the strategies helped make academic gains in reading.

Questioning Strategies

When students engage in questioning activities, peer tutoring and discussion groups, a rich language environment develops and academic engagement increases (Adcock & Cuvo, 2009; Bedrosian, Lasker, Speidel, & Politsch, 2003; Kliewer et al., 2004; LaBarbera & Soto-Hinman, 2009; Åsberg, 2010). Modeling what good readers do in their head through thinking aloud or self-directed questions, students with ASD gain examples of how to connect with the text (Allor et al., 2010; Colle et al., 2008; Gately,

2008; Iovannone et al., 2003; Kluth & Darmody-Latham, 2003; Åsberg et al., 2010). Students with ASD who participate in questioning modeling strategies move from less general reading strategies of sequencing to more in-depth reading strategies like author's purpose or point of view. Listening to their peers ask questions and listening to responses model what good readers do and students with ASD can learn by example. These higher order skills show they are integrating with the text beyond a factual level (K. Whalon & Hanline, 2008).

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Peer Tutoring

Peer tutoring allows the students to be the teachers and the learning to become reciprocal. Kamps (1994) found that reading rates and comprehension performances of the three students with ASD studied improved from 47%, 24% and 67% (respectively) to 85%, 85% and 100% on comprehension tasks after working with peer tutors. The use of small interactive groups that aim to use nondisabled peers as tutors has been shown to improve reading outcomes for students with disabilities. On the other side, Chandler-

Olcott and Kluth (2009) studied the effects of peer tutoring on the tutors as well as the benefits from the students with ASD. They found that the presence of students with ASD in the classroom can help both the teachers and the general education students to embrace and to advocate for their peers with disabilities (Chandler-Olcott & Kluth, 2009).

Discussion Groups

The use of discussion groups and interaction with peers engages all students including those with ASD and has been identified as a major factor in academic outcomes (Lanter & Watson, 2008). Ruddell (2002) identified cooperative reading approaches that are successful for all students including paired reading or small group discussion sessions. Vaughn, Gersten and Chard (2000) found that small interactive groups supported reading comprehension. The study showed significant differences in favor of the treatment students on the Gates-MacGinitie Reading Comprehension Test (Vaughn et al., 2011).

The use of these strategies has been shown to be effective in the classroom for all students including those with ASD. For years, policy makers and curriculum writers have focused on phonics interventions due to the theory that phonics needs to be mastered first (Randi et al., 2010; Silberberg & Silberberg, 1971). Unlike decoding difficulties that have generated prescriptive intervention programs and curriculums to instruct students in phonics, comprehension skills are vague and require more teacher lead planning and support. The ability to teach reading comprehension brings in the child's background knowledge, language skills and the ability to construct meaning (Randi et al., 2010; Ricketts, 2011; Saldaña & Frith, 2007).

Students with ASD have difficulty with these skills and therefore struggle with reading comprehension (Chiang & Lin, 2007; Nation & Norbury, 2005; National, 2000; Newman et al., 2007; C. Perfetti, Chin-Lung Yang, & Schmalhofer, 2008). While studies have shown that inclusion and specific instructional strategies that promote active inclusion are beneficial and present academic gains for students with ASD, these strategies are not often utilized in the classroom (Humphrey, 2008; McLeskey & Waldron, 2011; Ncube, 2011b; Obiakor, 2011). Unfortunately, most of the studies that support intervention strategies on students with ASD have been done on small sample populations (Chiang & Linn, 2007). If the research is to be generalizable to a larger population, larger samples from more diverse populations need to be used. It is clear that more research promoting effective strategies for facilitating literacy development in inclusive settings, specifically development of reading comprehension skills, needs to be published in sufficient numbers (Chiang & Lin, 2007). This study utilized the SEELS database which offers a large nationwide population of students to study.

STUDY RATIONALE

Over the past 20 years, many changes have led to a need for more research on teaching comprehension for students with ASD. They include the increase of inclusion through IDEA, an increase in the number of students diagnosed with ASD, and NCLB's push for academic achievement for all students. Federal law mandates that all students have access to the general education curriculum and be taught in their least restricted environment; therefore more research done with large sample sizes is needed to help teachers identify the strengths and weaknesses of students with ASD in the general education classroom, and then to create a plan to effectively teach them. Research on

reading has commonly focused on decoding skills, clearly a cardinal part of reading, yet leaving a gap in strategies that support the development of reading comprehension. Combined with the rise in the incidence of students with Autism Spectrum Disorder (ASD), there is a rise of students with both ASD and Hyperlexia (Aram, 1997). Because of these two factors, there is a need for research on teaching students with ASD and Hyperlexia, and on how they can better comprehend text in the general education classroom.

While many studies have been conducted on small scale samples to look at trends in ASD reading capabilities (Broun, 2004; Chiang & Lin, 2007; Cotter, 2011; Randi et al., 2010; Ricketts, 2011), these studies only offer small snapshots of what is really happening with the larger population of students. This gap in research can be filled through use of the data available in a national longitudinal, large scale sample such as the Special Education Elementary Longitudinal Study (SEELS) to focus on similarities and differences in the literacy capabilities of students with ASD. Using a large scale dataset that collects data across multiple years gives the researchers two advantages. The first is the ability to study greater numbers of students compared to the small single subject design research of students with ASD that typically includes fewer than 10 students in a single school or district. The second advantage is time. Most research (cross sectional design) is a snapshot of what is going on with a student at one point in time only. When looking at reading development, having the ability to track growth over a long period of time offers the researcher the capability to see long term effects of the intervention, accommodation or modification.

For these two reasons, the data that were used for this study were obtained from the Special Education Elementary Longitudinal Study (SEELS), which was funded by the Office of Special Education Programs (OSEP) of the U.S. Department of Education. SEELS is a national study that collected a comprehensive database of information from a representative sample of students with disabilities ages 6 through 12 over three waves from 2000 to 2004. Information was collected from parents, teachers, and students on a wide range of topics including students' characteristics, experiences, services and outcomes (SEELS, 2008). The study collected answers to questions pertaining to the same students during three different points of time based on the academic school year. Each point of time is identified numerically as wave one (2000-2001), two (2001-2002) and three (2003-2004). The SEELS study represents a sample of more than 11,000 students with disabilities between the ages 6 and 12 at the start of the study in 2000 (SEELS, 2005). The purpose of the SEELS was to measure academic, social, vocational and school attitudes, as well as the abilities of students with disabilities. Data were collected across three waves from parents, teachers, students through direct assessments and record reviews. Using the SEELS data, variables were collected from the database to conduct original research that looks at academic achievement across the four years of the study and their relationship to active inclusion for students with ASD.

PURPOSE OF STUDY

The purpose of this study was to use the Special Education Elementary Longitudinal Study (SEELS) to first explore trends in active inclusion in the general education classroom for students with ASD. The study then explored the relationship between reading comprehension and decoding skills of students with ASD. Thirdly, the

study aimed to identify instructional strategies that are effective in teaching students with ASD and Hyperlexia to comprehend text read in the classrooms today. This study analyzed the reading comprehension skills of students with ASD and Hyperlexia who received instructional strategies that foster active inclusion in the general education classroom. These instructional strategies are 1) peer tutoring, 2) discussion groups, and 3) questioning strategies. The conceptual framework used in this study (Appendix 1) visually displays how students with Hyperlexia, instructed with one or more of the four instructional strategies (the independent variables) are impacted in terms of academic achievement growth (the dependent variable) over time. This model controlled for the classic predictors of reading ability (gender, ethnicity, socioeconomic status, parent education, and home language), as well as the impact of the instructional strategies above and beyond their classic predictors. Educational practitioners can use the results from this study as they develop school policies and practices that lead to academic achievement of students with ASD included in the general education classroom.

Phase One:

Teachers are being required to include special education students in to the classroom. Across the country more and more students with disabilities are being educated with their nondisabled peers (McLeskey & Waldron, 2011; Moores-Abdool, 2010). This study addressed whether these students are actually being included in the learning process or are they just there as a physical presence. The first phase of this study looked at students with ASD and how they are being included in the classroom today. Is it a physical presence or is active inclusion happening in the classroom?

Phase Two:

One specific group of students included in the general education classroom is students with ASD and Hyperlexia. These students have the capability to decode the text, but lack the skills to comprehend meaning from it. This study examined the accommodations given to children with ASD who fall in the Hyperlexia category on the SVR framework. Lastly, this researcher examined the trends in academic progress of the identified students across the six-year span of the SEELS study to investigate the impact of the identified accommodations on their reading comprehension skills.

SIGNIFICANCE OF THE STUDY

Students with disabilities including ASD are increasingly being supported in the general education classroom with instructional strategies. Current research has called for further investigation into support for students with ASD in the area of reading while being included in the general education classroom (Chiang & Lin, 2007; C. Norbury & Nation, 2011). This study not only adds to the current field of research, but will be beneficial due to the large representative sample that was gathered by the SEELS database. Educational practitioners will gain a better understanding of how students with ASD can learn to read and understand the text through active inclusion strategies. Information gained from the study will potentially be taught in college preparation courses enhancing the preparation of general and special education teachers by adding best instructional practices on how students with ASD learn to read, and will be able to be used by in-practice teachers seeking ways to improve instruction for all students in their classrooms.

RESEARCH QUESTIONS

Based on the purpose and significance already outlined, the following research questions were examined in this study:

Phase One:

1. To what extent are students with ASD included in general education classrooms for language arts?
    a. How many hours are students with ASD included in the general education classroom?
    b. What classroom settings (general education classroom, resource room, self-contained special education classroom, or other) are being used to teach students with ASD?
    c. What instructional strategies are being used within the classroom for these students?
2. Among students with ASD, what is the relationship between these instructional strategies (peer tutoring, discussion groups and questioning strategies) and academic growth (Appendix 1) in reading comprehension?

Phase Two:

3. What is the distribution of students in the SEELS dataset diagnosed with ASD within the four quadrants of the Simple View of Reading (SVR) framework?
4. Among students with ASD in quadrant D of the SVR (those with Hyperlexia), what instructional strategies are being used to support reading skills development?
5. Among students with ASD in quadrant D of the SVR (those with Hyperlexia), what is the relationship between these instructional strategies (active inclusion,

peer tutoring, discussion groups and questioning strategies) and academic growth in reading comprehension?

Chapter II

REVIEW OF LITERATURE

The following review of the literature provides an overview of the variables under investigation in this study: Autism Spectrum Disorder (ASD), Hyperlexia, the advancements in reading policy, literacy skills and the separation of decoding and comprehension skills using the Simple View of Reading (SVR). The next portion will review the literature on comparing the performance of students with ASD on reading skills, including comprehension and decoding, to their nondisabled counterparts. Finally, the review will look at the different classroom strategies researched to support students with Autism Spectrum Disorder who have difficulties in reading comprehension including active inclusion, questioning, peer tutoring, and discussion groups.

Defining Autism and ASD

Asperger Syndrome, Autism, and Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS) have gained popularity in the media and an increased presence in the classroom. These disorders are commonly considered to be under the umbrella term Autism Spectrum Disorders (ASD). The variability of characteristics displayed by people affected and the range of severity of the disorder account for the differences in diagnoses (Baio, 2008). While the occurrence of ASD stems back prior to the 1940s (Frith, 2003), it has only really been fully recognized in the last 25 or so years. The term "autism" was coined by Leo Kanner in 1943 to describe a group of 11 children

who displayed delayed speech, excellent rote memory and the prevalence of echolalia (Frith, 1989). At the same time across the ocean, Hans Asperger described a group of children with social peculiarities and social isolation. His diagnosis was later given the name Asperger Syndrome in his honor in 1990. Lorna Wing popularized the term "Asperger syndrome" in the English-speaking medical community in her 1981 publication about 35 individuals with the disorder (Myles & Simpson, 2002). Autism, AS, and PDD-NOS are all identified in the International Statistical Classification of Diseases and Related Health Problems, 10th Revision: Version 2010 (ICD-10) under Pervasive developmental disorders (PDD). The American Psychiatric Association's Diagnostic and Statistical Manual-IV, Text Revision (DSM-IV-TR) acknowledges ASD as a synonym for PDD and is to become the new umbrella term for these disorders (http://www.dsm5.org/ProposedRevisions/Pages/Default.aspx). The criterion for ASD includes impairments in social interactions, communication, and restricted, repetitive and stereotyped patterns of behavior (Dunlap & Berton-Pierce, 1999).

In the education system, IDEA identifies Autism as one of the 13 classification codes for receiving special education services (IDEA website, retrieved September 18, 2012). ASD is commonly used synonymously with Autism, which is the IDEA blanket term for these disabilities in educational settings (Randi et al., 2010; Ricketts, 2011; K. Whalon & Hart, 2011; Whitby & Mancil, 2009). When creating an individual education plan (IEP) for these students, the choice coding for diagnosis and access to support these students is Autism.

Current research is still questioning whether autistic subtypes such as Asperger Syndrome (AS), Pervasive Developmental Disorder-Not otherwise specified (PDD-

NOS), atypical autism (AA) are indeed subtypes or severity grades on the spectrum (Croen, Grether, Hoogstrate, & Selvin, 2002a; Fombonne, 2003; Fombonne, 2005; Frith, 2003; Grandin, 2007). Kamp-Becker, Smidt, Ghahreman, Heinzel-Gutenbrunner, Becker and Remschmidt (2010) studied over 140 students between the ages of 6 and 24 who were diagnosed with either Asperger syndrome, Atypical autism, High Functioning Autism or PDD-NOS. Using the German version of the Autism Diagnostic Observation Scale (ADOS-G), as well as the Autism Diagnostic Interview- Revised (ADI-R), Kamp-Becker et.al (2010) found that it is "not possible to distinguish AS from HFA or AA, but to discriminate ASD from non-autism disabilities is feasible by summing up autistic symptoms" (p. 926).

Another study (Griswold et al., 2002) looking at characteristics of children on the Autism Spectrum describes the characteristics of children with Asperger Syndrome. The study states children with this disorder display strengths in factual based materials and rote memory (Griswold et al., 2002). This is common for students with ASD, but at different severities. Griswold et al. found that students with AS have deficits that lie in the inability to process information for inferential meaning. Challenges include (1) poor comprehension of abstract concepts (2) too literal interpretation of information, (3) comprehension of figures of speech, (4) problem solving and (5) finally separation of relevant and irrelevant information (Griswold et al., 2002).

Many researchers now agree that Autism is a spectrum disorder and Asperger Disorder is not a separate or distinct disorder, but is at the high functioning or mild end of the Autism spectrum (Frith, 2003; Mayes et al., 2009). For this study, the IDEA term of Autism or ASD will be used simultaneously as the blanket term for all students receiving

services under IDEA's coding of Autism. This is the way the terms are used in the SEELS database and are commonly used in educational settings.

Demographics of ASD

Over the past two decades, Autism Spectrum Disorder (ASD) has come to the forefront of research due to the increase in diagnoses. With the increased prevalence of new cases of ASD in children, educators and policy makers are looking to the research community for new means to identify and teach children with ASD. As of the fall of 2012, the Centers for Disease Control (CDC) estimate that approximately 1 in 88 American children will be diagnosed on the autism spectrum (U.S. Department of Health and Human Services, 2012). While some of the increase in the prevalence of ASD can be attributed to the incidence of the disorder itself, researchers believe that many new cases can be explained by improved diagnosing strategies (Baio, 2008) (Kamp-Becker et al., 2010; Mayes et al., 2009).

ASD has been shown to be most prevalent in Caucasian boys from upper middle class families (Croen, Grether, Hoogstrate, & Selvin, 2002b; Fombonne, 2005; Grinker, 2008). In the U.S. alone, it is estimated that 1 out of 54 boys and1 in 252 girls are diagnosed with ASD, making it almost four times more prevalent in boys (Craig & Telfer, 2005; Fombonne, 2003; Fombonne, 2005; Grinker, 2008; Kasari, 2002). A study was conducted by Michael J. Morrier, Kristen L. Hess and L. Juane Heflin (2011) to describe the ethnic and gender distribution of students with ASD. This study determined common characteristics of children with ASD in Georgia by collected demographic data from teachers in the Georgia public school systems who work with children with ASD. Researchers received 234 surveys from teachers who worked with 226 students with

ASD in their classrooms. Morrier et. al. found that 84.07% of the students were male giving a gender ratio of 5.76:1 over girls.

The ethnicity of the sample was close to the ethnic representation of Georgia, identifying 57% of the students as Caucasian; 34.51% African American; 1.33% Asian; 0.44% of Hispanic or Latino origin; 0.44% Native Hawaiian and 3.54% were reported as other or mixed race. Socioeconomic status (SES) was calculated using participation in free or reduced lunch programs. Students diagnosed with ASD, and coded as low SES represent 50.45% of the population. Discussion from the study stated that the gender ratio was representative of the national profile. According to the results, Caucasians were overrepresented, while students from diverse backgrounds were under-represented within the autism eligibility category. Reasons for this disproportion in the identification of ASD in different cultures listed in the study were cultural values placed on education, diagnosis of disabilities or possibly language barriers that impede learning first.

Another study conducted to look at the demographics of ASD was done in 2002 by Croen, Grether, Hoodstrate, and Selvin. They examined the epidemiology of Autism in California. Using all children born between 1989 and 1994 whose mothers were California residents at the time of delivery, the study found that over 4,000 children were diagnosed with full syndrome autism and were identified by the California Department of Developmental Services (DDS). This gave a representation of a prevalence of 12.4 per 10,000 infants (Croen, Grether, Hoogstrate, & Selvin, 2002b). The rise in ASD nationwide necessitates research for academic strategies for teaching this growing population.

IDEA and Autism/ASD

The Individuals with Disabilities Education Act (IDEA) is a federal law enacted in 1990 and reauthorized in 1997 and 2004. It was created to protect the rights of students with disabilities by ensuring that all students receive a free and appropriate public education (FAPE). In addition to equal access, IDEA also provides services and safeguards for students with disabilities at no cost to the parents (U.S. Department of Education, 2012). Special education services include size of instructional grouping, differentiated curriculum, implementation of modifications, specialized services, and assistive technology tailored to the child's specific needs. These services are identified on an Individualized Education Program (IEP). Children between the ages of3 and 21, who meet the eligibility criteria for one of 13 categories (autism, deaf/blind, deafness, hearing impaired, mental retardation, multiple disabilities, orthopedic impairment, serious emotional disturbance, specific learning disabilities, speech or language impairment, traumatic brain injury, visual impairment including blindness, and other health impairment) can qualify for an IEP. Students with impacting symptoms of ASD can qualify for an IEP under the IDEA coding of Autism.

Based on the severity and characteristics displayed by the child with ASD, school support can be given in many different ways. Just like the disorder itself, support can be plotted on a spectrum from intense to moderate support. Children with ASD can be supported inclusively in the general education classroom where the child is taught the same curriculum in the same setting with their typically developing peers. Moving down the spectrum of support, there is the option for pull out services. The child is taken out of the classroom in a one-on-one or small group setting to focus on one or more specific

skills that are not focused on in the general education classroom. This is commonly referred to as a resource room. The most intense setting for services is a self-contained classroom where the focus of the learning is teaching skills that are specific to the child's IEP. In the Morrier, Hess, and Heflin (2008) study of Georgia public schools, 42% of the subjects were categorized into an educational setting. The study found that 20.65% of the students received services in the general education classroom. This group of children being educated in the general education classroom is large enough to be looked at for strategies and modifications to support their educational needs. This study adds to the research on how to effectively teach this growing population of students in the classroom.

Academic Achievement

Adequate Yearly Progress (AYP), now called School Progress Indicator (SPI) has pushed for the need for academic achievement of all students including those with ASD. Academic achievement refers to the extent to which learners have gained the knowledge from the lesson being taught. For schools and states to make AYP, students need to become proficient in the areas of reading, math and science each academic year (U.S. Department of Education, 2012). Reading for content in other subject areas such as math and science requires the ability to read for meaning. Reading comprehension has been identified as "the most important academic skill learned in school (Mastropieri & Scruggs, 1997) because we need to be able to extract meaning from text in order to learn. All academic achievement, communication, and learning opportunities can be stemmed back to reading comprehension (Nation & Norbury, 2005).

NCLB, Race to the Top, and Reading

The No Child Left Behind Act of 2001, signed into law by President George W. Bush on Jan. 8, 2002, was a reauthorization of the Elementary and Secondary Education Act, which was the federal government's aid program for disadvantaged students. The main components of NCLB were to implement a number of measures designed to promote gains in student achievement and hold states and schools accountable for student progress (U.S. Department of Education, 2001). Individual schools had to meet state ""adequate yearly progress" targets in hopes to have all schools functioning proficiently by the 2013-2014 school year. Schools were held accountable in math, science and reading for all students, including sub-groups of students with low social economic status (SES), race and students with disabilities. Students with special needs were identified as one of the sub-groups making students with ASD now accountable for their academic achievements.

After the election of President Barack Obama (2008), Race to the Top (RTT) was enacted by the U.S. Department of Education to stimulate reforms in state and local school districts for grades K-12. States earn funding points by supporting strategies that will give students long-term gains in academics and increase productivity and effectiveness (Race to the Top Executive Summary, 2009). Like NCLB, RTT gives schools federal funding based on academic achievement of students on standardized tests. This AYP, now entitled School Progress Indicator will be used to show academic growth in reading, math, and science for all students including students with disabilities like ASD.

With the focus on high stakes tests and implementation of strategies for long-term academic growth for all students, academic achievement for special education students has become a hot topic. Now that schools are accountable for all students to learn and to have access to the general education curriculum, research on reading difficulties and how to support students with disabilities has increased (Chiang & Lin, 2007; Nation & Norbury, 2005). For years, the focus of research on reading achievement showed how to support students with decoding skills problems, rather than on reading comprehension.

Education seems to work in polar opposites such as oral versus silent reading, and phonics versus whole language (Nichols, 2009). "Learning to Read: The Great Debate" written by Chall in 1967, recommended phonics, only as a beginning method, and for the next 30 years we had a slow shift to whole language (Nichols, 2009). Whole language education believed that to teach children how to read, teachers should expose students to rich language environments and good literature. Whole language is a "top down" approach where the reader connects to the text based on prior knowledge and rich vocabulary (Donat, 2006).

Phonics is a "bottom up" theory where students use decoding strategies to build from the bottom up the skills for reading. The belief is that once the students learn to decode, they can pick up anything and read it (Donat, 2006; Dudley-Marling, 2011). A fluctuation of research pushed phonics to the forefront of reading skills. Phonics based approaches to reading interventions were studied along with phonemic awareness programs. According to the National Reading Panel (2000), children's phonemic awareness, knowledge of letter--sound correspondence and decoding skills, are the first skills taught and tested to support and predict reading abilities (National, 2000). The

result is a multitude of intervention programs and strategies for students with phonics based difficulties. The pendulum swung back to phonics and now is trying to find a middle ground for literacy instruction. Students with ASD that displayed little difficulty with decoding were perceived as good readers. Only now, as research looks at reading comprehension does the discrepancy between the two skills become recognized.

Reading First

To help support educators in new and effective ways of teaching, a grant program called Reading First funded states to implement "scientific, research based" reading programs for children in grades K-3. This created a need and a boom in research geared toward reading strategies and interventions. States were compensated for integrating research based reading instruction and curriculum to ensure that all children are able to read by the end of third grade (U.S. Department of Education, 2009). Funds provide an increase in professional development to ensure that all teachers have the skills they need to teach these programs effectively. The program also supports the use of screening and diagnostic tools and classroom-based instructional reading assessments to measure how well students are reading and to monitor their progress. The results of the interim report released by the Institute of Educational Sciences (2008) showed that students were not making significant gains. One theory released was that comprehension skills were not increasing by this method, in spite of gains in phonics at the first grade level (U.S. Department of Education, 2008). An understanding of the separation of skills between comprehension and decoding became apparent. It also negated the idea that phonemic abilities are not strong predictors of reading abilities. This study separated decoding

skills from reading comprehension in order to see what strategies would specifically support comprehension.

When separating phonemic awareness and phonics from text comprehension, research suggests there is different academic development happening (C. A. Perfetti, 1997). While knowledge of words is important, phonemic awareness and phonics alone is not sufficient for literacy (Nation, 2001). Reading is the understanding that the words in a text are strung together to create meaningful thoughts of communication. To accomplish this, word recognition, meaning of words, semantics and syntactic structures are all necessary along with background knowledge and metacognitive structures to process meaning of sentences (Randi et al., 2010). Semantics is the meaning of words when strung together to create ideas. Syntax is the structure or rules for language. It includes adjectives, subject/verb structure and other grammar rules. This idea of bringing life to words is done through reading comprehension.

According to the National Reading Panel (NRP), comprehension strategy instruction is defined as directly teaching students to be aware of the cognitive processes involved in reading (K. J. Whalon, Al Otaiba, & Delano, 2009). The example given in the study is one of teachers modeling strategies that are brain based thinking processes such as think aloud, questioning strategies, and summarizing (K. J. Whalon et al., 2009). When these cognitive skills are modeled and used properly, students can learn how to pull meaning from text. Instructional strategies that aim to support this learning are vital to reading comprehension. Research needs to take a more in depth look at these instructional strategies for reading especially for students who struggle in reading comprehension.

Simple View of Reading

The skill of reading is complex. According to the National Reading Panel (NRP) report published in 2000, reading involves many different processes that when working simultaneously allow for understanding and connection with the text. It includes phonemic awareness, phonics, fluency, vocabulary and comprehension strategies (National, 2000). Literacy, a more academic term commonly used for reading and writing combined, involves more than just being able to read words from the text. It involves the communication with others, listening, reading, following directions and the ability to exchange information back and forth between two or more people (C. R. Carnahan et al., 2009; Huemer & Mann, 2010; Ricketts, 2011). Skilled text comprehension includes skills that process the meaning of words, syntactic and semantic structures of word combinations, back ground knowledge recall, logical inferential abilities and finally metacognitive structures (Randi et al., 2010).

Alarmingly, approximately 15%- 20% of all students have significant difficulties in reading (http://www.carrdinc.org). Studies have looked at how students read and what skills are needed to perform these tasks (Chiang & Lin, 2007; C. A. Perfetti & Bolger, 2004). The idea of reading can be divided into two components; the ability to read the written words and the ability to derive meaning from it (Catts & Hogan, 2003). Gough and colleagues (Catts & Hogan, 2003; Gough & Tunmer, 1986; Ricketts, 2011) created the Simple View of Reading (SVR) as a framework to divide reading into two components; word recognition and language comprehension. Word recognition, commonly used synonymously with decoding, is the translation of print into language. Language comprehension is the ability to derive meaning from the text and involves a

student's ability to understand what was read and be able to express that understanding in some way (Catts & Hogan, 2003). The SVR combines both word recognition and comprehension as components of good reading abilities.

The SVR is a framework that divides student's abilities into four quadrants (A, B, C, and D) (Figure 1). The four box model puts students with strengths in listening comprehension skills on top and students who struggle with listening comprehension on the bottom. To the left of the center line, are students who have poor decoding skills. To the right of the center are students who have strengths in decoding skills. Box A represents good comprehension skills, but poor decoding skills. These students are commonly diagnosed with Dyslexia. Box B represents students who have high decoding and high comprehension and therefore are commonly good readers. The students in Box C are lacking skills in both and need both decoding and comprehension support. The final box is D. Students who land in Box D have good decoding skills but poor comprehension. Students with Hyperlexia fall in this category.

Students who fall in box A or C usually receive interventions that reinforce phonics skills. The students in Box B are reading on grade level and will continue with the common core curriculum. It is the students in Box D, identified as Hyperlexic, are the least studied and commonly receive the least amount of direct support for their reading problem (Catts et al., 2006; Flores & Ganz, 2009; Grigorenok et al., 2002; Mirenda, 2003; Newman et al., 2007; Ricketts, 2011).

Phonics based instruction has received far more support and attention than reading comprehension. Catts and Hogan (2003) conducted a longitudinal study of a group of 604 students from kindergarten to 3rd grade (2003). They identified 183

students were reading at least one SD below the mean. They found that these students perform significantly lower on tests of vocabulary, grammar and/or narration. Students in second grade who had language scores that were at least one SD below normal in kindergarten represented 60% of sample. Catts and Hogan (2003) state that students with language-learning disabilities, such as those with ASD, need to have language comprehension interventions especially for those with Hyperlexia. Many teachers may ask comprehension questions but may not know how to teach explicit strategies for comprehension (Randi et al., 2010). This study will give teachers research based intervention strategies that would help specifically teach reading comprehension to students with ASD and Hyperlexia.

ASD and Dyslexia

Studies have looked at decoding or word recognition skills in students stemming from phonological awareness, phonics, and sight word recognition (Chiang & Lin, 2007; Fossett & Mirenda, 2006; Gough & Tunmer, 1986; Mirenda, 2003; C. Perfetti et al., 2008). Until recently, more of the research has focused on decoding skills because they were seen as a prerequisite for literacy instruction (Ricketts, 2011). Dyslexia is a term used for a student who cannot decipher the code of phonics in order to read the text on the page. Dyslexia, according to the International Dyslexia Association (2002), is a specific learning disability that is neurological in origin and is characterized by difficulties in accurate word recognition, poor spelling and decoding abilities, despite adequate linguistic comprehension and IQ (Huemer & Mann, 2010).

The amount of research on the ability to decode words from text in ASD children outnumbers the research on reading comprehension (Ricketts, 2011). Children with ASD

have demonstrated the ability to use phonics to decode and read words in isolation and in text. Nation, Clark, Wright and Williams (2006) studied a group of 41 students, ages 6 to 15, with ASD and minimal language skills to determine where students with ASD display deficits in four reading categories: word recognition, nonword decoding, text reading accuracy and text comprehension. The study showed that 78% of the students with ASD in this study had had average or above average decoding skills, and were able to read single words in a list presented out of content. Yet, as predicted, 65% of the sample obtained reading comprehension scores that were at least one standard deviation below population norms. Although this study was conducted on a small scale (only 41 students), it is consistent that reading comprehension disabilities can exist separate from decoding disabilities. This current study will mimic Nation et al.'s study using one SD above norm for decoding and one SD below norm for low comprehension.

There are two ways to read. One way uses decoding strategies and the other is through sight memorization of the words. In a study by Frith and Snowling (1983), they expand on this idea by stating that sign word reading is done through a lexical strategy. This is taught to help when reading commonly used words, words they know or words that do not follow regular phonic patterns. The other way to read a word is through phonological strategies which uses grapheme to phoneme conversions or phonics. The study tested this theory by testing eight autistic children, 10 typically developing children and eight dyslexic children to determine if children with autism and dyslexia use these reading strategies differently. While the students with autism and normally developing peers did not significantly differ in word reading abilities, the children with dyslexia were significantly lower than either group.

In a second experiment with these same children, the Stroop test was given to name six colors. Based on times taken, the autistic children took longer to read the color words that did not match the background (Stroop effect). This dismissed the view that children with autism only "bark at print," reading words without processing the text at all (Frith & Snowling, 1983). The study supports the idea that children with autism show more skills that merely mechanical skills or decoding. Frith and Snowling state that children with autism are more likely to have their reading problems stem from comprehension, whereas, children with dyslexia have more of a decoding problem. The research has shown that students with ASD can display a wide range of difficulties in reading. Unfortunately, interventions designed for reading comprehension skill are lacking in both the research and in practice. This study will help close the gap in the literature on how to support teaching reading comprehension skills.

ASD and Hyperlexia

Dyslexia has become a household term used in schools and clinical settings to support children with reading difficulties. Word reading is the ability to decode the sounds of the letters in order to pronounce the words. There is no comprehension or processing of meaning at this level. Students who display difficulty in reading on the word reading level are commonly diagnosed as Dyslexic and start to receive services in phonic-based programs to improve decoding skills. These prescriptive intervention programs were designed and written in a way that through the step by step process lay out in the program; students will fill in gaps in decoding skills and move to higher reading levels. Students that can read the print, but do not understand what they are reading are not supported as easily due to lack of prescriptive programs for comprehension deficits

(Flores & Ganz, 2009; Gately, 2008; Gough & Tunmer, 1986; Nation & Norbury, 2005; C. Norbury & Nation, 2011). While most schools have a core curriculum for reading comprehension, there is a lack of comprehension intervention programs. According to the latest research, dyslexia can only account for a portion of the problem (Adams & Jarrold, 2009; Frith & Snowling, 1983; Georgiou, Das, & Hayward, 2009; Gough & Tunmer, 1986; Huemer & Mann, 2010; Infantino & Hempenstall, 2006). Hyperlexia, a new term to special education, might help close the gap on identifying disabilities in reading skills. Research is still striving to gain more information on how to define the problem, identify students, and then how to support reading comprehension skills of all students especially those who display signs of reading comprehension difficulties despite average decoding skills.

In recent years, there has been a slight increase in literature on reading comprehension development indicating that there is a need for interventions focused on reading skills other than phonics and phonemic awareness (Cain & Oakhill, 2006; Ricketts, 2011). According to Ricketts (2011), students with poor comprehension, 7%-10% of the population, attracted less attention than students with decoding problems 3%-4% of the population, but outnumber them in prevalence (Ricketts, 2011). While it is generally accepted that decoding skills are the precursor to reading, there are debates in the research about whether decoding has to always be taught and mastered before comprehension (Aram, 1997; Booth & Happe, 2010; Silberberg & Silberberg, 1971; Snowling & Frith, 1986; Sparks, 2001; Temple, 1990).

Students with comprehension deficits seem to fall through the cracks, even though gaining the ability to derive meaning from text is why teachers teach reading (Lyon &

Moats, 1997; Mirenda, 2003). These students seem successful in the primary years, (kindergarten through second) because the focus of literacy curriculum is on learning to read, whereas reading to learn becomes the focus in the secondary years. By third grade, children are not only required to read for meaning, but also use these skills across all content areas such as science, social studies and mathematics. While researchers have shown that students can fall in the high decoding/low comprehension quadrants of the SVR, research has also shown that little is being provided to the classroom teacher to identify strategies and interventions that will support these students (Hollenbeck, 2011; Iovannone et al., 2003; Jones et al., 2009; Kupperman, Bligh, Barouski, & Center for Speech and, Language Disorders, 1998; LaBarbera & Soto-Hinman, 2009). Teachers need specific reading comprehension strategies to teach students with ASD to read.

Hyperlexia, a term coined by Silberg and Silberg in 1967, is defined as the precocious ability to decode words with below average skills in reading comprehension. Silberg and Silberg described these children as ones who display a precocious interest in decoding, before the age of five. These symptoms are accompanied by a deficit in reading comprehension. According to a review of research by Grigorenko, Klin, and Volkmar (2003), R.M. Needleman (1982) suggested five criteria for Hyperlexia:

> (1)The presence of a developmental disturbance (cognitive and/or language delay); (2) early manifestation of single-word reading/decoding skills (as early as age 2 but usually by age 5); (3) the self-generated onset of fluent single-word reading/decoding in the absence of specific reading instruction; (4) driven, compulsive, and indiscriminate reading behavior; and (5) a higher level of single-word reading/decoding ability than expected or predicted based on the level of intelligence.

Most research reviewed in the study supports a discrepancy of at least one SD in reading over verbal IQ levels along with some delay in comprehension along with a

display of a developmental disorder. The definition of Hyperlexia currently accepted both in the clinical and research fields is a phenomenon of word recognition skills far above the reading comprehension and cognitive functioning skills of an individual within a child with a developmental disorder such as ASD (e.g. (Mirenda, 2003; Myles et al., 2002; Nation et al., 2006; Newman et al., 2007).

Grigorenko et al. (2002) studied 80 students who were referred to the Yale Developmental Disability Clinic. These students were referred because they were showing signs of severe developmental delays and social problems at a young age. Reviewing the files of these 80 children, they discovered that a diagnosis of Hyperlexia was present in 12 of the 80 children studied. The diagnosis was based on displaying two out of the three following criteria: (1) students must have a standard reading score two SD higher than their IQ on the Kaufman Assessment Battery for Children (K-ABC) decoding subtest, (2) age equivalent scores to be two SD above age equivalent IQ, and (3) the threshold-based diagnosis confirmed by clinical observations or evaluations. Of the 12 diagnosed as Hyperlexic, six were identified as Autistic and six were identified as PDD-NOS (Grigorenok et al., 2002). The study was conducted as a snapshot of the child and did not look back at when the child's decoding ability started which questions Needleman's early onset criteria, but still supports the high decoding/ low comprehension disability that many students with ASD display. This study also supports the idea that Hyperlexia is predominant in students with ASD compared to other disabilities.

Fontenelle and Alarcon (1982) studied seven boys and one girl who were between the ages of 4.0 and 7.0, who were from lower to upper middle class families and were determined to either be mentally retarded or emotionally withdrawn. A multitude of tests

given to identify IQ, behavior and academic abilities included the Wechsler Intelligence Scale for Children- Revised, the Peabody Individual Achievement, and the Burks Behavior Rating Scales. These types of tests can be compared and contrasted to see differences in ability and IQ. The findings of the study relayed that students with Hyperlexia can vary in IQ and behavioral manifestations. The study also found that the precocious word abilities exceeded cognitive ability and this is commonly observed in mentally or emotional deficient children. The tests showed that many students with Hyperlexia use iconic, or shape of the word skills, rather than semantic skills for word reading. This study mirrors Silberberg and Silberberg's first definition of Hyperlexia.

What is still not determined is if Hyperlexia is a syndrome, a disability or a "super ability" (Fontenelle & Alarcon, 1982). Kate Nation continues to study reading skills of students with ASD. Nation and Norbury conducted a review of studies on students with developmental disorders such as ASD. They found that for many of these students, reading comprehension difficulties are prevalent. Nation, Clark, Wright and Williams (2006) looked at students with ASD to identify the different levels of reading abilities, the difference between reading comprehension and decoding, the frequency of Hyperlexia in students with ASD and finally the level of nonsenses word reading skills in the sample. Forty-one students with ASD were assessed using the Neale Analysis of Reading Abilities-II (NARA-II). The NARA-II plotted the students to show comparison of reading accuracy and reading comprehension. Students were between the ages 6 and 15 with a mean age of 10.33.

The children were tested on four different assessments that looked at reading accuracy and comprehension. Results showed that nine students were completely unable

to read. These students would be plotted in box A of the SVR. The remaining 32 were analyzed further. They also found there were 22% who could not decode. They did find that 65% of the sample showed reading comprehension scores to be one standard deviation below norms and about 33% showed severe reading comprehension impairments. Reading accuracy was found on average to be within the normative range of the test. Yet the reading comprehension score was on average 1 SD below population norms. Of the 32, 10.3% showed a discrepancy of two SD between decoding and comprehension on the NARA-II. This would plot them in box D of the SVR. When all scores were looked at together, the study suggests that students with ASD learn reading skills independently and not in unison of the other skills. So academically, students should be taught reading comprehension and decoding parallel to each other, rather than in succession.

Newman, Macomber, Naples, Babitz, Volkmar, and Grigorenko (2006) studied 59 students to compare reading-related skills of children with and without ASD and with or without Hyperlexia. Splitting the children with ASD into two categories, the study found significant differences between the ASD+HYP and the ASD-HYP when looking at single word reading on the Woodcock Johnson Test of Achievement-III (WJ-III). Yet the ASD+ HYP scored significantly lower on the reading comprehension subtest of the WJ-III than their TYP. The ASD-HYP showed no difference with the ASD+HYP in decoding. This population of students with ASD, who display signs of Hyperlexia, seems large enough to warrant further research in identifying them, and then to create strategies to teach them. Grigorenko, Klin, Pauls, Seft, Hooper and Volkmar (2002) studied the demographics and the incidence of Hyperlexia in a sample for 80 children. The children

were recruited from the Yale Developmental Disabilities Clinic. To qualify for the study the child had to display a presence of severe developmental delays and social problems. Conducting tests over a span of 13 years on children ranging from 2.67 years to 12.5 years old, Grigorenko et al. identified children with Hyperlexia under a reading score two standard deviations above their IQ and at least one SD below in reading comprehension. They found that boys more than girls were diagnosed but that was equal to the ratio of boys and girls diagnosed with ASD. The study also found that children with ASD and Hyperlexia manifest a broad IQ range. This study unequivocally supports the hypothesis that Hyperlexia has a higher incidence in children with ASD than any other disorder studied. It also stated that longitudinal studies would be beneficial to looks at characteristics and epidemiology of Hyperlexia. This study specifically adds to this gap in the research.

While ASD is more prevalent in boys than girls, Hyperlexia in all students with ASD do not show a higher prevalence in one gender over another. Asberg, Kopp, Berg-Kelly and Gillberg (2010) looked at reading skills in children. The researchers focused on the performance in reading comprehensions, word decoding and spelling in Swedish girls between the ages of 3 and 18. Testing 20 girls with ASD, 36 with AD/HD and 54 typically developing girls, the study found that the girls with ASD did not significantly differ from TYP girls in spelling and word decoding. On the other hand, when testing reading comprehension, the study did not replicate earlier findings of lower abilities in the girls with ASD. The study speculates that the null findings could possibly be due to gender differences since most previously done studies were majority boys since the diagnosis of ASD is more predominate in boys. Another hypothesis for the null is the

low power in the nonparametric statistical techniques used. The study sheds light on the importance on continuing the research on students with ASD and possibly Hyperlexia. The other important conclusion in research is to try to take girls into a stronger focus of the study.

Frith and Snowling (1983) found that students with autism had more difficulty when reading and comprehending phrases of words when compared to reading a list of single words. This is opposite for the dyslexic children in the study who showed no lower score when words were threaded together (Frith & Snowling, 1983). They tested eight children with autism, 12 normally developing children, and five dyslexic children using the five passages reading restricted choice tests. The students had to fill in the blank with one of three choice words that all fit syntactically but only one was semantically correct. For example, one question asked "Tom could ____ something else, nearby. Was it a water rat? " (Frith & Snowling, 1983)p. 337). The choices were swim, hear, and heat. Each word fits syntactically because they are all present tense verbs, but the choice "hear" is the one that makes sense in the semantics of the story. The normal and dyslexic group performed at the ceiling, yet there was a significant difference in the low scores of the students with autism. Due to extended time it took for the autistic students to complete the task and the number of errors made, this study suggests a difficulty with semantics for students with ASD. Like many of the studies done on students with ASD, the sample size is extremely small and therefore the deficits in reading for students with ASD can only be traced to a difficulty in some area of sematic access. Larger scale datasets can help broaden the research on students with ASD and reading.

The common theme of all of these studies is the prevalence of high decoding with low comprehension in students with ASD. Since many people do not track early reading skills in children, the early onset of skills is based on parent opinion. Whichever way Hyperlexia is defined, the prevalence of this mismatched difficulty of reading is on the rise in schools. Most of the studies looked at sample sizes of 40 students or fewer, with some being smaller than five. One of the research questions in this study sets out to test these results on a larger population. The number of students with ASD is rapidly growing each year. Teachers are going to have more and more children with ASD in their classrooms. New intervention programs and strategies to teach them will be necessary for academic growth.

ASD and Comprehension Theories

Research has started to look into why children with ASD have reading comprehension difficulties. Researchers found that children with Hyperlexia do not use preexisting knowledge to help with reading comprehension (Booth & Happe, 2010; Cain, Oakhill, & Lemmon, 2005; C. R. Carnahan et al., 2011; Frith et al., 1994; Kuoch & Mirenda, 2003)In the Booth and Happe study (2010) of children both with and without autism, students were asked to answer questions that used both the text and general knowledge to answer correctly. The study showed that low ability students with autism connect to the text on a superficial level and do not remember most details embedded in the text. Until the students can derive meaning from the text and make personal connections, achievements in literacy will not be made.

Three different neuropsychological theories of why students with ASD struggle in reading include Theory of Mind (ToM), Executive Functioning (EF) deficits and Weak

Central Coherence (WCC) (Lanter & Watson, 2008; Nation et al., 2006; Randi et al., 2010; St. Clair et al., 2010). These three theories are often seen in students with ASD (C. R. Carnahan et al., 2011; Colle et al., 2008). While each one is not a perfect explanation of reading difficulties in students with ASD, it does support the unique differences in how these students look at text (C. R. Carnahan et al., 2011).

Theory of Mind

Theory of Mind is the inability to relate to another's feelings, or thoughts through the actions or descriptions written in the text. It is believed to have its roots in the philosophical debates of Descartes, understanding the science of the mind (Lombardo, 2001). In reading comprehension the reader must make a connection to the text beyond decoding of the words. The reader must gain a mental understanding of the characters or events in the text (Frith et al., 1994). Students with normal development in ToM, can form different perspectives about others and make connections between events in the story. Students with ASD commonly do not see the point of view of the characters in a book which weakens their comprehension of the text (Colle et al., 2008; Lombardo & Baron-Cohen, 2011). This is described as mind-blindness. One assessment that tests ToM/ mind-blindness is the false belief task. An example is the scenario of a child eating half of a chocolate bar and putting the rest in the cupboard. The mother moves the chocolate into the refrigerator while the child is out of the room. The child needs to accept that a belief other than his own could be true (Frith & Snowling, 1983). When children have difficulty with ToM, they cannot mentally dive into a book the way other children can, causing comprehension to be more on a surface literal level. So much of the coloring in a story is missed due to ToM deficits.

Executive Functioning

Another concern in the inability to comprehend text for students with ASD is the executive functioning (EF) deficit (C. R. Carnahan et al., 2011; Plaisted et al., 2003) Different processes that are related in EF include inhibition, set shifting, planning, coordination and control of action sequence (Fisher & Happé, 2005; McCrimmon, Schwean, Saklofske, Montgomery, & Brady, 2012). When reading for meaning, EF deficits in students with ASD create an inability to read for meaning or purpose (C. R. Carnahan et al., 2011). Students with deficits in EF will read on even if the text does not make sense. The process of stopping, checking and rereading if necessary does not work for a child with ASD and deficits in EF. Studies that look at students with ASD and EF commonly investigate the students' mental flexibility, planning and inhibition (McCrimmon et al., 2012). Mental flexibility is the ability to shift thinking to plan and execute steps to a goal. Studies that tested EF in students with ASD found that these higher level cognitive processes are deficient (C. R. Carnahan et al., 2009; C. R. Carnahan et al., 2011; Lombardo & Baron-Cohen, 2011; McCrimmon et al., 2012). In a study comparing EF of 186 students with and without ASD on homework difficulty, Endedijk, Denessen, and Hendriks (2001) found that due to difficulties in EF, students with ASD had more difficult starting and completing homework. This example of step by step procedures with a common goal can make reading difficult. Holding one part of the story as another subplot unfolds is almost impossible for a student with an EF deficit. This makes stories like mysteries or ones with multiple plots and characters hard to read.

Happe (2005) studied 27 students identified as having disabilities that placed them on the Autism Spectrum to see if ToM and EF could be taught. After pretests, and

random assignment three groups were identified. The first group was given training in Theory of Mind, the second group was trained in Executive Function and the third group acted as the control. ToM training consisted of using strategies of painting "photos in the head" to understand what we see or read can be placed as a picture in our head. The idea is that the pictures can become out-of-date or change even if we can't or didn't see it. EF training paralleled the ToM training and created "brain tools" which we use for different activities. Changing patterns and changing how we do things based on the situation can be achieved by changing "brain tools". These models were then tested after training sessions were completed. One way ANOVAs were used to compare the three groups. The two experimental groups showed gains in the ToM skills and there was no difference in the control groups. When testing for EF improvements, there were no significant improvements in these skills. Happe concluded that possibly this was due to the idea that ToM is a precursor skill to EF. This study supported that through training and modeling, students with ASD can make gains in skills associated with reading comprehension. Happe (2005) stated that longer more consistent programs are needed to truly test the potential benefits of these programs in the classroom.

Weak Central Coherence

The final theory is the idea of Weak Central Coherence, which is the idea of seeing the forest through the trees. Students with ASD commonly focus on details and miss the main idea of the text (Booth & Happe, 2010). Students with ASD who struggle with WCC will be able to sequence a story or list the different elements of a story, but do not see the message behind the text or understand the overall theme or purpose of the text. It is seeing the trees despite of the forest. For example, a child with WCC would

spend too much time describing the different positions the gingerbread boy takes on the fox's back as they cross the water in the classic fable *The Gingerbread Boy*. He would focus on where the gingerbread stood rather than the understanding that the fox is trying to move the gingerbread boy closer to its mouth to eat it. Frith identified that students with ASD outperform their nondisabled peers in the processing of details, but underperform on global tasks (Plaisted et al., 2003). She believed that there is a weakness in the operation of central systems for drawing together ideas or integrating individual pieces of information together to establish meaning. Imagine only seeing the dots in a Georges Seurat or Paul Signac pointillism painting and never putting them together to mentally see the image.

The three neuropsychological theories of reading deficits in student with ASD show that these students are not making mental connections to the text. Reading is like math computations where the equation has no real word relevance. Only through modeling and repetition of comprehension skills can students with ASD gain understanding of how to extract meaning from the text. (C. R. Carnahan et al., 2011; Fisher & Happé, 2005; Hamilton, Brindley, & Frith, 2009)

Rich environments full of vocabulary, higher order thinking, and students with a plethora of prior knowledge experiences can help students with ASD overcome some of these obstacles and learn to comprehend what they are reading. Strategies are needed to help pull from these resources to create a classroom that is conducive for learning to read.

Instructional Strategies

Active Inclusion

Inclusion is more than just the student being in the general education classroom each day. The physical presence of the student gains nothing if the inclusion is not active. Hart and Whalon (2012) reviewed some of the benefits of active inclusion for students with ASD. They found that students with ASD experience difficulties in verbal and nonverbal communication in social settings. They interpret emotions differently and have difficulty forming relationships and play opportunities. Using cooperative learning instructional strategies allow students with ASD to practice social skills in natural settings (Hart & Whalon, 2011a). Flexible grouping and cooperative learning have been found to enable students with ASD to participate in class more autonomously. The interaction must be reciprocal allowing for the students with ASD to lead. Giving students with ASD the lead role in cooperative learning and allowing them to present the findings to the class, fosters language development and social interaction (Utley et al., 2001). Good cooperative learning is not possible without collaboration between all teachers involved, well-planned lessons, routines and specific opportunities for social interaction, (Hart & Whalon, 2011a).

An effective strategy currently being researched for students with ASD is active inclusion (Crisman, 2008; Hart & Whalon, 2011a; Iovannone et al., 2003; Simpson et al., 2003)(Hart & Whalon, 2011a; Hart & Whalon, 2011b)(Hart & Whalon, 2011a; Hart & Whalon, 2011b). The opportunity for students with ASD to be in a language rich environment helps support language and reading abilities (Iovannone et al., 2003; Kliewer et al., 2004; LaBarbera & Soto-Hinman, 2009; Moores-Abdool, 2010). The

relationship between classmates promotes school success, social and emotional development, and overall quality of life (Carter, Sisco, Chung, & Stanton-Chapman, 2010; Gifford-Smith & Brownell, 2003). Peer interactions between students with ASD and their typically developed peers have been shown to be beneficial too. The relationships between peers benefit not only their social and emotional development but also school success and overall quality of life (Carter et al., 2010). Unfortunately, social interactions between special education students and their nondisabled peers still remain infrequent. Students with ASD may experience difficulty with oral language skills (K. J. Whalon et al., 2009; K. J. Whalon & Hart, 2011); therefore it becomes essential that students with ASD are included in language rich classrooms as a model. In a single subject study by Broderick and Kasa-Hendrickson (2001) data were collected about a 13-year-old boy with ASD included in the general education classroom. The study found that the boy was exposed to rich print and language environments since he was in a general education preschool which they concluded supported his written literacy skills. These studies show the benefits of including students with ASD with their nondisabled peers to support language and social development, but due to the small sample size and short observation time, they are harder to generalize to the larger population.

For inclusion to work, students and teachers alike must participate in the process. Many teachers are apprehensive when discussion inclusion of students in general education classrooms. Taylor, Richards, Goldstein and Schilit surveyed 96 graduate and undergraduate students in both special education and general education programs enrolled in university courses. A 14 item survey using a Likert type scale was used to obtain data about their perspectives on inclusive settings. Results showed that teachers

overall were uncertain and concerned with actual placement of special education students in general education setting. They scored differently based on what disabilities should be included and which should not. The two types of teachers agreed that students with learning disabilities can be included but the two groups disagreed when it came to placement of more severe disabilities such as mental or behavior ones. There was a consensus among most teachers that included students may be academically isolated even in an inclusive classroom. Taylor et al. suggested that communication and mentoring of teachers in Regular Education Initiate (REI) type programs and instructional strategies (R. L. Taylor & Others, 1997) . Active inclusion is more than a placement in a setting; it is a way of teaching.

Humphrey's (2008) definition of inclusion stresses the importance of presence, acceptance, participation and achievement. Presence is defined as physical presence in the room. Students cannot learn if they are not there. Participation is where the quality of the students' experiences is measured. The students must be socially accepted by teachers and students alike. Achievement should be measured as gains in academics, as well as social and emotional achievements. Some school based instructional strategies that promote inclusion all contain similar components; rich in language, inclusive and they are modeled by teachers so all students benefit. Strategies for increasing academic engagement for all students which lead to academic achievement included cooperative learning, discussion groups and peer mediated interactions such as peer tutoring.

The purpose of a study conducted by LaBarbera (2009) was to gather information on the participation in social conversations for autistic students. The study found that the students with autism are merely silent in classrooms where they are included. They

found that teacher talking and ignition of language represented the greatest talk time at 45.5% of the hours monitored; 37.68% of that was dialog from the teacher to the whole class. The second exchange which accounted for 7.11% of the time was between teacher and student, with the teacher leading the conversation. Students with autism were able to practice language use only 13.17% of the time. The study concluded that the students are getting very little opportunity to hear and speak the language. A decrease in teacher talk and an increase in student talk will lead to academic improvements. Opportunities to interact with their peers are vital to academic achievement for students with ASD. Unfortunately, physical inclusion rather than active inclusion models are what is truly happening in the classrooms. Support for active inclusion by the literature can help move teachers toward using these strategies in their classrooms (Simpson et al., 2003).

The ASD Inclusion Collaboration Model (ASD ICM) is designed to support general educators who assume responsibilities for teaching children and youth with autism. The core of the model includes a plan where students with ASD and their typically developing peers both benefit from planned contact with each other. The general education staff agrees that it is beneficial for all and that they resume primary responsibility for all students including the ones with ASD. This is contingent on support from special education teachers, ancillary staff members, and other resources.

There are five components for the ASD ICM to have effective academic instructional strategies. They include environment and curriculum modifications. Teachers must change the environment and the curriculum to fit all students and to add opportunities for cooperative learning. There must be a change in attitude and social support for the students and teachers as they make these changes, followed by

coordinated team commitment. Recurrent evaluations of inclusion procedures will show academic success or the need for changes. The final component is that the home and school collaboration is strong. Without a strong team both in the school and at home, the model can fail. The process is not an easy one and requires good planning and collaboration between general education and special education teachers. Effectively and efficiently including students with ASD will continue to be a significant challenge for schools in coming decades.

Questioning Strategies

Questioning is another common reading strategy used to teach all students to connect to the text while reading. According to Dougherty and Stahl (2004), question asking and answering can lead to improvements in memory, a closer connection to the text and a deeper processing of the text. Students with ASD need to move from literal interpretation of the text to a deeper more global understanding of the text (Booth & Happe, 2010). In a study done by Whalon and Hanline (2008), first and second grade students with ASD were studied to look at questioning strategies on reading comprehension. The study found that students, who were taught to think-aloud and ask questions, improved their reading comprehension. Specifically the students were able to create less general and more specific questions based on an understanding of what they read (K. Whalon & Hanline, 2008). This study investigated the effect of reciprocal questioning comprehension strategies among three students with ASD and nine typically developing peers in a general education classroom. In cooperative pairs, the authors reported increased the frequency of question generating and responding from baseline after receiving direct instruction on their comprehension skills. This intervention relied

on peer-tutoring or cooperative learning which again increased the rich language environment in a social setting.

When students with ASD are required to answer pre-reading questions, they activate prior knowledge and review common language related specifically to the text (O'Connor & Klein, 2004). This strategy activates the brain and holds the information for a short time to support the students reading comprehension. A study of 12 high-functioning students with ASD (ages 1 to15) was conducted to determine if a discourse comprehensions intervention works (Asberg, Dahlgren, & Dahlgren Sandberg, 2008). The teachers and students were trained to ask and answer three types of questions that scaffold from literal to inferential. The students were taught to ask and answer "right there" style questions where the answer is right in the text, the "reflect and search" question where the answer has to be inferred by integrating different sentences to construct the answer. The final type of question is "on my own" where the critical information has to be inferred using prior, or outside the text, knowledge. While results were not significantly different in nonword decoding, students showed small gains in discourse comprehension (Asberg et al., 2008; Åsberg, 2010).

Readers with ASD would be expected to have more limited access to social world knowledge in line with their impaired social functioning. ToM and social interaction deficits typically found in this population. This can hinder the development of an adequate social knowledge base and might prevent successful bridging inferences when reading socially related text. Sixteen adolescent students with ASD and Hyperlexic discrepancies between decoding and comprehension were matched against 16 typically developing peers to test the speed of question answering between the two groups on story

vignettes that necessitated an inference. Reading times were analyzed using mixed ANOVAs. The results showed that the mean reading time for questions when placed in the context of relevant triplets was 317ms faster than reading times for questions when placed in the context of irrelevant items. This suggests that students with ASD can answer questions quickly and correctly when prior knowledge or support knowledge is primed prior to reading.

Following the NRP-advocated strategies, using questioning strategies for reading comprehension is beneficial for all students. This study showed specifically how one type of instruction can be implemented in an inclusive classroom (K. Whalon & Hart, 2011). Using questions that focus on factual, defined as "In the Book" questions and those that are inferential, defined as "In my Head," students with ASD can increase not only their reading comprehension skills but also their communication skills. This Question and Answer Relationship Strategy (QAR) works to teach students how to generate questions in the context of the framework. Using scaffolding and cooperative learning, students with ASD can move from the factual questions they are more comfortable with to the tougher inferential ones.

The purpose of the study done by Myles, Hilgenfeld, Barnhill, Griswold, Hagiwara, and Simpson (2002) was to examine the reading performance of students with Asperger Syndrome on their reading abilities. The study had 16 students diagnosed with Asperger syndrome based on the DSM-IV criteria. The study included 14 boys and two girls between the ages of 6 and 16 years old. They all had full scale intelligence quotients ranging from 66 to 133. Using The Classroom Reading Inventory (CRI) to assess reading skills and abilities, the study was able to gather data about a child's ability to

read comfortably at an instructional range with 95% of the words readable and 75% comprehendible. The test not only can identify the child's decoding and reading abilities, it also asks questions of factual and inferential nature. The CRI was administered one to one either at the school or at the university. The test results compared their reading abilities to their actual grade level using the Wilcoxon Signed Rank test. Results showed that when these students were asked to read independently or silently, their reading levels dropped significantly. The results showed that the mean percentages of factual or literal questions answered correctly outnumbered the answering of the inferential questions. Using a paired comparison t test indicated a statically significant difference between the two types of questions for these students. The students were able to comprehend one-third more information that was factual or rote than the inferential questions. ToM, WCC, and EF can all affect children's abilities to answer higher order thinking questions that require the child to infer the answer rather than find it directly within the text. Children with disorders like AS again and again tend to fall into the pattern of higher decoding skills and low comprehension especially when higher order questions are used in the testing materials. Modeling and practicing questioning strategies can help improve a student's ToM, WCC and EF. Limitations with the study included the fact that the study was done on a small scale and did not include a good differentiated demographic group since we know these skills are lower in some demographics than others.

Peer Tutoring

Peer tutoring can also help support questioning strategies through modeling (D. M. Kamps & Others, 1994; LaGue & Wilson, 2011; Petursdottir, McComas, McMaster, & Horner, 2007; Utley et al., 2001). Tutors can model how to create literal and

inferential questions about the text being read (LaGue & Wilson, 2011). They also bring more prior knowledge and language to the discussion creating richer and deeper responses to the text. Many studies found an impressive increase in reading rates and improved performance in reading comprehension in students with Autism as well as their peer tutors.

Social relationships formed in school can make important influences to social and emotional development, promote school success and enhance quality of life (Carter et al., 2010). Peer tutoring has been found to increase the social interactions between the student with ASD and their nondisabled peers (Carter et al., 2010; Chiang & Lin, 2007). A review of literature study by Chiang and Lin (2007) on reading comprehension for students with ASD supported class wide peer tutoring as a positive teaching strategy in three of the five studies reviewed. Peer tutoring programs support exposure to research based strategies in the tutoree's instructional level. To foster good peer tutoring programs, Lague and Wilson (2011) state that teachers need to create a learning environment where the students can interact with the text and each other in a safe, social, and cultural environment.

Using peer tutoring and cooperative groups allows for students to gain access to learning through modeling of their nondisabled peers (Chiang & Lin, 2007). The research supports that peer tutoring that allows all students to work together alternating tutor and students' roles while practicing skills (D. M. Kamps & Others, 1994; Laushey & Heflin, 2000). One of the studies found in the literature review by Chaing and Lin (2007) was done by Kamps, Barbetta, Leonard and Delquadri (1994). They found positive results when studying three male autistic students in second grade. Using a

multiple baseline design, Kamps et. al. studied three high functioning students with autism during reading instruction in general education. All three boys were between the ages 8 and 9 and were included with nondisabled peers in an inclusion classroom. The results found that mean reading rates increased for all three students when peer tutoring was used. Specifically in the area of reading comprehension, class wide peer tutoring resulted in superior performance from baseline on reading comprehension questions and reading fluency. Their findings support class wide peer tutoring to improve academic skills along with social interactions between students with autism and their nondisabled peers. While significant results were gained from this study, the small sample size is identified as a limitation of the study. Peer tutoring activities can model good reading strategies and open up dialog with rich vocabulary for students with ASD. Kamps, Royer, Dugan, Kravits, Gonzalez-Lopez, Garcia, Carnazzo, Morrison, and Kane (2002) looked at the use of peer training to support social interactions between elementary students with ASD and their peers. Using a single subject reversal design to examine the effects of social skills, cooperative learning and control groups with peer tutoring interventions were used. The study looked at the duration, frequency and length of interactions between five students with ASD and their 51 nondisabled peers. Peer tutoring activities included vocabulary training, team activities, and social play. Results showed an increase of three times over baseline for social interaction.

In a second, follow-up study to test these results with a larger sample group, 34 students with autism (D. Kamps et al., 2002) ranging from 7- to 14-years-old were studied across the three years. Intervention programs that were implemented across two years included peer mediation, tutoring groups, lunch buddies, social playgroups and

recess buddies. ANOVA statistics showed significantly different effects by peer group conditions for trained peers than with familiar or stranger peer groups during interactions with the students with autism. Overall improvements in social interaction with nondisabled peers occurred for students with autism over the three years. The study supported structured, fostered and modeled peer interactions between students with ASD and their nondisabled peers.

Laushey and Heflin (2000) found that the buddy system of learning and playing elicited more social skills than without it. The study was conducted in two kindergarten classrooms that included the target students. A reversal design was employed to test the buddy system on social interaction between the two target students and their nondisabled peers. Results showed that the buddy program elicited more appropriate social skills. The study suggests that for the two participants with ASD, the peer buddy approach resulted in a higher percentage of social interaction than the control; group. Limitations of this study include small sample size, the degree of severity the students' disability displayed and the possibility of positive bias in data collection. All things considered, positive results from this study and others warrant future research on the support of peer interactions on students with ASD who are in an inclusive setting.

Research has focused on how peer tutoring has benefited the student with ASD. A study conducted by Jones looked at the impact of peer tutoring on the typically developing peers that pair up with the students with ASD. Jones looked at 28 TYP who were trained and worked for at least one term (six weeks) with students with ASD. After four half-term cycles, the TYP filled out a specially designed questionnaire to look at their experiences and feelings as a peer tutor. Jones also asked the parents of the TYPs,

the classroom teacher, the head teacher, and the classroom support assistant to fill out a questionnaire to obtain the views of the program on the students and the school as a whole. Of the 27 students who were peer tutors, 11 girls and seven boys completed the survey giving a response rate of 67%. Jones found that they enjoyed being a peer tutor, with 83% responding "enjoyed it very much." Results showed they built confidence, responsibility, an understanding of diversity and disabilities, and a caring attitude. The parents reported that the peer tutoring was a valuable experience for their children, highlighting acceptance of others, nonjudgmental attitudes, and a sense of personal achievement in their children.

Many studies about peer tutoring, such as the one by Petursottir, McComas, McMaster, and Horner (2007), use small sample sizes. This particular study only looked at one child and the effects of program play-related stimuli after a peer tutoring program on a kindergarten boy with ASD. While the results were not as significant as the results discovered in Kamps et al. study, there was still a modest increase in peer play after the sessions. Unfortunately many studies such as this one are unable to generalize to the population. Most of these case study research studies list sample size and generalizability as limitations. More research is needed on peer tutoring using larger scale datasets such as the SEELS database. Studies using larger sample sizes, like a national database, can fill some of the gaps in the research. The study presented in this dissertation not only used a large sample size but does over a longitudinal data collection period of time. The research needs to also focus on the peer tutoring interventions impact on reading, specifically reading comprehension skills.

Discussion Groups

The use of discussion groups as a form of cooperative learning allows for students to be actively included in the general education classroom and curriculum. When students are actively included in a rich learning environment with their peers, learning happens interactively (Kliewer et al., 2004; LaBarbera & Soto-Hinman, 2009; Simpson et al., 2003). Simpson, de Boer-Ott, and Smith-Myles (2003) looked at a collaboration model that offers guidelines and support for students with ASD and their peers. They state that active inclusion through discussion groups and cooperative projects allow all students to benefit from planned contact with each other. LaBarbera and Soto-Hinman (2009) found that students with ASD were commonly given little opportunities to participate in classroom dialogue. They believe that language development can improve by small group and whole class interactions, which will then support reading comprehension (Myles, 2002, p.46). Using strategies that include independent work and silent reading more often than active participation can create a classroom that does a disservice to the students with learning problems including students with ASD. It becomes imperative that teachers include students with ASD in the classroom academic discussions due to difficulty acquiring oral language skills (Whalon and Hanlin 2003, p.367). A study done by Kamps, Barbetta et al (1994), looked at peer mediated strategies such as cooperative learning groups and peer tutoring. These strategies have been proven to enhance learning in several curriculum areas for students with mild handicaps in mainstream settings. These types of instructional strategies increase and maintain high academic performance in all students. Specifically for students with ASD, these peer instructions and imitations improve social play, language development, a sense

of belonging and most importantly academic achievement. This study will help promote the use of these strategies in the classrooms where students with ASD and Hyperlexia are included.

A study of three students with HFA in general education elementary classrooms was conducted to see how class wide peer tutoring (CWPT) improves academic and social play for students with HFA (D. M. Kamps & Others, 1994). The three male students with HFA were tested using reading inventories, comprehension questions and observations during free play. Using multiple baseline designs across subjects with a reversal, the study supported the use of CWPT as an effective strategy for improving reading rates, dropping frequency of reading errors, and improved unstructured social interactions. While this study did present findings that are similar to the current research, the sample size of three students with HFA was small. Another limitation was the question on whether this would work with lower functioning students on the spectrum. The study does not allow for much generalization to larger more diverse populations.

A review of literature conducted by Chiang and Lin to identify reading difficulty patterns in students with ASD identified 11 studies that looked at reading and ASD. Of the 11 studies, only four focused on text comprehension, and of those four, only three described instructional approaches (peer tutoring or cooperative learning). All of those three had Debra Kamps as the head author. Her studies are noted throughout the review of research. She has stated that instructional strategies like questioning, peer tutoring, and cooperative learning will have academic and social benefits for all children. Chiang and Lin (2007) found that students with ASD can acquire reading comprehension skills using instructional strategies that promote language development in social settings with

non-disabled peers. Worth and Reynolds (2008) also recommended the use of class and group discussion groups for children with ASD.

Neil Humphrey (2008) wrote about ideas and strategies that are based on research for cooperative learning for students with ASD in inclusive settings. He identified six principles that create a better fit for students with ASD in the general education classroom. The first idea is that teachers and peers must "challenge stereotypes and raise expectations" (Humphrey, 2008, p. 42). When teachers see past the label, they can see the student not the disability. The second idea is to "create order from chaos". Using routines and order in the classroom will put the focus on the learning and not the chaotic environment of the classroom. Like the teachers and their stereotypes, the students need to gain "peer understanding."

This third idea of understanding will lower pulling and support successful inclusions. Humphrey states that social isolation is as big as a problem for students with ASD as bullying. Creating cooperative learning opportunities in the classroom will structurally bring students with ASD and their TYP together. Using social networks to develop "Circle of friends" will lead to natural friendships and partnerships in school work. The fourth is to develop social skills. This can be done through social stories. Social stories help describe a common situation and help move the student through the proper actions for the situation they are in. This will teach students with ASD how to act in social settings. Inclusion and modeling through cooperative learning environments help model the proper actions for students with ASD.

The fifth principle is to adapt academic subjects. Science and math can offer more hands on learning, discussion groups, and visual cues, especially when compared to

social studies or reading where language can affect the learning of the content. Modeling by the TYP can help students with ASD see the proper steps to discover the correct answer. Humphrey states that teachers must remember that "inclusion is a process not a state" and it can constantly be improved. These same ideas are supported by a review of effective practices for students with ASD by Iovaannone, Dunlap, Huber, and Kincaid. They support the idea that a comprehensive classroom elicits, facilitates, enhances, or supports specific skills including social and academic ones (Infantino & Hempenstall, 2006; Iovannone et al., 2003).

Contribution

NCLB and IDEA ignited an increase of research on how typically developing children learn to read. Given the variety of symptoms and range of severity of children with ASD, there is a paucity of research on the academic skills of these students. Based on the Simple View of Reading conceptual framework, research has shown that students need strength in both decoding and oral language skills in order to read. Children with ASD commonly show deficit in communication skills and metaphorical meanings of language. This deficit causes the comprehension of reading to be more difficult for many students with ASD. The purpose of this study was to first explore the relationship between language comprehension and decoding skills of students with ASD. The study then examined the trends in instructional strategies that are effective in increasing reading achievement for students with ASD used in classrooms today. Specifically, this study will look at how active inclusion through class discussion and participation opportunities and peer tutoring are beneficial to students with ASD in learning to comprehend. If teachers can understand and see the benefits of using these strategies and

accommodations in the classroom through this research, they may be more inclined to include them in their daily teachings.

Chapter III

RESEARCH METHOD

Problem

Many students with ASD struggle with reading comprehension. They are unable to understand the text even if they are able to decode it. The purpose of this study was to use the Special Education Elementary Longitudinal Study (SEELS) to first explore the relationship between reading comprehension and decoding skills of students with ASD. Secondly, the study aimed to identify instructional strategies that are effective in teaching students with ASD and Hyperlexia to comprehend text read in classrooms today. The study analyzed the reading comprehension skills of students with ASD and Hyperlexia who receive instructional strategies including participation in an active inclusive setting, peer tutoring, cooperative learning and discussion groups, and questioning strategies. This study used a national dataset because it allowed the researcher to analyze data across three waves spanning four years. Each wave represents a point in time across the four-year span. Wave one was collected during the 2000-2001 school year. Wave two was collected in 2001-2002 school year, and wave three was collected during 2003-2004 school year. The dataset also allowed for a larger more diverse sample collected from around the country to be used. The goal was to explore what different reading strategies

teachers could use in their classrooms to model good reading comprehension for students with ASD.

Research Questions

Phase One:

1. To what extent were students with ASD included in general education classrooms for language arts?
    a. How many hours were students with ASD included in the general education classroom?
    b. What classroom settings (general education classroom, resource room, self-contained special education classroom, or other) are being used to teach students with ASD?
    c. What instructional strategies are being used within the classroom for these students?
2. Among students with ASD, what was the relationship between these instructional strategies (peer tutoring, discussion groups and questioning strategies) and academic achievement (Appendix C) in reading?

Phase Two:

3. What was the distribution of students in the SEELS dataset diagnosed with ASD within the four quadrants of the Simple View of Reading (SVR) framework?
4. Among students with ASD in quadrant D of the SVR (those with Hyperlexia), what instructional strategies were being used to support reading skills development?

5. Among students with ASD in quadrant D of the SVR (those with Hyperlexia), what is the relationship between these instructional strategies (active inclusion, peer tutoring, discussion groups and questioning strategies) and academic achievement, defined by academic growth on the WJ-III test of achievement Passage Comprehension subtest?

Purpose

Given that academic achievement on state assessments relies on the students' ability to not only decode the text but be able to comprehend meaning, policymakers are looking to the research to promote tools and strategies that create gains in reading comprehension for all students, including those with autism spectrum disorder. Research has shown that students need strength in both decoding and reading comprehension skills in order to read, but at different levels (C. Carnahan, Musti-Rao, & Bailey, 2009; Grigorenok et al., 2002; Mirenda, 2003). Students with ASD commonly have discrepancies between their decoding and comprehension skills and fall in quadrant D of the Simple View of Reading, because they can decode text, but have difficulty grasping meaning from text (Chiang & Lin, 2007; Mirenda, 2003; Nation & Norbury, 2005). While research has increased on students with ASD and Hyperlexia, the literature still quests for a better understanding of the discrepancy between decoding and comprehension for these students (Nation & Norbury, 2005; Nation & Norbury, 2005; Newman et al., 2007; O'Connor & Klein, 2004; Randi et al., 2010; Simpson, de Boer-Ott, & Smith-Myles, 2003) and the understanding of how to support reading comprehension for student with ASD and Hyperlexia in the general education classroom.

The purpose of this study was to examine the trends in instructional strategies that are effective in increasing reading achievement for students with ASD, and then again, specifically for those students who exhibit Hyperlexia, a significant discrepancy in reading identified by high decoding skills and low comprehension abilities. Using the SEELS database, this study first identified instructional strategies that promote active inclusion for all students with ASD. These strategies were tested to see if they help students with ASD make academic growth between wave 1 and wave 3. The study then explored the relationship between language comprehension and decoding skills of students with ASD based on the Simple View of Reading Model. Finally, the study examined the achievement in reading of the students with Hyperlexia who receive instructional strategies that promote active inclusion during their literacy lessons in the general education classroom. Specifically, this study identified if academic gains are achieved in reading by students with ASD who receive the following reading instructional strategies: discussion groups, classroom participation, and peer tutoring, and questioning strategies.

Using SEELS data from wave 1(2000-2001 school year) to wave 3 (2003-2004 school year) allowed for the study to sample a large population of students with ASD by looking at their reading achievement over a four-year span. Through regression models and analysis of variance (ANOVAs), the study determined if students made significant gains in reading achievement between wave 1 to wave 3, and then served to identify which instructional strategies were significant to this improvement. The four years between wave 1 and wave 3 allowed for a better picture of academic growth in reading.

This regression model was repeated with students who were identified as having ASD and Hyperlexia.

The benefits of a longitudinal analysis over a cross-sectional study include increased statistical power and the capability to estimate a greater range of conditional probabilities (Yee & Niemeier, 1996). Using a large scale dataset that collects data across multiple years gave the research two advantages. The first was the ability to study greater numbers of students compared to the small single subject design research of students with ASD that typically includes less than 10 students in a single school or district. The second advantage was time. Most research (cross sectional design) is a snapshot of what is going on with a student at one point in time only. When looking at reading development, having the ability to track growth over a long period of time offered the researcher the capability to see long-term effects of the intervention, accommodation or modification.

Population/ Sample

The data used for this study were obtained from the Special Education Elementary Longitudinal Study (SEELS), a national database collected to provide a national picture of special education (www.seels.net). The SEELS study represents a sample of approximately than 13,000 students with disabilities between ages 6 through 12 at the start of the study in 2000 (www.seels.net) and monitored these students for four years. SEELS measures academic, social, and vocational characteristics, school attitudes, and abilities of students with disabilities. Data were collected across three waves from parents, teachers, and students through interviews surveys, direct assessments and record reviews of students who fall within the 12 federal disability codes (SEELS, 2005). A

population of over 11,000 students was eligible, and a response rate of 85% gave the study approximately 9,000 students to participate. Data were collected in three waves over four years. Wave 1 was collected during 2000-2001 academic school year. Wave 2 was collected during the 2001-2002 academic year. Finally, wave 3 was collected two years later, during the 2003-2004 academic year.

SEELS is funded by the Office of Special Education Programs in the U.S. Department of Education as part of the national assessment of IDEA 97. The study still is available for new research even though it was completed in 2004. New reports are being added to their website as researchers use this data for original analysis. Topics of reports include; A National Profile of Students with Autism (Sanford, Levine & Blackorby, 2008), National Profile of the classroom experience (Schiller, Sanford & Blackorby, 2008), A National profile of students with Hearing Impairments in Elementary and Middle School (Blackorby & Knokey, 2006), and one on Declassification of special education services (Holden-Pitt, 2005). This database is still being utilized by the U.S. Department of Education and by private researchers to add to the special education pool of research. National databases like SEELS allows for large scale data collection to be funded and collected from a national population that would be merely impossible for a single researcher to collect.

To use the SEELS database for original analysis, contact was made to the SRI International, an independent research agency that conducts research for the Office on Special Education Programs (OSEP) for the U.S. Department of Education. SRI required submission of research intention paperwork that addressed this authors' position as a Ph.D. student in the dissertation phase, the intent of the study, and how the SEELS

database will aid in the study. After approval, the SEELS raw data disk was released. The raw data were coded and categorized by a student ID to protect the identity of the student. It contained each and every variable and data scores collected on all questions under a multitude of topics asked by SRI data collection team.

Information for the SEELS was collected on topics of academics, home-school connections, school climate, and teacher and parent perceptions. This data were collected from over 11,000 students with special education needs across the United States. The data came in raw format and could be analyzed by the researcher in the fashion that pertains to their specific study. No similar research has been done to date using the SEELS dataset (or any other national dataset), and all analysis proposed herein constitute original research designed by this author, conducted completely independent of any other entity with access to the data.

For this current study, a sample of students was selected from the SEELS database population based on the following criteria. Because the study focused on the reading abilities and instructional strategies for students with ASD, only children with the IDEA coding of Autism on their IEP was included. This information was collected from the parent interview which asked to identify the primary disability code of the student identified for the study. Student participants met the following criteria:

1. Students have an IDEA coding of Autism as their primary disability.
2. Students will be excluded if Autism was a secondary coding.
3. Students will be native English speakers. This was identified by using the variable of whether or not English was the language spoken at home.

Data Set Analysis

To identify the sample group of students with ASD from the SEELS population, the students who were identified with ASD (See Appendix C) were selected from the overall population of over 11,000 students with disabilities (n=1,101) in the study. The sample selected of only the students with ASD that speak English in the home yielded 874 participants. This sample was disaggregated by gender, race, SES, 'parents' educational level, and the child's home language by using the commonly crossing variables made available by the SEELS database (see Appendix C). This was the sample population for phase one of the study.

Phase One

The research started first by examining the students with ASD to determine how they are being actively included in the classroom. To do this, descriptive statistics first looked at how many students are receiving their reading instruction in the general education classroom, for how long, and using what instructional strategies. This was done to identify current trends in inclusion. Data were collected from the survey completed by the language arts teacher of each individual student in the study. Specific questions that pertain to time, setting and delivery model were for analysis (Appendix C).

The study then compared the ability to participate and the actual participation that was happening in the classroom. To determine if the students are being actively included, analysis of each child's ability to understand a question, and then orally respond during reading was compared to their participation in group discussions and class presentations (Appendix C). The study then selected cases from this sample based on whether there was assessment data collected for wave 1 in both the letter word ID and

passage comprehension subtests of the WJ-III. This selection contained only students with ASD, speak English, and that have assessment data collected (n=304).

Further analysis of these students was conducted to determine what instructional strategies, if any, are being used in the classroom to foster reading. The language arts teachers of these students were asked if the student used any of the different instructional strategies in the classroom and to what extent (never, rarely, sometimes, and often). The study created frequency tables of all the different strategies used in the classroom.

To gain an understanding of what works and what doesn't, these strategies were tested to see if gains were made in reading achievement from wave 1 to wave 3. Since this study focused on reading in terms of comprehension, academic achievement and growth are determined by an increase in the standard scores of the passage comprehension subtest of the WJ-III. The analysis used block regressions to hold constant all demographic variables in order to look at what instructional strategies above and beyond are affecting reading comprehension.

Phase Two

Phase two of the study looked at the break down of these students to determine which students were identified as having Hyperlexia and how they make academic growth in language arts. The researcher had to create a new sample containing students with ASD, who speak English at home, and were plotted in quadrant D of the SVR framework. To determine the reading abilities of the new sample, the students were plotted on the SVR framework to identify reading decoding and comprehension abilities. This was done by analyzing the students' scores on the Woodcock Johnson Passage Comprehension and Letter-Word Identification tests taken from the direct assessment

section of the SEELS database. To be considered low decoding, the score had to be 89 points or lower. To be consider high decoding, the score had to be 90 points or above. This is based on a 10 point standard deviation in the scores. The same was done for passage comprehension, where scores 90 and above were considered high comprehension and 89 and below was low decoding. Students who scored 90 and above on letter word ID were considered high in passage comprehension skills.

To be identified in quadrant D of the SVR, the student had to display high decoding skills, and low comprehension skills. Students with ASD who scored one standard deviations below average on their decoding skills (high) and passage comprehension (low) were considered to be Hyperlexic and yielded 60 cases. (Appendix C). This became the sample population for phase two of the study. These students were disaggregated for classic demographic factors such as SES, gender and ethnicity.

Next, this researcher examined the instructional strategies that were used in their Language Arts block, with the goal of finding the trends in accommodations/support used by teachers of students with ASD and Hyperlexia to help improve their reading comprehension skills. To do this, analysis of questions from the SEELS database pertaining to what patterns in instructional strategies were used to support these students by teachers across the country (see Appendix C).

Lastly, this researcher examined the trends in academic progress of the identified students across the four-year span of the SEELS study to investigate the impact of the identified accommodations on their reading comprehension skills using a regression model to see growth over a three-year span from wave 1 to wave 3. The national database allows for this study to take a longitudinal comparison of growth to a cross-

sectional view which is beneficial in reading growth. Using the data again from the SEELS database Direct Assessment section compared wave 1 and wave 3 Woodcock Johnson Passage Comprehension scores of those students who did and did not receive the above accommodations (Appendix C). The researcher examined the instructional strategies that were used in their Language Arts block, with the goal of finding the trends in teaching used by teachers of students with ASD to help improve their reading comprehension skills. Through regression models and analysis of variances (ANOVA), the study identified students who made significant gains in reading achievement between wave 1 and wave 3 and what support might have helped them get there.

Statistical Power

Table 1

*Statistical power and Sample size throughout phases of the study***.**

Sample Group	n	Power
Students with ASD in the SEELS database	1101	NA
Students with ASD who speak English in the home	874	>.80
Students with ASD who completed academic assessments	304	>.80
Students with ASD and Hyperlexia	60	>.75

Statistical power analysis estimates the power of a statistical test to accurately determine if the null hypothesis can be rejected. The purpose of a power analysis in a research study is to limit the possibility of the researcher committing a Type I or Type II

error (rejecting the null hypothesis when the null is true or failing to reject the null hypothesis when it should be rejected). There are four components that make up statistical power. They are sample size, effect size, alpha level and power. Sample size refers to the minimal number of subjects needed to represent the population properly. Effect size is an estimate of practical significance of study findings (the usefulness of the results), whereas the alpha level represents the statistical level at which a researcher can reject or fail to reject the null hypothesis (the ability to state that the results of the study are true rather than as a result of chance). When using secondary data, the sample size is predetermined based on what information is collected, so a researcher should analyze the power of the available sample to determine if the research should continue.

The statistical power in this study was analyzed to ensure the sample size was large enough to show that the active inclusion does have an effect on academic achievement for students with ASD if in fact that hypothesis is true. For phase 1 of this study's analysis, the sample size varied from 304 – 874, depending on the specific research question analyzed. For research question three, which analyzed the relationship between the use of specific reading strategies and academic growth in reading, a sample size of 304 was used. With an estimated effect size of .3 (typical in educational research), and an alpha level of .05 (also the standard in educational research), the estimated statistical power is greater than .80 (the standard in quantitative research). In Phase 2 of the study where only students with Hyperlexia were included (n=60), the estimated statistical power is greater than .75 (a sample size of 64 students would give the study greater statistical power >=.80). However, because this analysis investigated a longitudinal dataset, the use of panel data (wave 1 to wave 3 matched sets) increased the

efficiency of the estimates, allowing a smaller sample size to be used with the same effect size and statistical power.

Instrumentation

The SEELS database used various instruments to gather data on the students, the school, and the family. Data were collected through parent interviews, questionnaires presented to the teachers, principals, and other support staff of the students, as well as direct assessments of the students. To collect direct assessment data from students, one test used was the Woodcock Johnson Test of Achievement (WJ-III). The WJ-III is a commonly used standardized test that has been historically shown to be reliable and valid. The questionnaires and other instruments that SEELS created were tested prior to implementation to provide evidence of validity and reliability.

The data pertaining to the sample group were used to determine if specific instructional strategies supporting active inclusion; peer tutoring, questioning strategies and classroom participation and presentation opportunities, will help student achievement in reading. Active inclusion, more than just physical presence in classroom, shows benefits for teaching autistic children due to rich classroom oral language and multiple modes of representation (Kliewer et al., 2004). Whalon and Hanline (2008) believe cooperative learning opportunities enhances our ability to comprehend language in general. Opportunities for class discussion, presentations, and questioning while actively included in the classroom demonstrate supported benefits to reading development of students with ASD. Peer tutoring supports reading comprehension in ASD students by creating different points of view of the text and moves them from the concrete to the more abstract meaning (LaBarbera & Soto-Hinman, 2009; Petursdottir et al., 2007;

Snowling & Frith, 1986). Within the SEELS database, teacher surveys asked participants about classroom strategies, modifications and accommodations that are used to support reading (Appendix C). Questions that showed what types of support and at what frequency were used to identify the types of instructional strategies these students receive for the sample of students with ASD and the sub-sample of students with ASD and Hyperlexia.

The first part of the data analysis explored the data on students with ASD and how they are included in the classroom. Using descriptive statistics, this study showed patterns and frequencies of active inclusion. Descriptive statistics painted a mathematical picture of the data on a single dependent variable (Huck, 2008). The second part of the data analysis explored the ability of the four selected instructional strategies to promote reading academic growth over time. A regression model holding constant the classic predictors for reading ability examined each strategy individually, and then the collective ability of all strategies used in conjunction with one another. The purpose of using a regression model is to either predict or explain the relationship between two variables. More specifically, regression analysis tries to explain how the dependent variable changes when any one of the independent variables is varied, while the other independent variables are held constant.

HASDAG stands for Hyperlexia and Autism Spectrum Disorder Academic Growth.

1. $HASDAG=\beta_0 + \beta_1 (Gender) + \beta_2 (Ethnicity) + \beta_3 (SES) + \beta_4 (Home\ Language) + \beta_5 (Parents' Education) + \beta_6 (Presenting\ to\ Class)$

2. HASDAG=$\beta_0 + \beta_1$ (Gender) + β_2 (Ethnicity)+ β_3 (SES)+ β_4 (Home Language) + β_5(Parents' Education) + β_7 (Peer Tutoring)

3. HASDAG=$\beta_0 + \beta_1$ (Gender) + β_2 (Ethnicity)+ β_3 (SES)+ β_4 (Home Language) + β_5(Parents' Education) + β_8 (Questioning)

4. HASDAG=$\beta_0 + \beta_1$ (Gender) + β_2 (Ethnicity)+ β_3 (SES)+ β_4 (Home Language) + β_5(Parents' Education) + β_9 (Discussion Groups)

5. HASDAG=β0 + β1 (Gender) + β2 (Ethnicity)+ β3 (SES)+ β4 (Home Language) + β5(Parents' Education) + β_6 (Presenting to Class)+ β_7 (Peer Tutoring)+ β_8 (Questioning) + β_9 (Discussion groups)

(Where B_0 is the constant and B_i is the slope.)

Design effects were applied to account for the effect of clustering by LEAs (students nested within classrooms in schools, districts and states).

Chapter IV

RESULTS AND ANAYLSIS

Introduction

Students with Autism Spectrum Disorder (ASD) come with many different reading abilities which make being included in the general education classroom for language arts a unique challenge for classroom teachers. The purpose of this study was to first explore the trends in language instruction for students with ASD, including time, setting and strategies commonly used. Then the study explored the relationship between reading comprehension and decoding skills in students with ASD. Thirdly, the study aimed to investigate if several instructional strategies commonly used in the classroom are effective in teaching students with ASD and Hyperlexia to comprehend text. This study analyzed the reading comprehension skills of students with ASD and Hyperlexia who receive instructional strategies that supported active inclusion. These strategies include the use of peer tutoring, cooperative discussion groups, and questioning strategies.

This chapter presents the results of the data analysis conducted from an original investigation into the Special Education Elementary Longitudinal Study (SEELS). First, this chapter presents the demographic data of the participating students within the SEELS

population, then with students with ASD, and finally the group of students who are identified as Hyperlexic.

After reporting demographics of the participants in the study, the research questions are addressed. The first question was to examine to what extent students with ASD are included in general education classrooms for language arts. The results identified the setting and delivery model for language arts instruction for students with ASD. The study then determined what types of instructional strategies were being used in the classroom for these students. Finally, the study examined whether specific instructional strategies; peer tutoring, cooperative learning and questioning strategies are helping students with ASD make academic achievements in reading.

After the study investigated the nature of language arts settings around the country for students with ASD, the study then examined the distribution of students diagnosed with ASD within the four quadrants of the Simple View of Reading (SVR) framework. Finally the study focused on the specific group of students with ASD who fell in quadrant D of the SVR (those with Hyperlexia) to determine what instructional strategies were used to support reading development. The study looked at the relationship between instructional strategies (active inclusion, peer tutoring, discussion groups, and questioning strategies) and reading achievement growth.

Data Management

The process to retrieve the SEELS database started with a petition to the Office of Special Education Programs, U.S. Department of Education, through SRI International. Permission to use the dataset was granted and once the data were received in disk form, several steps were taken to prepare the data for analysis. First the data were password

protected and stored in a secure location for protection. The data were available for both SPSS and SAS data programs. The disk also included the interviews and surveys as well as the data dictionary. Using the SPSS coded version, a new original dataset was created by including predetermined variables specific to this study. These variables are listed in Appendix C. The data were coded and could be sorted by student ID, a coding system put in place by SEELS to keep the identity of the students private. SEELS data came in raw form except for some of the demographic variables. SEELS combined different questions asked throughout the different surveys and interviews that answered primary disability, ethnicity, gender, grade and income. They identify them as "commonly used crossing variables" (SEELS, 2005, p. II-11). Data were collected by SEELS through parent interviews, student's school program survey, school characteristics, and language arts teacher survey. Questions were asked pertaining to the students' academic abilities, instructional supports being used, school characteristics, and students' attitudes toward school. Table 2 shows the direct assessments used by SEELS on each student in the database.

Table 2

SEELS Direct Assessments

Domain	Assessment	Assesses
Reading	WJR- Passage Comprehension	Tests the ability to derive meaning from content
	WJR- Letter- Word Identification	Identifies correct identification and pronunciation of letters and words
Math	WJR- Applied Problems	Tests the ability to apply data to the appropriate application in math
	WJR- Calculations	Ability to solve mathematical calculations
Self-concept	Student Self Concept Scale (SSCS) – Academic and Self-Image subscales (2nd form)	Rating scale of their self-confidence to academic and social questions
School Attitude	School Attitude Measure (SAM)- Selected items	Student's perception of school and locus of control
Friendship Interaction	Asher, R.R. (1984.) Loneliness in Children. *Child Development, 55*(4), 1456-1464.	Questions asking about friendship and loneliness at school.
Functional Skills	Scale of Independent Behavior-Revised (SIBR)	Rating scale of functional skills completed by knowledgeable person.

* WJR- Woodcock- Johnson Research Edition

Direct assessments (Table 2) were collected on each child using five regular assessments and one alternate assessment. The Woodcock-Johnson Research Edition (WJR) is used to assess math skills, specifically using the applied problems and the calculation subtests. Reading was assessed using the WJR Passage Comprehension and Letter Word Identification subtests. The student's self-concept was evaluated using the Student Self Concept Scale (SSCS); school attitude was measured by the School Attitude Measure (SAM); and friendship interaction came from Asher's article, "Loneliness in Children" (1984). The Scale of Independent Behavior-Revised (SIBR) was used as an alternate assessment for functional skills. All tests have been shown to be both valid and reliable tests to assess the associated tasks.

Three surveys and one quantitative interview were used to gather the other information about the child for the study. The parent interview was a one-on-one phone interview between a trained SEELS data collector and the parent or guardian over the age of 18 who can best answer questions about the child in the study. The school characteristic survey was completed by someone in the school who has access to the student body information for each school a participant in the study attended, such as the principal. Only one survey was completed for each school regardless of the number of students who were participants in the study. An educator who the principal deemed as the best person to describe the student's overall school program completed the student's school program survey for each child in the study. The general educator or special educator who teaches language arts to the student and can best describe the language arts instruction of the child completed the teacher survey. The teacher survey explicitly states to stop the survey if not the student's main language arts instructor.

For this study, the WJR Letter Word and Passage Comprehension direct assessments as well as many of the variables gathered from the surveys and parent interview from wave 1 and wave 3 of the study were used. Wave 2 data were excluded because the goal of the study was to assess the difference between wave 1 and wave 3 giving the maximum time for the growth to become apparent. The database started with 10,969 cases (participants). All students were coded with a randomized student identification number and no individually identifying information was provided for any participant. Therefore, the study was granted an approved exempt status from the Institutional Review Board for research on human subjects.

Demographic Information

A subset of the original dataset was created from the total database to represent the population and sample selection for this study. The first step was to identify the population for the study. All cases in the SEELS database were first analyzed for gender, grade level, ethnicity, household income, student's urbanicity (living in urban, suburban or rural locales), home language and head of household income. Data for this study were collected from the parent interview, the teacher survey and the school staffing survey along with direct assessments with the student. Appendix C lists which survey and interview questions these variables were gathered from. The data displayed in Tables 3 and 4 show the demographic data for all students who participated in the SEELS study. There were several instances of missing data from questions not answered by parents or teachers causing each question to have a different total number of responses (n). The final n for the students with full demographic data was 9,746.

Table 3

Frequency of Primary Disability Codes on SEELS Population

Disability Coding	n	%
Total Identified	**9746**	
Autism (ASD)	1,101	11.3
Learning Disability	1,050	10.8
Hearing Impairment	1,032	10.6
Orthopedic Impairment	991	10.2
Other Health Impairment	924	9.5
Emotionally Disturbed	876	9.0
Mental Retardation	866	8.9
Multiple Disabilities	845	8.7
Speech Impairment	838	8.6
Visual Impairment	815	8.4
Traumatic Brain Injury	359	3.7
Deaf/Blindness	49	0.5

Population Demographics

As explained previously, the SEELS database created a set of commonly used crossing variables (see Appendix C) including disability code, age, ethnicity, gender, family income, and urbanicity. The primary disability was listed based on 12 IDEA codes for qualifying for an IEP. Autism is used to code students with ASD. Table 3 shows the distribution of each disability represented in the database. The largest

proportion of students is identified with Autism as their primary disability, 1,101 students (10%). Learning Disabilities (9.6%, n=1,050), Hearing Impairment (9.4%, n= 1,032), and Orthopedic Impairments (9.0%, n=991) have similar percentages of students at approximately 9%. Emotionally Disturbed (8.0%, n=876) and Other Health Impairments which commonly include ADHD (8.4%, n=924) all clustered around 8%. Following that is Speech Impairment (7.6%, n=838), Mental Retardation (7.9, n=866), Visual Impairments (7.4%, n=815), and Multiple Disabilities (7.7%, n=845) all in the 7% range. Traumatic Brain Injury (3.3%, n=359) and Deaf/Blindness (.4%, n=49) represent the smallest group within the population.

Table 4

Demographic Description of SEELS population, All ASD Students in SEELS, and Current Sample.

Demographic	SEELS Pop		ASD Students		Study Sample	
	N	%	N	%	N	%
Student's gender	**9672**		**1098**		**874**	
Male	6383	66.0	918	83.6	730	83.5
Female	3289	34.0	180	16.4	144	16.5
Student's grade	**9484**		**1058**		**840**	
Ungraded	378	4.0	84	7.9	65	7.7
1st -3rd	2590	27.3	404	38.2	320	38.1
4th-5th	3084	32.5	345	32.6	277	33.0
6th and above	3432	36.2	225	21.3	178	21.2
Student's ethnicity	**9742**		**1101**		**874**	
Caucasian	6090	62.5	671	60.9	621	71.1
African American	2055	21.1	216	19.6	198	22.7
Hispanic	1246	12.8	145	13.2	32	3.7
Asian/Pacific Islander	246	2.5	54	4.9	14	1.6
American Indian/Alaska Native	61	.6	6	.5	3	.3
Multi/Other	44	.5	9	.8		.7
Household income	**8905**		**1045**		**832**	
$25,000 and under	3470	39.0	245	23.4	173	20.8
$25,001 to $50,000	2454	27.6	315	30.1	248	29.8

Over $50,000	2981	33.5	485	46.4	411	49.4
Student's Urbanicity	**9313**		**1048**		**842**	
Rural	829	8.9	42	4.0	41	4.9
Suburban	4604	49.4	453	43.2	383	45.5
Urban	3880	41.7	553	52.8	418	49.6
Education Level of Head of Household	**9139**		**1080**		**858**	
Less than High School	1540	16.9	60	5.6	32	3.7
High School or GED	3045	33.3	277	25.6	234	27.3
Some College	2452	26.8	308	28.5	251	29.3
B.A./ B.S. or higher degree	2102	23.0	435	40.3	341	39.7
Language Other than English at Home	**8688**		**1084**			
No	7133	82.1	874	80.6		
Yes	1555	17.9	210	19.4		

Further demographic data were collected from the SEELS for gender, grade, ethnicity, household income, urbanicity and home language for all students in the SEELS population. According to the research, the demographic variables in Table 4 have been shown to have a relationship to reading abilities (Morris et al., 2012). For example, boys are more likely to be identified with autism than girls (Wehmeyer & Schwartz, 2001). In line with this, there were more males in the study than females, with 58.2 % male (n=6,383) and 30.0% female (n=3,289) yielding about a 2:1 ratio of boys over girls.

Ethnicity has been shown to be disproportionate in special education, with a high percentage of minorities being identified as with a disability, yet among students with ASD, there is a higher percentage of Caucasian students identified (Losen, Orfield, & Harvard Civil, 2002). More than half of the students in the SEELS dataset were Caucasian (55.5%, n=6090) and African Americans had the second highest distribution at 18.7% (n=2055) with Hispanics third at 11.4% (n=1246). These ethnicities were followed by Asian/Pacific Islander (2.2%, n=246), American Indian/Alaska Native (.6%, n=61), and Multi/Other ethnicities (.4%, n=44) accounting for less than 4% of the population. The students were distributed amongst the grades with 378 (3.4%) students ungraded; 2,590 (23.6%) students between first and third grade; 3,084 (28.1%) students in fourth or fifth grade; and 3,432 (31.3) in sixth grade or above.

Demographic profiles of the students included the makeup of the household they reside in. Household income, parent's education level, and students' urbanicity were collected to describe some aspects of the home life of these students. These questions were scored based on response to questions asked by the interviewer to the parent or guardian of the child in the study. The household income variable was divided into three categories; those households making $25,000 or less per year, those making between $25,000 and $50,000, and those making more than $50,000. While the distribution of students was fairly equal, the largest category was households who made less than $25,000 (31.6%, n=3,470). Households that made $25,000 to $50,000 yielded 22.4% (n=2,454), and over $50,000 had 27.2% of the population (n=2,981). National averages show that students from low SES are more likely to be identified as having a learning disability (Dee & Jacob, 2011; Korat, 2011).

Parents' education level has been known to have an influence on academic achievement (Davidse, de Jong , Maria T., Bus, Huijbregts, & Swaab, 2011). The more education the parents have the more value they place on education, the more involved they are in their child's education and the higher the expectations are (Gonzalez-DeHass, Willems, & Doan Holbein, 2005). The education level in the SEELS study was measured in four categories; less than high school, high school or GED, some college experience, or B.A./B.S. or higher degree. Parents who had earned a high school diploma or a GED accounted for 27.8% of the students (n=3,045). Some college experience was second with 22.4% (n=2,452); Bachelor's degrees or higher accounted for 19.2% of the families; and Less than a High School Diploma represented 14.0% of the population. The data showed a higher percentage of white, non-Hispanics than the total sample, with a higher SES than the sample as a whole; 39% college degree or higher, 49% incomes over $49,000.

Where students live can factor into the education of the students and is shown to be related to academic achievement. Student's urbanicity is another commonly used crossing variable, and is categorized by Rural, Suburban, and Urban. The majority of the students live in a Suburban setting, 42.0% (n=4,604). Urban settings account for 35.4% (n=3,880) of the SEELS population. Similar to the average population density, rural living brings in the lowest number of students at only 7.6% of the population (n=7.6).

The students' language was analyzed based on research showing that language barriers can hinder reading abilities (Palmer, Chen, Chang, & Leclere, 2006). Parents were asked to respond yes or no to the question asking if a different language other than

English was spoken at home. No other language than English is spoken at home for 65% of the students (n=7113).

Students with Autism Spectrum Disorder Demographics

The sample for this study consisted of only students with Autism listed as their primary disability on their IEP. The results presented in Table 4 show that students with ASD, represented 10% of the total population of students in the SEELS dataset (1,101 students). The ratio of males to females in the total population was almost 2:1, yet in the sample of students with ASD, males accounted for 83.4 % or a ratio of 5:1. Educational levels of the head of household change when looking at the sample of students with ASD. Students, whose parents had a college degree or higher, accounted for 39.5 % of the sample group. This is the largest category in this parent education variable, unlike the total population where high school diploma or GED was the largest. Again there was a difference in the population and the sample when comparing how much money was made. In the sample of students with ASD, 44% of the homes made more than $50,000 whereas only 27% did in the total SEELS population. The ethnic demographic variable of students with ASD showed that Caucasians accounted for 55% of the population and 60% of the sample group. These findings match the research stating that most students with ASD are Caucasian males from middle to upper class families (Croen, Grether, Hoogstrate, & Selvin, 2002).

Study Sample Demographics

To assess reading abilities of students with ASD, the participants from the database had to meet two initial criteria to be cases in this study. The first criterion was to identify them as having Autism Spectrum Disorder. To qualify, the database selected

cases that identified Autism as their primary disability based on receiving a coding of Autism on their IEP (n=1,101) The second criteria was that the student must be from a household where English is the primary language spoken at home. Students who were raised in non-English speaking families add another layer of justifications of academic achievement or failure (Palmer et al., 2006). Students with Autism and English speaking represent approximately 7% of the total SEELS population (n=874) and qualify to be participants in this study.

Data Analysis

Phase 1: All Students with ASD

Question 1: Language Arts Instruction

The first question under investigation in this study asked to what extent are students with ASD included in general education classrooms for language arts. To fully answer this question, the study also examined how many hours students with ASD are receiving language arts instruction, and in what classroom settings (general education classroom, resource room, self-contained special education classroom, or other). The SEELS dataset shows that 98.9% of the students with ASD who speak English in the home receive some type of language arts instruction.

The SEELS database collected the number of minutes each student received language arts instruction. Then the study examined the different service delivery models used to teach the students with ASD in the sample, and the primary goals for language arts for each student. The language arts instruction varies between school districts, schools, grades, and even classrooms. This piece will give a framework of what the typical setting looks like for students with ASD in language arts instruction.

Table 5

Primary Goal for Language Arts for Students with ASD

Goal	N (555)	%
Reading at Grade Level	161	29.0
Improve Reading Skills	192	34.6
Developing Functional Reading Skills	108	19.5
Building Pre-Reading Skills	56	10.1
No Goals for Reading Achievement	38	6.8

The language arts teacher was asked to identify one of five choices that best explained the students' goals for reading. The choice responses were reading at grade level, improving reading skills, development of functional reading skills, building pre-reading skills or no goals for reading achievement. For most of these students, 63.6%, the primary goal for reading achievement is a combination of improved reading skills and reading at grade level. This showed that more than half of the sample was working toward grade level reading.. Students working toward pre-reading or functional skills during language arts represented 29.6% of the population, and 6.8% of the students were listed as having no reading goals regarding achievement.

Table 6

Minutes per Week Students with ASD and Hyperlexia are in Language Arts Instruction

Minutes per Week	**%**
275 minutes or less	28
300 - 570 minutes	50
600 - 1,920 minutes	22

The number of minutes students spent in language arts was calculated to see how much time students spent in language arts classes. The variable was collected from the language arts teacher survey where they were asked to write in the time in minutes or hours that the student received language arts instruction. Table 6 shows the total number of minutes per week that the students received language arts instruction. The amount of time students spend in language arts varies greatly from less than 4 ½ hours a week (less than an hour a day) to 32 hours a week, which calculates out to more than 6 hours a day. Depending on the severity of the disability, the structure of schedules, and the grade level the student is in can affect the amount of time a student spends in language arts classes.

Table 7

Number of Language Arts Settings for Students with ASD.

Number of Settings	N	%
No Language Arts Setting	6	1.1
One Language Arts Setting	425	77.6
Two Language Arts Settings	111	20.3
Three Language Arts Settings	6	1.1

The service delivery model displays the setting where the student receives instruction. The variable was obtained from the teacher's survey question pertaining to service delivery model for language arts. The teacher responded with all service models the student could receive, which included the general education classroom, resource room, special education self-contained classroom, other instructional setting not named, or did not receive language arts instruction. More than one category could be chosen if the student received language arts instruction in multiple settings. Table 7 shows the number of different settings each student has for language arts. The largest group of students received instruction in one setting, 77.6% of students. This group included students who are included in the general education setting or those who are taught in self-contained classrooms. Many students may receive part of their language arts instruction in two different settings accounted for 20.3% of the students (n=111). Three settings and no language arts settings yielded six students or 1.1%.

Table 8

Instructional Setting for Students with ASD during Language Arts

Instructional Setting	n (542)	%
General Education Classroom	214	39.5
Resource Room	124	22.9
Special Education Self-Contained Classroom	308	56.8
Other Instructional Setting Not Named	19	3.5
Do not receive Language Arts Instruction	6	.7

*Some students received services in more than one location bringing total % over 100

Table 8 shows the results from the service delivery models for students with ASD. A special education self-contained classroom taught the largest group of students with ASD, followed by general education classroom. Some students received language arts in more than one setting. Commonly, students are included in the general education classroom and pulled out to a resource room for small group. A third setting, listed here as other instructional setting not named, might include speech and language support with a speech pathologist or possibly an individualized school designed support setting.

Table 9

Instructional Strategies used by Students with ASD in Language Arts.

Instructional Strategy	n	%
Student responds orally to questions		
Never or Rarely	125	22.8
Sometimes or Often	417	75.8
Student takes quizzes or tests		
Never or Rarely	223	41.1
Sometimes or Often	303	55.8
Student works independently		
Never or Rarely	116	21.2
Sometimes or Often	426	77.9
Student works with peer or group		
Never or Rarely	153	28.0
Sometimes or Often	368	67.3
Student participates in class discussion		
Never or Rarely	207	37.9
Sometimes or Often	306	55.9
Student works on project or presentation		
Never or Rarely	228	52.6
Sometimes or Often	226	41.3
Student completes writing assignments		
Never or Rarely	174	31.9
Sometimes or Often	348	63.8

Student presents to the class or group		
Never or Rarely	325	59.1
Sometimes or Often	183	33.3
Student reads aloud		
Never or Rarely	153	27.9
Sometimes or Often	373	68.1
Student reads literature, poetry, plays, drama		
Never or Rarely	232	42.6
Sometimes or Often	278	51.1
Student reads informational materials		
Never or Rarely	206	37.7
Sometimes or Often	312	57.1
Student practices phonics/phonemic skills		
Never or Rarely	180	32.8
Sometimes or Often	345	63.0
Student practices/learns vocabulary		
Never or Rarely	75	13.8
Sometimes or Often	450	82.6
Student reads silently		
Never or Rarely	193	35.2
Sometimes or Often	336	61.2
Student does sight word reading		
Never or Rarely	140	25.5
Sometimes or Often	386	70.6

Many different strategies are used to teach students to read. In the SEELS dataset, teachers were asked to respond how often the student participates in several activities: works with peers or in group, presents to the class or group, and receives peer tutoring as a support. All of these instructional strategies promote active inclusion. Table 9 shows the different instructional strategies commonly used to teach students with ASD in the classroom. In the study, 75.8% of the students respond orally to questions. These students demonstrated the ability to participate in language based environments for reading, and show that the student is capable of verbal responses. Commonly used strategies include practicing vocabulary (82.6%), doing sight word reading (70.6%), and reading aloud (68.1%). Instructional strategies that promoted active inclusion varied in usage. Participating in class discussions sometimes or often was noted for 55.9% of the students with ASD. Only two of the strategies were being used by less than half of the students on a frequent basis (sometimes or often), and included students work on projects and presentations (41%.3) and student presents to the class or group(33.3%). Working with peers or groups sometimes and often was a strategy used by 67.3 % of the students in their language arts instruction. Conclusions find that students with ASD were included in general education classrooms, many with goals to read on grade level. Language arts instruction varied in delivery and setting for these students.

Question 2: Instructional Strategies for Students with ASD

Question 2 asked among students with ASD, what is the relationship between these instructional strategies (peer tutoring, discussion groups, and questioning strategies) and academic achievement in reading? A Chi-Square test of independence was performed to analyze the relationship between the students who can participate in class

(measured by the ability to respond orally to questions in class), and the students' active inclusion in the classroom (measured by participation in class discussions and presentation to the group or class).

Table 10

Cross Tabulation Table of Responding Orally in Class and Presenting to the Class or Group for Students with ASD (n=545)*

	Never or Rarely presents to class	Sometimes or Often presents to class	χ^2	*df*	*p*
Never or Rarely respond orally to questions	101	17	168.87	1	<.01
Sometimes or Often respond orally to questions	220	164			

* 43 students had a response of N/A in Special Education Setting

Table 10 shows the results of the Chi-square analysis for this question. There was a significant relationship between being able to respond orally to questions in class and the degree to which the students were using this skill to participate in discussions and presentations, χ^2 =(16, N= 545) = 168.87, p <.01. Students who were identified as sometimes or often responding to questions orally represent 75.8% of the population (417 students). Of that group, the analysis showed that 220 never or only rarely present to class. This showed that while students can participate in class, many do not. Of the students with ASD who can and do respond orally to questions, 164 students sometimes or often presented to the class or group.

Table 11

Cross Tabulation Table of Variables Working with Peers or in Groups and Participating in Discussions for Students with ASD (n=542).*

	Never or Rarely participates in discussions	Sometimes or Often participates in discussions	χ^2	*df*	p
Never or Rarely work with peers or in groups.	101	98	348.84	1	<.01
Sometimes or Often work with peers or in groups.	44	256			

* 43 students had a response of N/A in Special Education Setting.

Chi-Square analysis showed that there was a significant relationship between working in a group or with peers and their participation in class discussions χ^2 (16, N=542) = 348.84, p< .01 (Table 11). The results show that about half of the students work in groups and participate in discussions (n=256). A small number of students were given the opportunity to work in groups or with peers but still did not participate in class discussions (n=44). There is a relationship between the ability to participate through oral responses to questions and the opportunity to work in groups with the actual participation through presentation and discussions. These students have been identified as being able to participate and are given the opportunity to participate in class discussions, present to the class, and are working in groups.

Question 3: Instructional Strategies and Academic Achievement

The purpose of the final question asked in phase one was to analyze the academic achievement of the students with ASD as it pertains to reading and instructional strategies. Among students with ASD, what is the relationship between instructional strategies and academic achievement measured by difference between wave 1 and wave 3 scores on the passage comprehension test of the Woodcock Johnson-Research Edition?

To calculate reading achievement growth, the differences in the students' standard scores on subtests of the WJR at wave 3 and wave 1 were used. Standard scores indicated how far above or below the average (the ""mean") an individual score falls, using a common scale, such as one with an ""average" of 100. The WJR represents a normative curve with an average of 100. The study first looked at the growth of students Letter word ID and passage comprehension scores between wave 1 and wave 3. For Letter Word ID growth between wave 1 and wave 3, the mean growth score was 1.8 (SD=17.52), with a median of 1.0 and range of 164.0. For Passage Comprehension growth between wave 1 and wave 3, the mean growth score was -1.8 (SD= 17.08), with a median of -3.0 and range of 151.0. The growth variable is a normative curve with an average of 1 for Letter-Word ID and -3.0 for Passage Comprehension subtests.

Demographic Variables and Academic Growth in Reading

To investigate the relationship between instructional strategies and academic achievement, the passage comprehension growth score discussed above was used, since the focus on the study was on reading comprehension rather than decoding abilities. According to the research, reading abilities were influenced by demographic variables such as gender, ethnicity, parent's education level, and urbanicity. The results showed

that none of these had a significant effect on the academic growth of students with ASD in the SEELS dataset.

Table 12

Gender Difference and Academic Growth for Students with ASD

Gender	**N**	**Mean**	**SD**	***t***	***df***
Males	210	-2.18	16.61	-.69	53.74
Females	42	0.02	19.37		

For the gender variable, a t-test was run to test the mean difference in the passage comprehension growth score between males and females (Table 12). There was not a significant difference between males and females in terms of academic growth on the passage comprehension score, (t (*df* 53.73) = -.69, *p*=.495).

Table 13

Pearson Correlation Matrix among Education of Head of Household and Academic Growth

	Academic Growth
Educational Level of Head of Household	.069
	(.277)

For parent education level, the study asked the educational level of the head of household. A Pearson Correlation was used to show the relationship between two or more interval level variables. The correlation was computed to assess the relationship between education level and academic growth. There was no significant correlation between the two variables (r=.069, n=249, p= 0.277).

Table 14

Summary of ANOVA for Ethnicity and Urbanicity on Academic Growth for Students with ASD

	Sum of Squares	df	Mean Square	*f*	*p*	*Group mean*
Ethnicity						
Between Groups	742.12	5	148.42			
Within Groups	72,528.74	246	294.83	.50	.77	
Total	73,270.86	251				
Urbanicity						
Between Groups	945.87	2	472.93	1.62	.20	
Within Groups	72,093.32	248	290.70			
Totals	73,039.19	250				

Table 15

Pearson Correlation Matrix for Instructional Strategies and Academic Growth of Students with ASD

Instructional Strategies and Academic Growth	1	2	3	4	5
1. Student responds orally to questions	1.00				
2. Student works with peers or group	.265**	1.00			
3. Student participates in class discussion	.592**	.540**	1.00		
4. Student presents to class or group	.318**	.507**	.578**	1.00	
5. Passage Comprehension Growth	.027	-.110	-.033	.004	1.00

** Correlation is significant at the 0.01 level (2-tailed)

A One-Way ANOVA was run to test the impact ethnicity and urbanicity have on academic growth in reading, measured by growth between wave 1 and wave 3 on the passage comprehension subtest of the Woodcock-Johnson Revised (WJR). For ethnicity, students were asked to respond to one of the following categories; Caucasian, African American, Hispanic, Asian/Pacific Islander, American Indian/Alaska Native or Multi/Other. The main effect of ethnicity was not significant, $F(148.42,294.83)=.50$, $p=.77$. Urbanicity was categorized into Suburban, Rural and Urban. The main effect of urbanicity was not significant, $F(472.93, 290.69) = 1.62$, $p=.20$. Neither ethnicity nor urbanicity had an effect on academic growth.

Research has shown that these demographic variables impact reading achievement for all students (Morris et al., 2012). Yet in this study, these variables showed no significant relationship to reading achievement. The research used academic achievement gains rather than a cross sectional analysis of achievement. Possible reasons for this will be addressed in Chapter 5. For instructional strategies that support active inclusion, four were selected as independent variables; (1) student responds orally to questions, (2) students work with peers or groups, (3) students participate in class discussions, and (4) student presents to class or group. According to the research, these strategies represent cooperative learning, discussion opportunities, questioning strategies, and opportunities to use oral language. They have been shown to be related to academic growth for all students including those with ASD (Cotter, 2011; Dudley-Marling, 2011; Gustafson et al., 2011; LaGue & Wilson, 2011; Morrier, Hess, & Heflin, 2011; Ncube, 2011a). Pearson Correlations were used to assess the relationship between each strategy and academic growth (Table 15). There was no correlation between the any of the

instructional strategies and academic growth variables. The results in this study do not mirror results shown in research previously conducted. Yet again, this study focused on gains rather than cross sectional achievement.

However, correlations were noted between different instructional strategies. There were significant positive relationships between working in peers or groups and responding orally ($r(545) = .265$, $p < .01$), presenting to the class and responding orally ($r(545) = .318$, $p < .01$), and participating in group discussions and responding orally ($r(545) = .592$), $p < .01$). Correlations were also noted for working with peers or in a group and participating in discussions ($r(542) = .540$, $p < .01$) and working with peers or in a group and presenting to the class or group ($r(544) = .507$, $p < .01$).

Table 16

Summary of ANOVA for Instructional Strategies and Academic Growth for Students with ASD

	Sum of Squares	*df*	Mean Square	*F*	*p*	*Group Means*
Student responds Orally to Questions						
Between Groups	297.93	3	99.31	.327	.806	
Within Groups	59,188.94	195	303.53			
Total	59,486.87	198				-1.97

Student works with Peer or Groups						
Between Groups	10,11.24	4	252.81	.831	.507	
Within Groups	58,135.76	191	304.38			
Total	59,147.00	195				-1.93
Student participates in Class Discussion						
Between Groups	700.91	4	175.23	.560	.692	
Within Groups	60,675.92	194	312.76			
Total	61,376.82	198				-2.23
Student presents to the Class or Group						
Between Groups	788.51	4	197.13	.656	.623	
Within Groups	58,304.17	194	300.54			
Total	59,092.67	198				-2.29

A One-way ANOVA tests the mean difference in the dependent variable between the groups of the independent variable. There were no significant differences found in academic growth of student with ASD between the four instructional strategies. No differences were found between groups or within groups in relationship to academic growth.

Table 17

Regression Analysis of Instructional Strategies and Academic Growth for Students with ASD.

	Model 1				
Variable	*B*	*SE B*	*β*	*t*	*Sig. (p)*
Constant	1.19	7.521		.16	.874
Student will Respond Orally to Questions	1.51	2.070	.064	.731	.466
Student works with peer or group	-2.992	1.649	-.149	-1.81	.071
Student participates in class discussion	-1.392	1.910	-.071	-.729	.467
Student presents to class or group	2.194	1.511	.119	1.452	.148
R^2		.029			
F for change in R^2		1.423			

The last analyses run for phase one of the study was a regression analysis. The purpose of this test was to look at the impact of the four strategies combined on academic achievement growth. The first phase of this study was to see if these active inclusion instructional strategies would increase academic achievement for students with ASD in reading comprehension. Regression analysis was used to test if these instructional strategies can significantly predict academic achievement. The results of the regression indicated that there was no significant relationship among three of the four instructional strategies and passage comprehension (R^2= .029, F(4,188)=1.423, p=.228). The only one that showed any significance was the instructional strategy of students working with peers or in groups. Yet the relationship was weak at p= 0.071. Table17 shows the results of the regression test.

Phase 2: Students with ASD and Hyperlexia

The purpose of the second phase of this study was to focus on students with ASD and Hyperlexia. To first identify the students with Hyperlexia, the sample needed to be divided into the four quadrants of the Simple View of Reading (SVR) framework. The sample was divided by plotting them on the SVR based on their scores on the WJR letter word ID and their passage comprehension standard scores. Students who had a standard score of 90 points or higher on the letter word ID were considered to have average to high decoding abilities. Students who scored 89 points or lower were categorized as having low decoding skills. These scores were used because the normal range of standard scores on the WJ were 90 to 110 (mean of 100 with a SD of 10). As for passage comprehension, scores were categorized the same way, with 90 or above as average to high comprehension skills and 89 and lower as low comprehension skills. Students were plotted into four categories based on low decoding/low comprehension, low decoding/average to high comprehension, high decoding/low comprehension and average to high decoding/high comprehension.

Table 18

Students with ASD plotted on SVR for Wave 1.

	High Comprehension		
	Quadrant A - Decoding/+ Comp. 24 Students	Quadrant B +Decoding/ + Comp. 75 Students	
Low Decoding	Quadrant C -Decoding/ - Comp. 173 Students	Quadrant D + Decoding/ - Comp. 64 Students	High Decoding
	Low Comprehension		

Table 18 shows the distribution of all students with ASD who completed the WJR in wave 1 (n=336) on the SVR. The majority of students were in quadrant C (n=173). These are students who struggle in both decoding and reading comprehension. Seventy-five students were identified as reading on an average or above average range in both decoding and comprehension. The smallest group of students was in quadrant A, which is the low decoding/ high comprehension group, commonly described as dyslexia. Quadrant D, which is the Hyperlexia group, yielded 64 students. These students become our sample group for phase 2 of the study (Table 19). The 64 students with ASD, speak English in the home and are shown to have Hyperlexia became the sample for phase two. The section first describes the demographic profile of these students. Table 19 shows the demographic makeup of these 64 students. Notable demographic differences between phase one and phase two include gender, ethnicity, parent education and income. Males made up 87.5% of the population (n=56) whereas females account for only 12.5% (n=8).

This is a ratio of 7:1, boys over girls. Of the population, 78.1% of the students are Caucasian (n=50) and 17.2% are African American, which accounts for more than 95% of the population. Pertaining to income, 43.5% come from households that make more than $50,000 and 38.7% come from families that make between $25,000 and $50,000. When looking at education levels, 69.4% of these students have parents/guardians who have at least some college experience or have received bachelors or higher degrees. This is very similar to findings in the research that states most students with ASD are boys that come from upper middle class Caucasian families.

Table 19

Demographics of Students with ASD and Hyperlexia

Demographic	N	%
Student's gender	**64**	
Male	56	87.5
Female	8	12.5
Student's grade	**64**	
Ungraded	2	3.1
1st -3rd	22	34.4
4th-5th	26	40.6
6th and above	14	21.9
Student's ethnicity	**64**	
Caucasian	50	78.1
African American	11	17.2
Hispanic	2	3.1
Asian/Pacific Islander	1	1.6
American Indian/Alaska Native	0	0
Multi/Other	0	0
Household income	**62**	
$25,000 and under	11	17.2
$25,001 to $50,000	24	38.7
Over $50,000	27	43.5

Student's Urbanicity	**63**	
Rural	3	4.8
Suburban	28	44.4
Urban	32	50.8
Education Level of Head of Household	**64**	
Less than High School	1	1.6
High School or GED	18	28.1
Some College	20	31.3
B.A./ B.S. or higher degree	24	38.1

Table 20

Students with ASD plotted on SVR framework from Wave 3 WJR scores.

High Comprehension

	Quadrant A - Decoding/+ Comp. 13 Students	Quadrant B +Decoding/ + Comp. 84 Students	
Low Decoding	Quadrant C -Decoding/ - Comp. 186 Students	Quadrant D + Decoding/ - Comp. 92 Students	High Decoding

Low Comprehension

To see if changes in the number of students with ASD and Hyperlexia changed over time, the students were plotted again based on wave 3 results. Wave 3 showed that 92 students were identified as being Hyperlexic. In wave 1, 19% of the students were identified as Hyperlexic, and in wave 3 it increased to 25%. Table 20 shows the distribution of students with ASD in wave 3. As the students grew older, more of them were identified as being Hyperlexic. There were also more total cases that had scores on the WJR recorded (wave 1 n=336, wave 3 n=375).

Question 4: Instructional Strategies for Students with ASD and Hyperlexia

Among students with ASD in quadrant D of the SVR (those with Hyperlexia), what instructional strategies were used to support reading skills development? This section describes what the average language arts class looks like for students with ASD and Hyperlexia. Similar to analysis performed in Phase one of this study, the second

phase of the study first examined the number of hours and in what setting these students received language arts instruction.

Table 21

Minutes per Week Students with ASD and Hyperlexia are in Language Arts Instruction

Minutes per Week	**%**
275 minutes or less	28
300 - 570 minutes	50
600 - 1,920 minutes	22

The results were pulled from the language arts teacher survey asking for minutes of language arts instruction the child received and in what setting (general education classroom, special education self-contained, resource room, or individual or home instruction) (Table 20). Students who received 275 minutes or less of language arts instruction per week accounted for 28% of the sample. This translated to about 4 ½ hours a week or less. Fifty percent of the student language arts block ranged from 300-570 minutes a week (5 to 9 ½ hours per week), and 22% received 600-1020 minutes (10-17 hours per week). Students vary on the amount of time needed to learn a new skill, the intensity of instruction, and amount of practice they received, which translated into academic achievement (Gettinger, 1985).

Table 22

Instructional Setting for Students with ASD during Language Arts

Instructional Setting	N=64*	%
General Education Classroom	27	54
Resource Room	12	24
Special Education Self-Contained Classroom	21	42
Other Instructional Setting Not Named	6	12
Do not receive Language Arts Instruction	0	0

*Some students received services in more than one location giving N a higher value.

Students who were included with their typically developing peers for at least part of their language arts block of time accounted for 54% of the sample. Other service delivery models include resource rooms where the students were pulled out for some of the language arts time or special education self-contained classrooms where students are separated from their typically developing peers. Using some small group or individual instruction outside of their regular setting in resource rooms is given to 24% of the sample. The most excluded from inclusion settings was the self-contained classroom where 42% of these students are out of the general education settings for language arts. SEELS survey allowed responders to choose more than one setting for language arts instruction due to the fact that some students might receive language arts in multiple settings (Table 22).

Table 23

Instructional Strategies used by Students with ASD and Hyperlexia

Instructional Strategy	N=50	%
Student responds orally to questions	9	18.0
Never or Rarely	41	82.0
Sometimes or Often		
Student takes quizzes or tests		
Never or Rarely	6	12.0
Sometimes or Often	44	88.0
Student works independently		
Never or Rarely	8	16.0
Sometimes or Often	42	88.0
Student works with peer or group		
Never or Rarely	10	20.0
Sometimes or Often	39	78.0
N/A in Special Education Setting	1	2.0
Student participates in class discussion		
Never or Rarely	16	32.0
Sometimes or Often	34	68.0

Student works on project or presentation		
Never or Rarely	14	28.0
Sometimes or Often	33	66.0
N/A in Special Education Setting	3	6.0
Student completes writing assignments		
Never or Rarely	12	24.0
Sometimes or Often	38	76.0
Student presents to the class or group		
Never or Rarely	31	60.8
Sometimes or Often	19	37.3
N/A in Special Education Setting	1	2.0
Student reads aloud		
Never or Rarely	4	10.0
Sometimes or Often	45	90.0
Student reads literature, poetry, plays, drama		
Never or Rarely	13	26.0
Sometimes or Often	37	74.0
Student reads informational materials		
Never or Rarely	9	18.0
Sometimes or Often	41	82.0

Student practices phonics/phonemic skills		
Never or Rarely	21	42.0
Sometimes or Often	28	56.0
N/A in Special Education Setting	1	2.0
Student practices/learns vocabulary		
Never or Rarely	5	10.0
Sometimes or Often	45	90.0
Student reads silently		
Never or Rarely	10	20.0
Sometimes or Often	40	80.0
Student does sight word reading		
Never or Rarely	13	25.5
Sometimes or Often	36	70.6
N/A in Special Education Setting	2	3.9

Table 23 shows the different instructional strategies commonly used for students with ASD and Hyperlexia in the classroom. These data were collected from the teacher survey in wave 1. According to the data, 82% of the students orally respond to questions in the classroom and 90% read aloud, but only 37.3% present to the group or class. Active inclusion also involves working with peers. The study showed that 78% of the students were working in groups or peers, but only 68% participate in class discussion.

Variables that yielded large numbers of students ($n \geq 40$) participate in reading aloud, reading silently, learns vocabulary, taking quizzes and tests, and orally responding to questions. Reading information text accounted for more students with ASD and Hyperlexia than reading literature, plays and other nonfiction text ($n = 45$, $n = 37$ respectfully). According to the research, students with ASD commonly preferred to read informational text compared to fictional pieces. The factual nature of nonfiction is easier for them to grasp compared to abstract pieces like plays, poetry and fictional stories.

Question 5: Academic Achievements among Students with ASD and Hyperlexia

The final question in phase 2 mirrors question 3 in phase 1. Among students with ASD in quadrant D of the SVR (those with Hyperlexia), what is the relationship between these instructional strategies (active inclusion, peer tutoring, discussion groups and questioning strategies) and academic achievement in reading? The difference between phase 1 and phase 2 is that the sample in phase 2 contained only students with ASD and Hyperlexia. These 64 students were pulled from quadrant D of the SVR. Among students with ASD and Hyperlexia, what is the relationship between instructional strategies and academic achievement (Appendix C) in reading?

Demographic Analysis for Students with ASD and Hyperlexia

Table 24

Gender Difference and Academic Growth for Students with ASD and Hyperlexia

Gender	**N**	**Mean**	**SD**	***T***	***df***	***p***
Males	45	.29	13.73	-.44	.73	.341
Females	8	2.75	18.30			

Demographic data were analyzed to see if there was a relationship with academic growth for students with ASD and Hyperlexia. The results showed that gender, ethnicity, urbanicity and parent education does not have an effect on academic growth, measured between wave three to wave one passage comprehension subtests of the WJR. For gender, the t-test showed the mean score on academic growth variable for males was .29 (SD=13.73), whereas the female's mean score on academic growth was 2.75 (SD=18.30). There was not a significant difference between males and females in terms of academic growth, (t (8.46) = -.44, p=.341).

Table 25

Pearson Correlation Matrix among Education of Head of Household and Academic Growth for students with ASD and Hyperlexia

	Academic Growth
Educational Level of Head of Household	-.006 (.968)
Student's Household Income	.305* (.028)

* Correlation is significant at the $p < .01$ level (2-tailed)

Pearson Correlations were used to show the relationship between education level of head of household and academic growth and then house hold income and academic growth. There was no correlation between educational level of head of household and academic growth (r=-.006, n=52, p= 0.97). Income was the only demographic that had an influence on academic growth (r= .305, n=52, p= .028). According to Cohen (1988), the effect size was moderate at .30.

Table 26

Summary of ANOVA for Ethnicity and Urbanicity on Academic Growth of Students with ASD and Hyperlexia

	Sum of Squares	df	Mean Square	F	p	Group Means
Ethnicity						
Between Groups	429.26	3	143.09	.684	.566	
Within Groups	10,248.62	49	209.16			
Total	10,677.89	52				
Urbanicity						
Between Groups	35.67	2	17.84	.085	.919	
Within Groups	10,324.33	49	210.70			
Totals	10,360.00	51				

Table 27

Pearson Correlation for Instructional Strategies and Academic Growth of Students with ASD and Hyperlexia.

Instructional Strategies and Academic Growth	1	2	3	4	5
1. Student responds orally to questions	1.00				
2. Student works with peers or group	.107	1.00			
3. Student participates in class discussion	.759**	.333*	1.00		
4. Student presents to class or group	.243	.416**	.435	1.00	
6. Passage Comprehension Growth	.185	.118	.389*	.332*	1.00

** Correlation is significant at the $p < 0.01$ level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

A One-way ANOVA was run to test the impact ethnicity and urbanicity has on academic growth in reading, measured by growth between wave 1 and wave 3. The main effect of ethnicity was not significant for students with ASD and Hyperlexia, F (3,49) =.68, p=.57. Urbanicity was categorized into Suburban, Rural and Urban. The main effect of Urbanicity was not significant, F (2,49) = .085, p=.92. Neither ethnicity nor urbanicity had an effect on academic growth.

To calculate the relationship between instructional strategies and academic achievement in students with ASD and Hyperlexia, the passage comprehension growth score was used by subtracting wave 1 from wave 3. The results show that none of these had a significant effect on academic growth for this sample of 64 students who were identified as having ASD and Hyperlexia. For letter word ID growth between wave 1

and wave 3, the mean growth score was -5.02 (SD=15.92), with a median of -5.0 and range of 93. For Passage Comprehension growth, the scores were positive between wave 1 and wave 3, with the mean growth score being .66 (SD= 14.33), and a median of 0.5 and range of 71. Pearson Correlations were computed to assess the relationship between each instructional strategy and academic growth (Table 26) for students with ASD and Hyperlexia. There were Correlations between the two of the instructional strategies and academic growth variables, students participating in class and academic growth (r (.41) =.389, p.012). A relationship was also shown between presenting to the class or group and academic achievement (r (42) =.332, p=.032). There were correlations between some of the two instructional strategies. There was a relationship between participating in class discussions and responding orally (r (50) =.243), p<.01), between participating in class discussion and working with peer or group (r (50) =.333, p=.018), and between presenting to class or group and working with peers or group (r (50) = .416, p=.003.

Table 28

Summary of ANOVA for Instructional Strategies and Academic Growth for Students with ASD and Hyperlexia

	Sum of Squares	*df*	Mean Square	*F*	*p*	*Group Means*
Student responds Orally to Questions						
Between Groups	927.263	2	463.63	2.449	.1	
Within Groups	7,194.74	38	189.34			
Total	8,122.00	40				2.00
Student works with Peer or Groups						
Between Groups	249.45	4	62.362	.285	.886	
Within Groups	7,872.55	36	218.68			
Total	8,122.00	40				2.00
Student participates in Class Discussion						
Between Groups	1,728.04	3	576.01	3.333	.030	
Within Groups	6,393.96	37	172.81			
Total	8,122.00	40				
						2.00
Student presents to the Class or Group						
Between Groups	1,187.15	4	296.79	1.507	.220	
Within Groups	7,287.25	37	196.95			
Total	8,474.41	41				1.55

Instructional Strategies and Academic Achievement in Reading

The second question asked was if these active inclusion instructional strategies would increase academic achievement for students with ASD and Hyperlexia in reading comprehension. Multiple regression analysis was used to test if these instructional strategies significantly influence academic achievement. The results of the regression indicated that there was not significant relationship between any of the instructional variables and passage comprehension for students with ASD and Hyperlexia (R^2= .212, F (4, 36) =12.416, p=.067). Table 28 shows the results of the regression test. Therefore the null hypothesis was not rejected. Post hoc tests showed no relationships between each individual instructional strategy and academic growth.

Table 29

Regression Analysis of Instructional Strategies and Academic Growth

	Model 1				
Variable	*B*	*SE B*	*β*	*t*	*Sig. (p)*
Constant	-7.488	11.913		-.629	.534
Student will respond orally to questions	-4.994	4.515	-.253	-1.106	.276
Student works with peer or group	-2.369	2.778	-.150	-.853	.400
Student participates in class discussion	7.982	3.896	.522	2.049	.048
Student presents to class or group	3.810	3.213	.220	1.186	.244
R^2		212			
F for change in R^2		2.416			

The purpose of this study was to gain a better understanding of the reading difficulties students with ASD have, especially in the area of reading comprehension. The results showed that there were a substantial number of students who fell in the

Hyperlexia quadrant of the Simple View of Reading framework. These students have high decoding and low comprehension levels suggesting their language arts instruction should focus on interventions that support reading comprehension. The second purpose of the study was to see if specific instructional strategies help improve reading comprehension skills in students with ASD and for students with ASD and Hyperlexia. The results showed that these instructional strategies did not make a significant difference in reading comprehension. While other studies in the literature showed that these instructional strategies did impact reading comprehension, the differences in the data collection, interpreted results, and outcomes are discussed in the following chapter..

Chapter V

DISCUSSION

The increase in the number of students diagnosed with ASD requires teachers and practitioners to identify instructional strategies in language arts that meet their needs. Federal law has pushed that special education students have access to the general education curriculum. There is a need for more research on instructional strategies that support inclusion for these students. In the area of language arts research, there are fewer studies on comprehension strategies compared to decoding strategies and very little research on students with ASD and Hyperlexia. Longitudinal studies on students with ASD and especially Hyperlexia are valuable to the field. Studies, like this one add to the scope of research and can provide valuable information for educators on how to teach students with ASD and Hyperlexia to comprehend text.

The purpose of this study was to use the Special Education Elementary Longitudinal Study (SEELS) to first explore trends in language arts instruction for students with ASD. The first phase of results looked at students with ASD and how they are being included in the classroom today. Is it a physical presence or is active inclusion happening in the classroom? Are there common strategies being used for this population? In phase two, the study then explored the relationship between reading comprehension and decoding skills of students with ASD to determine the distribution of students on the Simple View of Reading Framework in order to plotted the students on

the Simple View of Reading Framework (SVR) to identify how many students with ASD also classify as Hyperlexic. The study explored which instructional strategies were given to children with ASD and who fall in the Hyperlexia category on the SVR framework. Lastly, this researcher examined the trends in academic progress of the identified students across the four-year span of the SEELS study to investigate the impact of the identified accommodations on their reading comprehension skills. In other words, the researcher tried to identify instructional strategies that are effective in teaching students with ASD and Hyperlexia to comprehend text.

Using the SEELS database, the researcher had access to a population of 10,969 students identified with a disability. This allowed the research conducted using this database to get a relative cross section of students from around the country over a four-year span of time. Research on students with ASD commonly has small to single subject samples. Conducting studies on special education students are usually difficult due to privacy of the students, small clusters within school districts and parental permissions (Harcourt, Perry& Waller, 2011). Students with ASD accounted for 1,101 of the participants in the SEELS database. This is one of the benefits of using large scale datasets like SEELS when conducting special education research.

This chapter includes: (a) a summary and interpretation of the findings, (b) recommendations for teachers and practitioners, (c) limitations of the study, (d) suggestions for future research.

Summary and Interpretation of the Findings

Phase 1: Students with ASD

Demographics

To describe what language arts instruction looks like for students with ASD, the study explored commonalities in different population of students in the database. Demographic information was gathered on both the total population of students within the SEELS database, on the sample group of students with ASD, and also with the sample of students with ASD and Hyperlexia. The latest statistics from the U. S. Department of Health and Human Services states that 1 in 88 children as being diagnosed with ASD by age 8 (U.S. Department of Health and Human Services, 2012), an increase of 289.5% over the last 12 years. Overall awareness of the disability by parents and doctors, along with changes in guidelines and diagnostic tools are some theories for the increase in the prevalence of the disability (Croen, Grether, Hoogstrate, & Selvin, 2002a; Fombonne, 2005; Grinker, 2008). This alarmingly fast growing population of students requires educational strategies that will help them learn in today's school systems.

In this study, the Autism/ASD category was the largest, identifying 1,101 students as having ASD as their primary disability. Office of Special Education IDEA data table website identifies specific learning disabilities as the highest amongst all 14 disability categories followed by speech and language impairments (https://www.ideadata.org/arc_toc13.asp#partbCC . Autism comes in third or fourth depending on age group. It is unknown why SEELS had such a large population of students with ASD willing to participate. Maybe the invitation or incentive appealed to families of students with ASD more than other disabilities.

Demographic information, including gender, ethnicity, parent education, income, and urbanicity have been shown to have an effect on academic achievement of all students (Fombonne, 2005; Landerl & Moll, 2010). While the demographics are slightly higher in this study than what the current research shows, the trends are still the same. Results showed that more males than females were identified with ASD. Four times more Caucasians than other ethnic categories and almost two times more likely to be from upper middle class educated families were identified. Students with ASD are more commonly Caucasian boys from upper middle class educated families. Since ASD in a developmental disorder that affects a child's social behavior, students with highly educated and involved parents are more likely to identify concerns and may have better medical support for diagnosis. Some studies on the epidemiology of ASD support the theory that the prevalence of ASD in upper middle class Caucasian families might be due to diagnosis trends rather than the prevalence of the disorder itself (Fombonne, 2003; Frith, 2003).

Different demographic variables have been known to play a role on academic achievement. Variables such as SES, ethnicity, household income, and even parent's educational levels all can effect a student's success. In this study, the relationship between demographic variables and academic achievement was not significant. This showed that these demographic variables did not play a role in the achievement for students with ASD. One theory is that their disability overshadowed the effect of demographic variables. In other words, the impact the disability has on the child's learning far exceeds the impact SES, race, or gender has on learning. Another theory is that the prevalence of ASD in specific demographic characteristics. The research shows

that students who are African American, or come from low SES can struggle harder in school than their upper middle class Caucasian counterparts. Since it is found in the research and in this study, that the prevalence of ASD is more common for the second defined group, their demographics might have less of an impact than in other disabilities. Further research is needed to test whether either of these theories can be plausible.

Question 1: Learning Environment

Question one set out to describe the typical learning environment for students with ASD. Support for active inclusion includes the presence in rich language environment with typical developing peers that can act as role models and tutors for students with disabilities (Humphrey, 2008; Obiakor, 2011). Students with ASD have a broad range of abilities and disabilities causing the academic setting and program to vary greatly. While every child with an IEP is evaluated individually to determine what educational setting is best, there is a goal to include more and more students with disabilities in the general education classroom. Based on the study, 214 students out of 542 are included in the general education classroom for some or all of their language arts instruction. This showed that about half of the sample were placed in inclusive settings and expected to learn from the general education curriculum.

Time spent in a resource room was commonly a supplemental service to the general education that can work as a stepping stone to full inclusion. The use of a resource room represents 14.2% of the population. Students with ASD that were taught in special education self-contained classrooms benefit from smaller class sizes, highly tailored curriculum specific to each child, and more teacher support than the general education classroom, but they did not benefit from the experiences of working with their

typically developing peers. What impact does this separation have on reading achievement? Does not having peer role models in reading lower the expectations of the teachers and students? Do they miss out on language rich environments where higher vocabularies are being used?

The study found that 35.2% of the students were not included in general education classrooms for language arts. Teachers in self-contained classrooms and resource rooms need to make sure their standards are not being lowered and that they compensate for the language differences in the classrooms. More research needs to be done to find ways to help teachers and practitioners prepare their classrooms to meet the needs of all students either by working to move them toward inclusion or by making sure the self-contained classrooms mimic that of a general education classroom.

When looking at language arts curriculum, standard goals are set for each grade level to make gains throughout the year. Overall, more and more students are being placed in the general education classroom with supports to meet their goals. Many students with ASD have academic goals that can be met using the general education curriculum in an inclusive setting. Goals for special education students become personal, commonly spelled out on their IEP. They are designed to look at the child's specific needs and what is attainable in a year's time. More than half of the students have goals to improve reading skills up to grade level. While progress is being made toward full inclusion, teachers need more support on how to teach a diverse population of learners.

To support the education of students with ASD in the classroom, different instructional strategies are commonly used to maximize learning. This study set out to answer the question; "What instructional strategies are being used within the classroom

for students with ASD?" Results from the language arts teacher survey showed these students participate in many active inclusive activities such as working with peers or in a group (67.3%), participate in class discussions (55.9%) and reading aloud (68.1%). More than half of the students with ASD are being taught using active inclusion strategies according to the teacher survey. Research on teaching strategies have included many of these active inclusion strategies as being a part of a comprehensive program that supports academic achievement in reading and other subjects. Research has shown that the opportunity to be a part of cooperative learning environment foster language development, promotes school success and social interactions (Utley et al., 2001) which are skills commonly affected by ASD.

On the other hand, there is a concern for educators that while many of the students seem to be able to participate, they are not getting the opportunity to do so. Many students with ASD are not presenting to the class or group (59.1%) and they are not likely to work on projects or presentations (52.6%). Does that mean that while they are being placed in the classroom, they are more likely to be just physically present in the general education curriculum and the child's progress is being supported only by the special education teacher and the IEP?

The research showed that when students with ASD are placed in rich environments where higher level language discourse is being used, these students can improve their reading skills (Åsberg, 2010).

This study did not come to the same conclusion. Some teachers see special education students as not part of their classroom but instead the responsibility of the special education teachers. So instead of getting extra support from two teachers, their

support is cut significantly when the special education teacher is not working directly with them. More research is needed on why some strategies are being used and some are not being used. Are certain strategies not commonly used due to teacher training, teaching style preferences, or difficulty implementing? Future research could look into how teachers perceived these strategies and how they are being used in their classroom.

Question 2: Instructional Strategies and Academic Achievement

To test the relationship between instructional strategies that promote active inclusion, the following interventions were chosen to represent strategies in the research that have been shown to promote academic growth in students with ASD; responding orally to questions, working with peer or group, presenting to the class, and participating in group discussion. While almost less than half of the students are able to participate, they do not according to the teacher survey. This is a concern that these students might be physically included in the classroom but are not actively involved.

Much of the research on different instructional strategies, and their impact on reading achievement were commonly cross sectional studies with small samples or single case studies. This study did not find gains in reading achievement across the four years between wave 1(2000-2001) and wave 3 (2003-2004). Since the gains were not significant, one question that arises is whether the gains demonstrated in the other studies are short lived. Do the strategies hold up over a long period of time? In many of the studies the researcher was involved with the implementing of the instructional strategies. They had first-hand observation of what and how it was being used. In this study, the teachers self-reported whether or not the strategies were being used. Another question arises as to how the teachers responded to the questions. Do they fully understand the

strategy and how to continuously implement it? Did they report they use these strategies but really do not? These questions conflict each other as future research is concerned. Should researchers be involved in the implementation and possibly cause a false increase or do teacher reports not match what is really happening and possibly cause a false decrease?

Academic achievement is the primary goal of all students in school (NCLB, 2001). Because the ability to read is so vital to academic achievement, this study focused on how to improve academic achievement for students with ASD, especially in the area of reading comprehension. Question two was to determine if the selected instructional strategies would improve reading comprehension for students with ASD. The academic growth in reading comprehension was measured by the difference between wave 1 and wave 3 of WJR passage comprehension subtest. These strategies were chosen because they were shown in other studies to help students with ASD improve language, comprehension and overall academic achievement. While relationships were shown between some of the instructional strategies, no relationship was found for instructional strategies and academic growth for all students with ASD. Using these strategies in the classroom does not predict reading achievement for students with ASD. While students did make academic gains in both letter word ID and in passage comprehension based on the WJR, the instructional strategies chosen were not shown to be related to this gain. So the question becomes, what did cause the gains in academic achievement?

Question 3: Distribution of student on SVR

Question three asked what is the distribution of students with ASD that were plotted in quadrant D of the SVR frame work. The distribution placed 173 students in

quadrant C defining them as low in decoding and comprehension. Overall reading support whether at a functional or more academic level is needed. Quadrant B, which defines students with average to high decoding and comprehension skills account for 75 of the students. These students tested average or above average in both areas. They are students who have reading programs that seems to be working and do not need different intervention support.

Students who have average to high comprehension skills despite low decoding skills are referred to as having dyslexia. They account for only 24 of the 336 students, which is just 7%. Students who can decode text on an average to above average range, but cannot comprehend what they are reading are described as having Hyperlexia. Students with ASD and Hyperlexia accounted for 20% of the sample. Some studies identify students with higher decoding than comprehension skills as being in the range from 15% to 65% (Grigorenok et al., 2002; Nation et al., 2006). The number of students who fell in quadrant D and are described as having Hyperlexia in wave 3 was 94, which is an increase of 6% from wave 1 to wave 3. One reason for this might be due to the gap increasing each year that they are not supported. As these students move from grade to grade, the need for comprehension skills increases causing the gap to grow. The results from this study showed that there is a sizeable population of students with ASD and Hyperlexia and worth further research. Hyperlexia is not a common term to many teachers and practitioners. This is an under researched and under supported group of students. These students test well in many informational reading inventories because they commonly test heavier in decoding skills than comprehension. If they are identified, teachers are less equipped with interventions for comprehension skills. In today's

classrooms there are numerous decoding interventions for students with reading disabilities. Decoding programs such as phonics based ones are scripted and prescriptive in nature. There are much fewer interventions geared toward supporting students with difficulties in comprehension despite good decoding abilities. Comprehension skills are not as systematic. Educators need support in teaching these students and the research field needs to fill this gap.

Question 4: Instructional Strategies for Hyperlexia

Students with ASD who also display dyslexic difficulties are supported in the schools with multitudes of scripted academic phonics programs that help them to read. Phonics based programs are now a part of every elementary school curriculum. Unlike Dyslexia, there are so few intervention programs for Hyperlexia. Compared to decoding programs that are fully laid out in scripted term, comprehension programs only set up guidelines and support tools, leaving the classroom teacher to create and implement teaching strategies. The research supports strategies that allow students to participate in discussions and interactive learning with their peers (Chiang & Lin, 2007; Hart & Whalon, 2011a; D. Kamps et al., 2002). Strategies that increase use of language, like questioning and presenting opportunities, are used to support reading comprehension by exposing them to rich language and prior experiences (Hart & Whalon, 2011b; LaBarbera & Soto-Hinman, 2009; K. Whalon & Hart, 2011). According to the teachers survey, responding orally, working independently, taking tests, reading aloud, and completing written assignments are all being used sometimes or always in the classroom by more than 75% of the students. Presenting to the class or group was the only strategy that teachers identified as being used never or rarely. Reading informational text was more

commonly used than reading literature pieces like plays or poems due the difficulty they have with fictional text. This study set out to determine if these strategies promote academic achievement for students with ASD and Hyperlexia in the SEELS database.

Question 5: Achievement Growth for Students with ASD and Hyperlexia

Schools have implemented these strategies for students to use to improve comprehension skills. Many of those strategies were identified in this study as ones that support active inclusion. Three of the strategies did not show any relationship to academic growth. Working with peers, responding orally to questions and presenting to class or group did not show to improve reading comprehension for students with ASD and Hyperlexia. The only instructional strategy that showed a relationship to academic achievement was working in discussion groups. While the relationship was significant, it was a weak relationship. These strategies have been shown to support reading comprehension in the research. What was different between what other studies found and what this study found? Did the teacher survey leave too much leeway for the teachers in their responses about instructional strategies? Do the gains not last over long periods of time? Future research is needed to see if these strategies really do or do not support academic achievement in reading comprehensions.

Recommendations

Findings from this study suggest that there is no relationship between the instructional strategies and academic achievement for students with ASD and Hyperlexia. While the two variables were not significantly related, this study makes a number of contributions to the existing literature. The most important finding is the number of students with ASD who also have Hyperlexia. This group of students is just starting to

be studied. Special education teachers and general education teachers need to learn about Hyperlexia and understand the difficulty these students have when trying to comprehend text. Many informal assessments in school for reading abilities focus on decoding, which these students have little or no trouble with. Their difficulty is the mental processing of the information off the page and into mental pictures. Theory of mind, central coherence and executive functioning should be theories incorporated into college courses on special education and reading. Hyperlexia should become a more common term in the teaching field. With a better understanding of the difficulties these students have, teachers can modify reading curriculum to support students with ASD and Hyperlexia. While the results were not significant, this study does bring light to the fact that there are a number of students who have Hyperlexia and need to be taught a different way to read.

Limitations

The first limitation of the study is the diagnosis and coding of ASD. Being a spectrum disorder with no genetic testing, students are identified as having ASD based on screening questionnaires completed by a team that includes a psychologist, a neurologist, a psychiatrist, a speech therapist, or other professionals experienced in diagnosing ASD. These children range from severe ASD including nonverbal children to high functioning ASD or Asperger. The coding for all ranges of ASD on an IEP is Autism. This combines into one term a wide range of children with very different difficulties commonly related to the disability. A more descriptive picture of the students' severity could help identify which students are in the proper placement for reading and then the strategies can be tested to see if they have an impact or not on reading.

The instructional strategies that were tested in this study have been shown to support academic achievement for all students. National Standards for reading, school visions, and subject curriculums all have been changed over the past decade to add inclusive teaching styles into the classroom. The strategies in this study were listed in the survey with check boxes for the language arts teacher to check if the student uses these strategies in the class. One concern is whether the teachers truly understand what these strategies look like in action. Another concern is whether many of the teachers selected strategies that they wish they were using more often in the classroom. The use of self-reporting surveys is a limitation of the study.

A common limitation with using a large-scale longitudinal research design with this study was missing data. Missing data can cause the sample size to diminish in size as variables are merged. It can alter results based on the reason for the missing information. Common reasons for missing data include (1) inappropriate responses to survey questions; (2) refusal to respond to a question; (3) question was not applicable to subject and were instructed to skip the question or (4) subject no longer available to participate in the study. The sample size for my study was not only reduced based on each qualifying variable of the participants, but also by missing data in the study.

Another limitation of using a large scale database is the lack of clarification on the study. Results were collected prior to this study and therefore follow up questions cannot be added or clarified. For example, a question asked the language arts teacher to mark what instructional strategies are being used in the classroom. One of the categories is Student Reads aloud. Does that mean he reads the text to the whole class, or just when he reads he has to say the words out loud? Some questions were clarified on the data file,

but not all. Plus the interpretation could be different between the teachers filling out the survey.

Suggestions for Future Research

In terms of future research, more studies are needed to gain a better understanding of Hyperlexia. Longitudinal studies on students with ASD that start in preschool would be beneficial to document the early onset of decoding, and then follow the students through as the comprehension skills start to fall behind their decoding reading abilities. More studies on reading comprehension for all students, especially those with ASD and Hyperlexia is needed to balance out the knowledge we have on decoding skills. This would help create language arts programs that are statistically proven to improve both components of reading; decoding and comprehension. Similar style studies analyzing the relationship between these reading strategies and academic achievement should occur. The results from this study contradict what the research on this topic currently supports. Studies should contain large sample populations since that is a big difference between this study and the ones that found these strategies to work.

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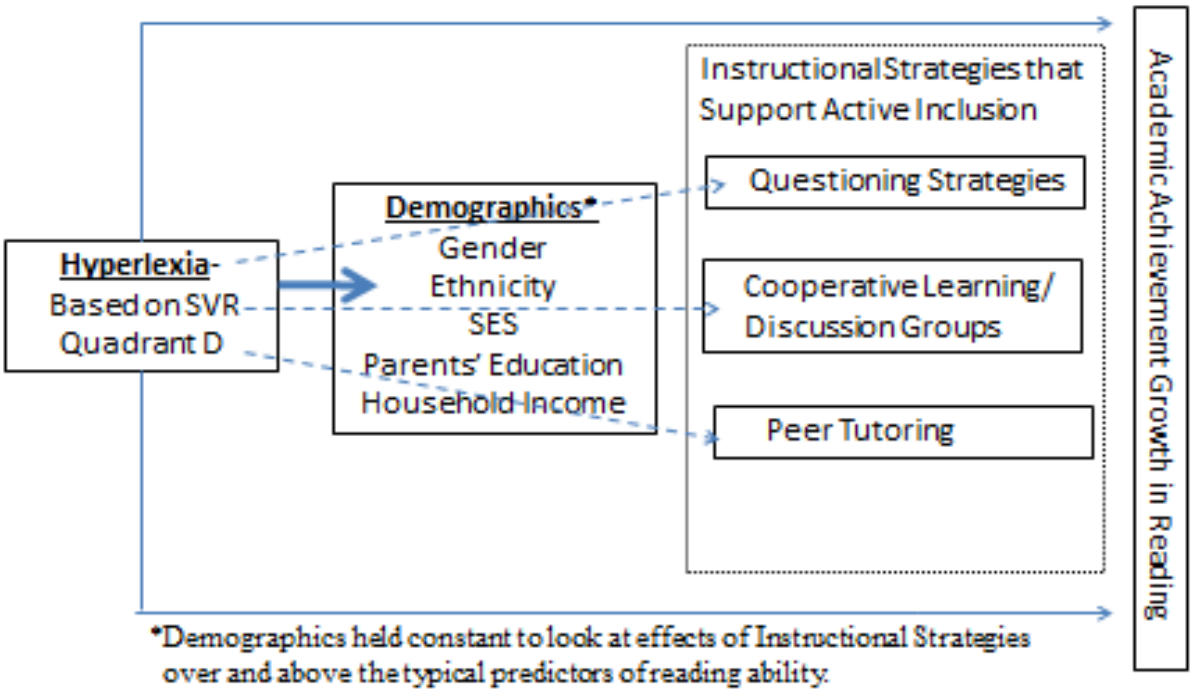
Apprendix A

Conceptual Framework



Appendix B

Definitions

Academic Achievement- The extent the student or teacher makes gains in learning in a subject area by a student measured by tests, school work, and observations. It is a measurement of performance on specific academic goals. AYP- Adequate Yearly Progress is the state's way to measure academic achievement. (Chiang & Lin, 2007)

Academic Growth – specifically measured in this study as the difference between Wave 3 and Wave 1 Letter Word ID and Passage Comprehension Scores on the Woodcock Johnson III.

Active Inclusion- Active Inclusion is a learning environment where the general education students and special education students are being taught in the same classroom using the same curriculum. Active inclusion uses modifications in presentation of learning allowing for all students to make academic achievement. (Hart & Whalon, 2012)

Autism Spectrum Disorder- A disorder diagnosed by a severe and pervasive impairment or limitation in several areas of development; reciprocal social interaction skills, communication skills, or the presence of stereotyped behavior, interests and activities. (DSM-IV-TR) This includes Autism, Asperger's and PDD-NOS.

Cooperative learning- A learning environment where students of all kinds work together to achieve a common goal within the lesson. Team activities, discussion groups, or group learning are synonyms (Simpson,2003).

Decoding – The ability to make match sounds to letter symbols in order to extract meaning from written words. (Chiang &Lin, 2007)

Dyslexia- A learning disability that impairs the person's ability to recognize and comprehend the written word. (Ricketts, 2011)

Executive Functioning- The ability to identify a goal and carry out the steps to achieve that goal using self- monitoring and self-corrections. (C. R. Carnahan et al., 2011)

Hyperlexia-A reading difficulty where the person has a significantly higher word decoding ability than reading comprehension ability. (Grigorenko, Klin, & Volkmar, 2003)

Peer Tutoring- The act of learning and teaching a peer a skill or lesson through collaboration. Research has shown that if students can verbalize the skill in a teaching fashion they can internalize it. (D. Kamps et al., 2002)

Questioning Strategies- An instructional strategy of using higher order questions and answers to allow for students to gain factual and inferential knowledge on a topic. (Stahl, 2004)

Reading Comprehension- The ability to gain meaning from text. It is the interaction between the words and the person's knowledge, emotions, and understanding. (Eikeseth & Hayward, 2009; Gately, 2008)

Simple View of Reading- a four box model that shows the difference students have between decoding skills and listening comprehension skills in order to learn to read. RC=LC x D (Gough & Tunmer, 1986)

Theory of Mind- The ability to make inference about the emotional state of others by using mental states and knowledge of oneself. (Frith et al., 1994)

Waves one and three- The data was collected between fall 1999 and spring of 2004. Wave one was collected during the 2000-2001 school year, and wave three was collected during winter and spring of 2003-2004 school year.

Weak Central Coherence- Display of extreme attention to details at the expense of the bigger picture. (Booth & Happe, 2010)

Appendix C

Variable List

The following questions are pulled from the different sections of the Parent Interviews, teacher surveys, school characteristic surveys and student school program surveys portion of the SEELS database. Direct Assessments of the students are also included. The letter/number corresponds to what survey/interview and which question. Each wave has the same questions asked and assessed based on which year. For this study Wave 1 and Wave 3 data was used.

SURVEY/INTERVIEW/ASSESSMENT CODES

TS- Teacher Survey

PI- Parent Interview

DA- Direct Assessment

SCS - School Characteristic Survey

SPS- Student's School Program Survey

Part 1: Demographics:

While many different questions in different sections asked the demographic questions of the student, the SEELS database created a set of commonly used crossing variables, including disability category, age, ethnicity, gender, family income, urbanicity, and grade level. These are reanalyzed and a new set is created for each wave of the study.

Figure 2: Commonly Used Crossing Variables from SEELS Database

Exhibit 13 Commonly Used Crossing Variables Student Characteristic	Number of Categories	Wave 1 Variable	Wave 2 Variable	Wave 3 Variable
Primary Disability	12	w1_dis12	w2_dis12	w3_dis12
Age	3	w1_age3	w2_age3	w3_age3
Ethnicity	6	w1_eth6	w2_eth6	w3_eth6
Gender	2	w1_gender2	w2_gender2	w3_gender2
Grade	4	w1_grade4	w2_grade4	w3_grade4
Income	3	w1_incm3	w2_incm3	w3_incm3
Urbanicity	3	w1_urb3	w2_urb3	w3_urb3

Parent Interview- Section A and Section K

These questions will identify the educational level of the head of household and whether English is the primary language spoken at home.

PI/A4A. Is any language other than English regularly spoken in your home?

1. YES (Go to A4B)
2. NO (Go to A5A)
7. REFUSED (Go to A4B)
8. DON'T KNOW (Go to A4B)

PI/K9. What is the highest year or grade {you/ {CHILD}'s mother/father/legal guardian} finished in school?

1. 8TH GRADE OR LESS

2. 9TH GRADE OR ABOVE, NOT A HIGH SCHOOL GRADUATE

3. HIGH SCHOOL GRADUATE OR GED

4. POST HIGH SCHOOL EDUCATION, NO COLLEGE DEGREE

5. 2-YEAR COLLEGE DEGREE/AA DEGREE

6. 4-YEAR COLLEGE DEGREE/BA, BS DEGREE

7. SOME POST BA, BS WORK, NO DEGREE

8. MASTER'S DEGREE, E.G. MSW, MA, MFA, MPH, MBA

9. PHD, MD, JD, LLB, OR OTHER PROFESSIONAL GRADUATE DEGREE

Part 2: Classroom Instruction

TS: B1- For approximately how much time in a typical week do you provide language arts instruction to this student (enter minutes per week).

SPS: A4a- Please indicate all the setting in which this student received instruction this school year for each subject listed below. (General Education Classroom, Resource room, Special Education self-contained classroom, Individual or Homebound instruction, Not applicable).

a. Language arts

* Number of settings was calculated by the choices for this question too.

TS: B3- What is the primary goal for reading achievement for this student

1. Reading at grade level

2. Improving general reading skills, but not necessarily to reach grade level

3. Developing functional reading skills, such as word recognition for daily living

4. Building pre-reading skills (i.e., letter recognition, auditory discrimination of

sounds, matching words, etc.)

5. No goals regarding reading achievement

Part 3: Instructional Strategies

TS: C3& D2: How often does this student engage in these activities during language arts

instruction? Responses are recorded as Never, Rarely, Sometimes, Often.

c. Student responds orally to questions

d. Student takes quizzes or tests

e. Student work independently

f. Student works with a peer or group

g. Student participates in class discussions

h. Student works on project or presentation

i. Student completes writing assignments

h. Student presents in front of class

i. Student reads aloud

j. Student reads literature, poetry, plays, drama

k. Student reads informational materials

l. Student practices phonics/phonemic skills

m. Student practices/learns vocabulary

n. Student reads silently

o. Student does sight word reading

Part 4- Simple View of Reading (SVR) and Academic Achievement. In order to place the students in the four quadrants of SVR, the direct assessment portion of the database will be used. Specifically two subtests of the Woodcock-Johnson Test of Achievement-Research Edition(WJ-R) will be used from wave 1 to place the students. The WJ-R wave 3 scores will be used to show academic achievement in reading.

1. Woodcock- Johnson Research Edition- Passage Comprehension in Wave 1 and Wave 3.
2. Woodcock- Johnson Research Edition- Letter-Word Identification in Wave 1 and Wave 3.