

Asperger Syndrome and High-Functioning Autism
And the General Education Classroom:
Best Known Teaching Strategies

By

Jackie Palmer

A Project Submitted to the Faculty of
The Evergreen State College
In Partial Fulfillment of the Requirements
for the degree
Master in Teaching

2010

This Project for the Master in Teaching Degree

By

Jackie Palmer

has been approved for

The Evergreen State College

by

Leslie Flemmer, Ph.D., Member of the Faculty

June 2010

ACKNOWLEDGEMENTS

This master's paper would not be a success without the love and support of my husband, children and grandchildren. I would like to thank my adult children Jenica and Tabi for helping out with Christian during the many hours of writing and for Kelcie driving him to school. I express my loss of time with my grandchildren Xavier, Zoey, and Zaylee, but for a good cause—fulfilling a lifetime dream. My special thanks go to my son Christian who had to share his anchor, his mom, with a computer. Additionally, I would like to thank the Master in Teaching faculty, and particularly Sonja Wiedenhaut who was always there for me during my family crisis. Thank you Grace Huerta for helping me find politically correct terminology in this writing endeavor. Finally, I thank Leslie Flemmer who had to jump in blindly and analyze the entire work. Above all, this paper would not have been written without all of the previous special needs children that have entered my life. Thank you all!

ABSTRACT

This paper examines the best teaching strategies for serving the whole child who is diagnosed with Asperger Syndrome or High-Functioning Autism in the general education classroom. Though these students have normal to high IQ and are taught all day in the general education classroom, modifications need to be made for their success. Learning processes tend to be different than the mainstream and lack of Theory of Mind skills inhibit much needed social and behavior skills. An overview of the historical treatment and education of special needs children reveals a lack of professional development needed in order to best serve the needs of these children. A critical review of the literature reveals that teachers should empower themselves with as many strategies as possible in order to achieve the needs of the children in their classes. The current rise in this fast growing epidemic of Asperger's and Autism suggests the necessity for further research to ensure these children their academic and social success in becoming productive citizens of our future.

TABLE OF CONTENTS

TITLE PAGE.....	i
APPROVAL PAGE.....	ii
ACKNOWLEDGEMENTS.....	iii
ABSTRACT.....	iv
CHAPTER 1: INTRODUCTION.....	1
Rationale.....	6
The Controversy of Inclusion.....	7
Statement of the Problem.....	9
Limitations.....	9
Summary.....	10
CHAPTER 2: HISTORICAL BACKGROUND.....	12
Introduction.....	12
Supreme Court Cases.....	14
Autism Joins Medical Profession.....	15
Asperger Syndrome recognized by DSM-IV.....	17
Special Education Law.....	18
Summary.....	20
CHAPTER 3: CRITICAL REVIEW OF THE LITERATURE.....	21
Introduction.....	21
Overview of Academic Testing and Strategies.....	21
Getting to know children with AS.....	22
Comparing scientific testing.....	25
Differentiated Instruction.....	28

Summary of Assessment Instruments.....	32
Writing Strategies.....	36
Comparing written performance.....	37
Self-regulated strategy development.....	40
Self-regulated strategy development modified.....	43
Writing fiction.....	46
Reading Strategies.....	50
Fluency.....	51
Reading Interventions.....	54
Reading review of strategies.....	58
Comprehension scaffolding.....	60
Reading strengths in Asperger Syndrome.....	62
Mathematics Strategies.....	65
Strengths and Weaknesses in math.....	66
Life skills training in math.....	68
Curriculum design.....	70
Processing differently.....	73
Special Interest Strategies.....	74
The existence of special interests.....	76
The nature of special interests.....	81
Content Analysis of special interests.....	86
Integrations of special interests.....	87
Behavior modification using special interests.....	91
Speech Strategies.....	93

New qualitative qualification for speech.....	94
Using context within conversations.....	97
Speech deficits effecting school performance.....	102
Communication skills enhanced.....	104
Social Skill Strategies.....	108
Growing up with Asperger Syndrome.....	108
Risks with social deficits.....	110
Definitions of friendship.....	114
Social skills training.....	116
Theory of Mind training.....	120
Theory of Mind tasks.....	121
Compare and contrast ToM performance.....	126
Development of a new computerized ToM test.....	131
ToM training.....	136
Behavior Modification Strategies.....	141
Problems with anxiety.....	141
Treatment plans.....	144
Professional training.....	149
Cognitive behavior therapy.....	151
Summary.....	156
CHAPTER 4: CONCLUSION.....	158
Introduction.....	158
Historical Relevance of Findings.....	158
Summary of Findings.....	160

Classroom Implications and Recommendations.....	166
Suggestions for Future Research.....	171
Conclusion.....	173
APPENDIX.....	177
REFERENCES.....	181

CHAPTER ONE: INTRODUCTION

Autism is currently considered the fastest growing developmental disability and is now ranked the 6th most commonly classified disability in the United States according to The National Center on Birth Defects and Developmental Disabilities (Rice, Baio, Van Naarden, Doernber, Meaney & Kirby, 2006). During the past decade, the number of children and youth on the autism spectrum has increased approximately 173%, making it the fastest growing developmental disability in the United States (Rice et al., 2006). The prevalence of autism appears to be increasing as much as 10% to 17% annually and could reach 4 million Americans in the next decade (Rice et al., 2006). Increases in inclusion of students with Autism from 1991 to 2004 outpaced that of other low-incidence disabilities.

Due to the rising incidents of autism, teachers in general education classrooms will likely teach one or two students with an autism spectrum disorder during any given year. Although legislation mandates the inclusion of students with autism, inclusion has not always been supported with additional training and professional development (Woodward, 2006). If teachers are expected to provide the appropriate education mandated by the Individuals with Disabilities Education Act (IDEA) and meet national and state standards, they need the training and knowledge to do so.

To serve the needs of all children, teachers must educate themselves on the commonalities in the students they serve by researching learning strategies. This paper will address the following three questions:

1. What are the neurological impairments describing children on the Autism spectrum classified under Asperger Syndrome?
2. How do these impairments affect children's learning?
3. What teaching strategies have been successful for children on the autism spectrum classified under Asperger Syndrome and/or High-Functioning Autistic?

This chapter will examine the rationale around best teaching strategies for children with Asperger Syndrome and/or High-Functioning Autism. Chapter two will trace the evolution in the need of obtaining best teaching strategies for children with Asperger Syndrome and/or High-Functioning Autism. Chapter three presents an integrative review of the literature addressing the two research questions of this paper. Each article in this review begins by addressing the strengths and weaknesses of children with Asperger Syndrome and/or High-Functioning Autism. After introducing the need for modification, each article then presents scientifically documented strategies tried in the classroom addressing the needs of children with Asperger Syndrome and/or High-Functioning Autism. Finally, chapter four will recommend the best practices found while reviewing literature in the prior chapter. This chapter will also conclude the paper with connections to the past, present and future needs of the children we serve who are classified as Asperger's or High Functioning Autistic on the Autism spectrum.

Chapter one begins with comparing and contrasting High-Functioning Autism with Asperger's Syndrome as they relate to the public school system. It will introduce the argument for effective strategies in teaching elementary students with autism spectrum

disorders in general education classrooms and discuss the relevance of these strategies to the greater community. In doing so, it will define key terms and hi-light limitations in the review of literature.

Autism Spectrum Disorders (ASD) is defined as a triad of impairment, characterized by deficits in social development, communication, and repetitive behaviors or interests (American Psychiatric Association, 2000). Across this spectrum, individuals manifest a unique collection of symptoms so that one child with ASD could rarely be compared with another. At one end of the spectrum, individuals are severely affected by their deficits such as significant cognitive and speech delays. At the other end of the spectrum are individuals with similar characteristics to classic autism but display low-average to above-average cognitive abilities and more typical language abilities, at least superficially. Individuals at this higher end of the spectrum are referred to as having High-Functioning Autism or Asperger's Syndrome (HFA/AS).

Why have two labels? The difference according to the Diagnostic and Statistical Manual of Mental Disorders, (DSM-IV-TR, 2000) is that Asperger's syndrome is differentiated from autism by an examination of the child's early development and the existence of some characteristics that are rare in children with autism. DSM considers that early language and cognitive skills are not delayed significantly in children with Asperger's syndrome. There is also no clinical delay in age-appropriate self-help skills, adaptive behavior and curiosity about the environment in childhood. The clinical profile of a child with Asperger's syndrome is also less likely to include motor mannerisms and preoccupation with parts of objects as occurs in autism but the child can have a circumscribed interest that consumes a great deal of their time amassing information and

facts. The DSM classification also noted that the profile of social skills in children with autism includes self-isolation or rigid social approaches, while in Asperger's syndrome there can be a motivation to socialize but this is achieved in a highly eccentric, one-sided, verbose and insensitive manner. While it is frustrating to be given a diagnosis which has yet to be clearly defined, it is worth remembering that the fundamental presentation of the two conditions is largely the same. This means that treatments, therapies, and educational approaches should also be largely similar.

Although the specifics vary, in general, similar deficits are recognized across HFA/AS diagnostic criteria in the areas of social, communication, narrow interests, speech and language skills, and in some cases, motor clumsiness. Under the social deficit area, skills for social reciprocity are affected. The inability to conduct personal interactions easily; attract, develop, and maintain friendships; discern appropriate behavior in countless and diverse social settings; instinctively control impulsive words and actions; know without being taught the hidden curriculum of society; and experience empathy and other social emotions are but a few of the disabling outcomes of this critical deficit (Attwood, 2003, 2006; Ritvo, 2006).

The communication deficit contains many struggles. These commonly include initiating and taking turns in conversation; choosing appropriate topics and knowing the proper time and place to open a topic; knowing how to ask questions of someone else and let him or her talk; understanding correct use of grammar, vocabulary, and articulation; interpreting abstract and literal language, such as idioms and analogies; knowing the correct way to use voice to communicate with teachers and employers; and understanding context-appropriate styles and levels of speech to use with parents, people in positions of

authority, and other adults (Gillberg, 2002; Klin, Volkmar, & Sparrow, 2000). Social skills need to be addressed as part of curriculum with this population of children to avoid miscommunication errors and to instill a community of belonging for everyone within the classroom.

The emotional deficit occurs in two categories: lack of empathy and emotional confusion. Lack of empathy is noted as the impact of having little or no ability to imagine oneself in another's position. Emotional confusion occurs when individuals with HFA/AS confuse facial expressions, verbal expressions, and body language, interpreting them to mean something other than or opposite from what the other person intended. Noting the inevitable confusion of emotional states, Grandin (1995) replies, "Emotions are hard to figure out; they're not logical. My emotional make-up is simple. Everything I think falls into...happy, sad, scared, or angry" (p. 92). Not being able to read others' emotional responses cause problems in the educational setting in both social and communicative interactions. Educators need strategies to accommodate the child with HFA/AS when interacting with peers.

The sensory deficit exhibits a range of hypo or hyper-responses to visual, auditory, olfactory, gustatory, tactile, vestibular, and proprioceptive sensitivities that can have an impact on every area of daily life for the individuals with HFA/AS (Kern, Trivedi, Garver, Grannemann, Andrews, Savla, Johnson, Mehta & Schroeder, 2006; Myles, Hagiwara, Dunn, Ruinner, Reese, Huggins & Becher, 2004). These sensory deficits can cause educational problems when children tend to have melt downs (overly sensory outbursts). Educators need strategies in diverting melt downs and promoting engagement with a child who has shut down.

Some fine-motor deficit effects HFA/AS in the form of poor penmanship skills. Accommodations may be needed in school to facilitate writing or replacement strategies such as keyboarding vs. writing assignments may be suggested. Gross motor skills impairment may be noticed in areas of physical education where awareness and being an advocate can help include the child in the physical education.

The executive function is defined as the ability to set goals, initiate a plan, inhibit distracting stimuli, monitor performance, and flexible change from one point of focus to another as defined by Manjiviona (2003). HFA/AS deficit can be seen in organizing daily schedules, managing homework assignments, preparing for exams, and generally succeeding school obligations and culture. This deficit explains their special interests due to stimulus over part to whole which explains why these individuals focus on one insignificant detail, instead of seeing the larger, more important picture. Educators need to learn these special interests and design strategies for utilizing these strengths within accommodated curriculum.

Rationale

The relevance of exploring the deficits of HFA/AS population is to understand where strategies need to be developed in providing equity and excellence to all children in our classrooms and in preparing all students to be well-rounded citizens contributing to the welfare of society. With the multitude of ways that the disorders manifest for this population, a repertoire of strategies to draw from is necessary. There is a critical need for training and information for teachers working with HFA/AS children. If we are to teach so that all students can learn skills and content knowledge such as those addressed

by the Essential Academic Learning Requirements (EALRs) for Washington State, then teachers must be prepared. This means having a repertoire of strategies available.

From a societal perspective, schools are designed to teach and prepare children to be active citizens (Spring, 2006). It is expected that after graduating, and upon becoming adults, individuals will be able to hold jobs, vote, and contribute to society on many levels. These goals of education are not often extended to children with disabilities. Students who have been passed through the system without having their needs met consequently do not have the voice or the tools necessary to survive in society. Children with disabilities such as High-Functioning Autism and Asperger's will play a part in our society. How they are treated along the way will determine their rate of success as adults, for example, will they achieve their potential to contribute and participate in society or will they come to depend on society for their survival?

The Controversy of Inclusion

The Individuals with Disabilities Education Act of 1990, PL 101-476, mandated that student placement be based on individual needs rather than on a labeled diagnosis (Villa & Thousand, 2000). It required the enrollment of students with disabilities in the Least Restrictive Environment (LRE). LRE is a concept that supports the inclusion of students with disabilities in general public education physically, cognitively, and emotionally to the greatest extent possible.

The many controversies stemming from inclusion are from parents of children with special needs, parents of non-special needs, educators and the public. Parents of children with special needs such as children with HFA/AS do not want to lose the backing of the special education department knowing that their child has diverse needs.

These parents are afraid that their child will be placed in a regular classroom with no assistant and with a general education teacher who has no experience with diversity or has any strategies to accommodate their child's needs. Many know that when the above situation occurs, the child sits marginally to the wayside putting in the hours mandated for attendance.

On the opposite side of the spectrum are the parents who do not have children with special needs and who are generally uneducated about the diverse needs of other children. The only information these parents usually act on is the story they are told by their child who witnessed a melt down during class time because the directions to the assignment were unclear and confusing. In this situation, the child with special needs is looked at as a distracter to the operation of educating the majority.

General education teachers oppose inclusion due to large class sizes and lack of training, as well as resources and support of the special educational staff. Many have never been trained in recognition of any of the 14 classifications under IDEA and do not have strategies to accommodate diverse needs. Breakdown in team advocacy often occurs between the general education teacher and the special education teacher due to time and student load.

The final objection to inclusion is because of additional cost. Many times when a student with special needs is placed in the general education classroom, they require an assistant to assure their needs are met. This assistant helps modify assignments, corrects behavior, begins communication between students and staff or is a safety net for the child with special needs (Gillberg, 2002; Klin et al., 2000). The assistant does cost extra tax dollars to support but not only do they support inclusion, they are an extra body in the

classroom to support the teacher which usually ends up supporting the general population of that classroom.

Regardless of the controversies to inclusion, public education is mandated to offer equal educational opportunities to all children. This paper, in the search of strategies, helps to educate parents and educational staff through informing professionals with research based strategies that help the child with HFA/AS find success in the general educational classroom.

Statement of the Problem

Children with High-Functioning Autism or Asperger Syndrome, similar to other students, are in need of teacher support, and many of their teachers lack the strategies needed in reaching their diverse needs. This, unfortunately, is detrimental to the student's learning and potential for contributing to a democratic society as a useful citizen. The purpose of this paper is to demonstrate strategies general education teachers can adopt within their classrooms to support and teach students on the autism spectrum disorder. These strategies support the cognitive, communicative and social development of students with autism. Elementary teachers have a critical window during which social skills are developed in addition to cognitive demands. Since the autism spectrum is so varied and each child is their own individual, particular attention to a multiplicity of strategies is necessary. This paper will specifically address this need by critically evaluating current research in the education field.

Limitations

The diagnosis category of Autism is fairly new, it was not until 1990, Public Law 94-142 (the Education of the Handicapped Act) was amended to include the disability

category of autism. Due to the length it took in making this category legalized, research is just now surfacing about this disorder. Educators only have two decades of scientific documentation to draw inferences from. Though this category is on an exponential rise, experimental research cases are small, some consisting of one participant. While the research may be valid and reliable, it is unlikely to generalize the results to all students with HFA/AS. Given the variable nature of these two categories, no one strategy will work for all students. The specific strengths and weaknesses of each individual must be analyzed before implementation of strategies can be used. Many of the strategies recommend the use of assistants, aides and additional support to implement in the general education population but with budget cuts occurring, creativity must be used to modify strategies. Each research paper addressed in chapter three discusses the need of further quantitative and qualitative research needed in the field of HFA/AS students which finalizes our limitations with this subject.

Summary

This chapter introduced the argument for effective strategies for general education teachers of students with High-Functioning Autism and/or Asperger Syndrome. It compared and contrast the two diagnosis and gave proof that similar strategies would be beneficial to both population of students. This chapter described the deficits inherent in both diagnoses to establish a basis when researching strategies to apply in the classroom. In addition, it discussed the controversy of inclusion and limitations of the literature review.

Chapter two will provide the historical background in the discovery of Asperger Syndrome and High Functioning Autism. It will describe the historical exclusion and

discrimination of individuals with autism as well as the history of public schooling in the United States due to Supreme Court cases. Lastly, the chapter will demonstrate how Autism and Asperger Syndrome were categorized within special education, the law, and the diagnostic tool driving the process.

CHAPTER TWO: HISTORICAL BACKGROUND

Introduction

Chapter one addressed the need for effective strategies for teaching students with Asperger's Syndrome or High-Functioning Autism in the general education classroom. It appraised the significance of the question to the educational community while describing the struggles of students who are at-risk in our schools today.

This chapter will review the founders of Asperger Syndrome and Autism. It will also explore the historical background of these two disorders. Following chronologically, chapter two will look at how Supreme Court cases created norms in special education history. Next, the chapter will demonstrate how Autism and Asperger Syndrome were categorized within Special Education, the law, and the diagnostic tool driving this process. Finally, this chapter will conclude with how the history has impacted the present and what this means to public education today.

Sixty-six years ago, two similar psychiatric papers became public interest in two countries: Germany and the United States. In 1943, Leo Kanner, an Austrian psychiatrist wrote 'Autistic disturbances of affective contact'. This paper stemmed from his psychiatric practice at the John Hopkins Hospital in Baltimore, Maryland. Kanner was the first child psychiatrist in the United States. Kanner's paper described eleven boys with 'early infantile autism'. The term autism was borrowed from Eugen Bleuler who was a Swiss psychiatrist most notable for his contributions to the understanding of mental illness. Bleuler coined the term autism that means "escape from reality" but applied it to

his adult schizophrenic patients. Kanner recognized that this term closely described his eleven patients at John Hopkins (Lyons & Fitzgerald, 2007).

Hans Asperger, in 1943, wrote his paper 'Autistic Psychopathy in childhood' describing four children with 'autistic psychopathy'. Asperger acknowledged the fact that he had adopted Bleuler's terminology in his doctoral thesis and until 1980, his term of autistic psychopathy remained when describing children with Asperger symptoms. Asperger was a psychiatrist in Vienna, Austria who became famous for his lifetime research dedicated to four boys regarded as schizophrenic. One boy, Fritz, was followed into adulthood where he became a famous astronomer who corrected one of Newton's many laws. Asperger described his patients in a positive light by recognizing their social difficulties but illuminating their unique strengths (Lyons & Fitzgerald, 2007).

The psychiatric profession still did not recognize autism as a condition to mental health until the year 1967 when it was classified under schizophrenia in the International Statistical Classification of Diseases and Related Health Problems.

Did this new condition in human nature just arrive on the scene in the 1940's? Scientific research says not: Ashley Koegel (2008), a Stanford Medical School student, found a short story published in 1853 by Herman Melville called *Bartleby* (1853). This person demonstrated social deficits in all four distinct forms specified by the DSM-IV-TR to a greater or lesser degree. Melville describes the nonverbal implications of the character noting that he often refuses to make eye contact during conversation. Melville describes Bartleby's voice as "mildly cadaverous" and his intonation as "flutelike" (p. 167). Secondly, Bartleby appears to be unable to form relationships with any of his co-

workers; he apparently has no family, friends nor a home. Thirdly, Bartleby is obsessed with daily routine and has trouble with reciprocity in language (Koegel, 2008).

As early as 1801, documented scientific evidence appeared describing Autism with Jean-Marc Gaspard Itard and the boy named Victor. The Wild Boy of Aveyron was brought to the National Institution for the Deaf and Mutes in Paris, France where Itard was the chief physician. Itard named the boy Victor and worked at socializing the child. Through these studies, Itard was able to write his book, *An Historical Account of the Discovery and Education of A Savage Man*, published in 1801 in France. Many of the idiosyncrasies found in Victor were later written as conditions attributed to the labeling within Autism. In fact, many say that Itard is the Forefather of special education because he was the first to develop an individualized educational procedure. His studies were breakthroughs because he developed a student centered approach to his curriculum with Victor and one based on Victor's needs (Wobus, 2009).

Supreme Court Case Creates Special Education History

As described above, both clients of Asperger and Kanner were seen in a hospital setting. Children classified with any special educational needs did not attend public schools until 1972. The Pennsylvania Association for Retarded Children (PARC) v. Commonwealth of Pennsylvania court case made a precedent upon teaching special educational need children (Spring, 2006). PARC objected to the desegregation of students from public education and overwhelmed the court with evidence on the educability of special children. For three years, lobbyists and congressmen struggled with this law because of the fear of federal control in local education. According to Spring (2006), "The resolution of this political problem, as it appeared in 1975 in Public Law 94-

142 (Education for All Handicapped Children Act), was the requirement that an individual educational plan (IEP) be developed for each child jointly by the local education agency and the child's parents or guardians" (p. 430).

According to Peter and Pamela Wright (2007), PL 94-142 law, also known as EHA (Education for All Handicapped Children Act) required states to provide a free, appropriate public education (FAPE) for every child between the ages of 3 and 21 regardless of how seriously handicapped they are. As mentioned above, the IEP must include short and long-term goals for the student, as well as ensure that the necessary services and products are available to the student. This law also requires that students are placed in the least restrictive environment (LRE). LRE means placing the student in the most normal setting that is possible within the educational setting. The EHA act also ensures students with disabilities are given nondiscriminatory tests, tests which take into consideration the native-language of the students and the effects of the disability, and that, due process procedures are in place to protect parents and students (Wright, 2007).

Categorizing Autism within the Medical Profession

In 1980, Autism was categorized as a developmental disorder separate from schizophrenia in the Diagnostic and Statistical Manual of Mental Disorders (DSM-III), the reference book used by health-care professionals to diagnose mental health disorders. One year later, Dr. Lorna Wing publishes her paper titled: *Asperger disorder*, in honor of Hans Asperger (Wing, 1980). When Lorna Wing's daughter was diagnosed with autism at the age of three in the late fifties, little was known about the condition. Lorna's experience as a parent and psychiatrist in addition to the void of information she found, led her to join The Medical Research Council's Social Psychiatry Unit where she

addressed the confusion surrounding the diagnosis of autism. Her paper brought the distinct idiosyncrasies of children classified as having Asperger syndrome to the foreground.

Ten years later, Uta Frith received The President's Award of the British Psychological Society for distinguished contributions to psychological knowledge (Frith, 1991). These contributions were the translation of Hans Asperger's work from German to English. This was the first time that English speaking countries heard about Asperger's work in first person format. Ironically this is the same year that Autism is now recognized by IDEA (Individuals with Disabilities Act). Children diagnosed with Autism can now receive special educational services due to this classification. They are guaranteed FAPE and LRE services.

The PL 101-476 Individuals with Disabilities Education Act (IDEA) (1990) is also known as the Education of the Handicapped Act Amendments of 1990, renamed earlier EHA laws and their amendments (including PL 94-142 and PL 98-199). Their new name is the Individuals with Disabilities Education Acts. More importantly, PL 101-476 replaced the word "handicapped" with the word "disabled" and, therefore, expanded the services for these students. IDEA reaffirms PL94-142's requirements of a free, appropriate public education through an individualized education program with related services and due process procedures. This act also supports the amendments to PL 94-142 that expanded the entitlement in all states to ages 3 to 21, designated assistive technology as a related service in IEPs, strengthened the laws commitment to greater inclusion in community schools, provided funding for infant and toddler early intervention programs, and required that by age 16 every student have explicitly written in their IEP a plan for

transition to employment or post secondary education and two new categories: autism and traumatic brain injury (Wright, 2007).

Categorizing Asperger Syndrome in the DSM-IV

Hans Asperger originally described Asperger syndrome in 1944. However, this syndrome was not well known for many years. This situation has changed somewhat since Asperger syndrome was made “official” in DSM-IV (APA, 2000), following a large international field trial involving over a thousand children and adolescents with autism and related disorders (Volkmar & Rutter, 1994). The DSM-IV is the bible in special education. This book contains the 14 categories that can receive special services in public education today. Descriptions of impairments and the qualification criteria can be found in the DSM-IV. The field trials revealed some evidence justifying the inclusion of Asperger syndrome as a diagnostic category different from autism, under the overarching class of Pervasive Developmental Disorders. More importantly, it established a consensual definition for the disorder which should serve as the frame of reference for all those using the diagnosis. Below you will find this description and diagnostic criteria for 299.80 Asperger’s Disorder taken from the DSM-IV (APA, 2000) book:

Qualitative impairment in social interaction, as manifested by at least two of the following:

1. Marked impairments in the use of multiple nonverbal behaviors such as eye-to-eye gaze, facial expression, body postures, and gestures to regulate social interaction,
2. Failure to develop peer relationships appropriate to developmental level,
3. A lack of spontaneous seeking to share enjoyment, interests, or achievements with other people (e.g. by a lack of showing, bringing, or pointing out objects of interest to other people),
4. Lack of social or emotional reciprocity.

Restricted repetitive and stereotyped patterns of behavior, interests, and activities, as manifested by at least one of the following:

1. Encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus,
2. Apparently inflexible adherence to specific, nonfunctional routines or rituals,
3. Stereotyped and repetitive motor mannerisms (e.g., hand or finger flapping or twisting, or complex whole-body movements),
4. Persistent preoccupation with parts of objects (American Psychiatric Association, 2000).

Special Education Law

Special Education has seen two new laws since the addition of Autism to IDEA; both of these laws contain policies that pertain to the children of my study. The laws are the PL 105-17 (1997) and PL 108-446 (2004). Under the PL 105-17, a critically important feature of the new law specifies that regular classroom teachers will be part of the team that develops each child's IEP. That is especially important since the law removes barriers to placing disabled students in regular classroom setting and ties the education of students with disabilities more closely to the regular education curriculum. The law also requires that IEPs include the program modifications and supports for the child and teacher to enable the child to succeed in the classroom. Because both the special education teacher and the classroom teacher are writing the goals together for the child with special needs, conferencing is now mandated between these two educators. All three of these new additions relate closely to the child with AS/ HFA because they are generally in a regular education class the entire day.

Another important addition to the PL 105-17 was the guidelines for expulsion of children with special needs. The basic idea is that students with emotional impairments do and say things that are directly related to their impairment. Therefore, the school would be basically expelling the student for having impairment. This is obviously unfair and discriminatory treatment. However, before the enactment of this law, it was a common practice for children with special needs. Now schools must prove that the

misconduct does not relate to the child's disability and if the child is expelled for more than 14 school days, mandatory education must take place during expulsion. Also the problem of the misconduct must be addressed in a change to the IEP and/or a functional behavior plan (FBA) written for the child to prevent or deter such behavior in the future. (Vaughn, Bos & Schumm, 2006).

Behavior issues usually coincide with social goals for the child with AS/ HFA because of frustration due to lack of nonverbal communication skills. Many children experience "melt downs" because they do not know how to advocate or express their emotions. When this happens they usually do or say something they should not. Special educators now focus on specific de-escalation techniques for children on the autism spectrum. These strategies are written in the IEP so that anyone working with the student is aware of what to do in case of a meltdown.

The PL 108-446 is part of the No Child Left Behind Act and the conditions pertaining to children diagnosed with AS/ HFA are (a) schools could no longer change services without parent consent, (b) core academic subjects are now mandatory, (c) assistive technology is now added, (d) transition plans must be included in IEP, (e) participation in assessments with accommodations, and (f) school nurses. The first condition of no changes without parent consent and the fourth regarding transition plans affects the child with AS/ HFA due to their apparently inflexible adherence to specific, nonfunctional routines or rituals. These children have extreme trouble with change if they are not prepared for in advance. When proper scaffolding occurs, change then is handled as with any normal developmental student; the new guidelines in this law seem to be written with them in mind (Vaughn et al., 2006).

Summary

Due to Asperger's Syndrome now having made an official medical designation, the rise in this syndrome has increased immensely. In 2001, the National Institute of Neurological Disorders (NIH) estimated that autism affects 1 in 250 children. During this time Down's syndrome was the number one neurological disorder in children affecting 1 in 200 children yearly. Six years later, 2007, the Centers for Disease Control and Prevention reports autism affects 1 in 150 children (Rice, 2006). Medical experts say the changed number reflects better detection, broader diagnostic criteria and increased public awareness—not a spike in the syndrome. Autism is now the number one neurological disabler affecting children today. Because Autism, High Functioning Autism and Asperger Syndrome have just recently been classified in the medical profession, research is being conducted regarding how to best serve the needs of these students. A common thread among the research articles is that more qualitative and quantitative research should be done concerning the success of the children diagnosed with Asperger's/ High-Functioning Autism in the general education population. In chapter three, there are nine subheadings regarding the research on the best known teaching practices for children with Asperger/ High Functioning Autism. These subheadings refer to the academic areas where modifications need to occur according to the DSM-IV classification of the neurological disorder. The subheadings include behavior goals, social skills, speech, reading, special interests, math, writing, reading and theory of mind enhancing.

CHAPTER THREE: CRITICAL REVIEW OF THE LITERATURE

Introduction

Chapter two provided an overview of the historical background of Asperger Syndrome and how these children came to be served in the public education. This chapter illustrated the need for research in teaching children diagnosed with AS/HFA due to the recent classification of these children and the lack of data in educating them. Court cases were documented and needed to make change occur in assuring the needs of these children were met and now educators are held accountable in meeting these needs.

Chapter three will critically review recent research literature on testing for strengths and weaknesses in children classified with AS/HFA and strategies recommended for teaching these children in a general educational setting. This chapter is broken into nine categories pertaining to servicing the whole child educationally. Sequentially, these categories are academic testing, writing strategies, reading strategies, mathematical strategies, and strategies in the following areas: special interests, speech, social skills, theory of mind and behavior. Each section will look at research in the testing involved determining the strengths and weaknesses of the child with AS/HFA and at recent strategies employed to best teach these children in a general educational setting.

Overview of Academic Testing and Strategies

“What is your favorite part of the day at school?”

“Reading but not reading class, science and computers are my favorite parts of the day at school.”

(Chuckle) “What about lunch or recess?”

“Actually those used to be my two worse parts of my day but now they are my favorite because I get to each lunch and spend recess in the computer lab by myself.”

“Do you have any friends that you would want to eat lunch with?”

“Friends, no not really, I just started this school a couple of months ago because my mum got scared.”

“Scared?”

“Yea, at my last school, some kids followed me home and battered me up a bit in the street.” Collins (2003)

What you have just read is a script from a videotaped interview between Chris Collins, interviewer and 14-year-old-Luke, a child living in London who has been diagnosed with Asperger’s Syndrome (AS) (Collins, 2003). This qualitative research study, narrated by Simon Baron-Cohen introduces us to the world of children diagnosed with AS. In the first chapter I review the many strategies needed to address the success of children diagnosed with AS and High-Functioning Autism. The following research will examine academic testing, the implications for developing individualized educational plans, how to design differentiated instruction and the function of schooling for children diagnosed with AS/ HFA (Collins, 2003; Minshew, Goldstein, Taylor & Siegel, 1994; Siegel, Goldstein & Minshew, 1996; and Griswold, Barnhill, Smith-Myles, Hageqaia & Simpson, 2002).

Getting to Know Children with AS/HFA

Collins (2003) filmed children, parents and teachers being interviewed about their experiences of how well prepared public schools were equipped to educate and integrate children who had been diagnosed with Asperger Syndrome. The interview questioned the affect schools had with the socialization factor and the true function of schooling for these children.

The criteria of the targeted children in this study included two diagnosis: one with Dr. Fiona Scott who is a member of the Autism Research Center (ARC), and the other consisted of the children attending a support group sponsored by the narrator, Simon Baron-Cohen who is a Professor of Developmental Psychopathology at Cambridge

University and a Fellow of Trinity College. The interviewees also attended public education classes or had graduated from mainstreamed public education.

The videotape documented interviews of six boys, their mothers and four teacher interviews. Joe was four when diagnosed and five at the time of the interview. The strategy in place for Joe at school was an isolated place in the corner of the room where he could work independently whenever he began to feel an over-sensory melt-down begin. Joe also had a one-on-one paraeducator to help him stay on task and to help with transitioning. The film crew followed Joe around at school which demonstrated many of the common themes of this qualitative study: lack of eye contact during conversation, independent or parallel play and special interests; in Joe's case it was dinosaurs. The next boy on the video was Charlie who was diagnosed at the age of six and was 10-years-old during the filming of this video. Charlie was in fifth grade in a general education class—his modification included special seating in the back of the room, special interest integration (i.e., stones) within his curriculum and extra time for assignments. Luke, the opening star and the main interviewee of the film, was diagnosed at age eight and was 14 at the time of filming. His special interests were reading articles off the computer. Instructional modification included using his preoccupation of computers as a safety net. Whenever he felt stressed out, he could go to the computer lab for a prescribed amount of time and through his interests in computers, he could self-regulate and then return to the classroom. Peter and Mathew were 22-year old twins who were not diagnosed until adulthood. We hear a firsthand account about how important it is for early detection. Lastly, we meet Steven, age nine, who has been referred to Dr. Scott for testing. The film crew gives us a glimpse of an intake developmental interview with the mother, the

personal interview between Dr. Scott and Steven and the observation during school hours. We also observed Steven at the neurologist, his EEG and the interpretation of this test describing abnormal brain waves.

The major themes discussed and seen with all the participants were being bullied at school, feeling different and out of place and special interests as controlling and disruptive in the academic realm of schooling. Luke demonstrated what being bullied at school can lead to—outright physical abuse and bodily endangerment. On feeling different and out of place, Luke stated that he felt like he was a foreigner unable to speak the language with other students in his own school. The film also demonstrated how the computer takes over Luke's life at home and how his mother struggles to integrate her son within the large family setting. Joe wanders the playground with his eyes to the ground not knowing how to initiate contact and uncomfortable when other boys do want to play with him. The interviewer could not get Joe to talk to him so the other two themes would be generalizations when describing Joe. Charlie spoke about being made fun of at school and said that he felt people spoke a different language other than what he could understand. Different film clips showed how Charlie could monopolize a conversation during discussion time with off topic discussions involving his special interests of stones. Both the twins talked about their difficulty in school never being diagnosed. Kids made fun of them and bullied them for being odd. Both felt school would have been a more positive experience had they been diagnosed. They felt teachers might not have yelled at them for being cold and unemotional or for not being organized and paying attention. Both twins said that they felt teachers believed that they made their lives difficult on purpose and were being stubborn.

Though only six children were interviewed in this study, the narration and discussion with Simon Baron-Cohen gives some credence to the generalization of the themes found in the research regarding children diagnosed with Asperger Syndrome. Almost every study discussed references the expertise of Baron-Cohen and his background of the psychopathology of this disability. The need for social integration illustrates the function of schooling for these children in developing productive future citizens. This video demonstrates the need for modifications and strategies to provide a successful environment for children diagnosed with AS.

Comparing Scientific Testing

To know the needs of the children with AS/HFA we serve requires testing within the subjects taught at schools. Minshew, Goldstein, Taylor and Siegel (1994) is a quantitative testing research study posing the question--will participants with HFA/ AS differ from control participants on subtests assessing mechanical, procedural, comprehensive and interpretive skills in academic learning?

The researchers (Minshew et al., 1994) relied on two assessment instruments for the testing of both control group and target group. The Autism Diagnostic Interview and the Autism Diagnostic Observation Schedule were used for analyzing academic strengths and weaknesses. Both of these tests were videotaped and the tapes were rescored by the developers of the instruments to provide independent verification of diagnosis in all of the cases. The DMS-III was used to code the results. A WISC-R was used to verify both intellect and verbal IQ above seventy. Any known etiology for the participants Autism such as neurofibromatosis, tuberous sclerosis, Fragile-X syndrome, intrauterine infection with cytomegalovirus or toxoplasmosis or postnatal meningitis were removed from the

study (Minshew et al., 1994). The control group consisted of community volunteers and were chosen based on being medically, neurologically and psychiatrically healthy.

To measure oral directions, word and letter sequences, the researchers (Minshew et al., 1994) used the Detroit Tests of Learning Aptitude-2 (Hammill, 1985) (DTLA-2). The Woodcock Reading Mastery Test-Revised (Woodcock, 1987) (WRMT-R) tested for visual-auditory learning, letter identification, word identification, word attack (nonsense words), word comprehension (synonyms, antonyms, and analogies) and passage comprehension (cloze design). For mathematical computation and application, reading decoding, spelling and reading comprehension, the Kaufman Test of Educational Achievement (Kaufman & Kaufman, 1985) (K-TEA) was implemented over a two hour testing period.

There were 54 male test participants and 41 control participants. Neither group differed significantly with regard to age, intellectual level, gender, race, or socioeconomic status. The test group had the following statistics: mean years of age, 16.30; SES, upper middle class; verbal IQ, mean of 97.69; performance IQ, mean of 93.50 and full scale IQ, a mean of 95.5. The control group had the following statistics: 15.38 mean years of age; SES, upper middle class; verbal IQ, mean of 99.51; performance IQ, 97; and full scale IQ, mean of 98.32.

Significant differences between children with autism and control participants were found for all subtests of the DTLA-2, Visual-Auditory-Learning and Passage Comprehension from the WRMT-R, and Reading Comprehension from the K-TEA. Children with autism did not differ from control participants with regard to overall reading and mathematical scores, nor did they differ with regard to basic procedural skills

related to reading. Significant differences were found for those composites that contrasted procedural and mechanical skills on the one hand with comprehension skills on the other. Children with autism actually did better than the control group at word attack relative to word identification (Minshew et al., 1994).

The reading strengths of children diagnosed with Autism consist of an adequate word and decoding knowledge, a large information bank (long term memory), and fluency in oral reading. Strengths in comprehension are recalling facts and details. Weaknesses include understanding what is read specifically in nonverbal cues, understanding the motivation of characters or formulating inferences about story events or elements. Inferences and reading between the lines is the hardest skill to maintain while reading for the targeted group.

Computational skills are a strong point with children on the Autism spectrum. Mathematical weaknesses include application of theorems to everyday life scenarios, understanding story problems, formulating hypotheses, and developing strategies for obtaining solutions.

In the communication and language department, the tests showed strengths in fluent narrative discourse, intact word knowledge, grammar and high areas of vocabulary. The mechanical and procedural aspects of language are intact for children on the Autism spectrum. The weaknesses found using the tests were prosodic, semantic and pragmatic aspects of language as well as the interpretive skills involving comprehension of metaphorical or figurative aspects of language. Reciprocal communication is affected by inability to see another perspective. Analogies and metaphors are almost impossible for the literal child with HFA.

Differential Instruction

Using the results of this testing along with other scientific testing studies performed since 1969 lead to another research study performed by Siegel, Goldstein and Minschew (1996) in answering how to design instruction for the child diagnosed with HFA/AS in the public schools pertaining to general education classes.

One research denoted that having orally read direction for lessons, sample items, etc. would promote success and positive peer recognition for the child while Hichley and Levy (1988), showed that oral reading also improves comprehension with the addition of another sensory organ on board. The authors (Siegel et al., 1996) also discovered the use of high-interest reading material helps promote group interaction with lesson plans while promoting independent reading progression.

The authors (Siegel et al., 1996) found that vocabulary building material will help offset the deficit of semantic knowledge. Teaching common prefixes, roots, and suffixes meaning and spelling will also help to boost vocabulary and the meaning of unknown words. Tyler, Delancy and Kinnucan, (1983) found that the use of advance organizers enabled students to arrange and categorize new information by connecting it with prior knowledge. This helps the child with HFA facilitate storage and retrieval of information. Using expository organizers would help with organizing any new information: word banks containing key facts, phrases, and vocabulary, plot outlines, the depiction of story events in temporal sequence with pictures are ways to help the child with HFA in comprehending while reading.

The difficulty with recreating a logical story and understanding or forming conclusions about causal relationships can be learned through Hansen and Pearson (1983)

thinking strategy program. During group discussions lasting 10 to 20 minutes, students connect pertinent personal experiences to situations described in the text which are shared with classmates. This activity produces a common bank of knowledge which exceeds the prior experiences of any individual. Students also make predictions about what might occur in the reading selection by considering similar circumstances from their own experience. Through this peer modeling, children with HFA could enhance their inferential comprehension.

The weakness in the ability to use reading strategies could be helped with the Informed Strategies for Learning (ISL) program developed by Paris and Oka (1986) which used 20 structured training modules to teach reading strategies. The researchers found that, “The system relies on demonstration, application using work sheets and high-interest reading material, and group discussion of the processes recommended for reading” (p. 6). The authors do note that modifications to this program would have to be made for the autistic learning style due to the use of metaphors.

Another overarching strategy is the use of self-instruction in the form of self-statements. Strategies can include guided reading, questioning to location pertinent information, and underlining of critical sentences to ensure that the main idea of the story is understood. Programs already in use with special education can be adapted to the autistic learning style which includes: Raphael and Pearson (1985) *Right There and Think and Search* which teaches students to identify question-answer relationships (QARs); Graham and Wong (1983) developed a mnemonic, 3H strategy called *Here, Hidden, in my Head* to show students how information was contained in the text, implied in the text or part of the reader’s funds of knowledge; Palincsar and Brown (1984) developed a self-

monitoring program that helped with summarizing, the identification of main idea.

Clarification of text using text cues to predict and anticipate new information that is presented; and, Schunk and Rice (1986) developed a five-step, self-directed strategy to teach students the value of strategy information to improve performance. Finally, Manzo (1969) developed the ReQuest Procedure in which the student models the instructor in a one-to-one correspondence using self-statements to establish reasoning skills.

In mathematics, two problems occur as a default, problem representation and problem solution. The first requires students to transfer words to a schema representing the problem which involves a process of distinguishing between what is said in the problem and the question to be answered. The exercises in reading for self-instruction, self-questioning, and self-monitoring can help in this area. Montague and Bos (1986) came up with an eight step problem-solving strategy for mathematical problems.

1. Reading the problem aloud for understanding with teacher helped with unknown words,
2. Paraphrasing the problem by using self-questions such as “What is asked for? Or rephrasing the question into a declarative statement,
3. Visualizing the problem by drawing a picture diagram of the problem,
4. Stating the problem using sentence stems such as “I have....I want to find....,”
5. Developing an hypothesis using “If I...Then...” statements and writing the operation signs,
6. Estimating an answer,
7. Calculating and labeling the answer,
8. Self-checking.

Montague (1992) added to the above program by adding a “DAY”, “ASK”, and “CHECK” activities. This required the students to ask themselves in step three “does the picture fit the problem?”

Hutchinson (1993) also added to the above program by printing prompt cards that relied on self-questioning techniques. Examples of these were: Have I read and

understood each sentence? Have I written an equation? Rewording a problem can help immensely in the understanding of what is being asked as well as teaching mathematical language so that students can locate words in story problems that indicate the process required to solve the problem. Students could underline these words and then write the numeric representation alongside the problem for understanding. Or these problems can be translated into picture or graphic form to facilitate understanding. Accommodations in the form of leaving off the surface features such as units of measurement within the answer could help with solving problems.

In communication and language, materialistic aides such as charts, models, diagrams, posters, and other visual materials help this visual learner. To empower the individual have them give speeches on factual information, describe their special interest or reciting a memorized item. Teachers should communicate in short, syntactically simple sentences that contain one idea. Students should reiterate instructions for clearer understanding.

Siegel, Goldstein and Minshew argue, “Deficient comprehension of metaphor, colloquialisms, and figures of speech found in autism is likened to the experience of a person learning English as a second language. Explaining such aspects of language will require specialized curricula material and use of examples obtained from the autistic person’s own experience” (Siegel et al., 1996). Given this information, it seems communication between the special education teacher, the general education teacher and the ELL teacher would benefit the implementation of the best made plans for the success of a child on the Autism spectrum.

The weaknesses in this study, as in any special education topic, is each child is like an island unto themselves and thus should and is diagnosed on an individual basis. This statement then relates to not any one strategy being the fix-all for any one special educational child; thus the reason for an IEP. Another limitation that the authors address is not addressing the application of behavior modification techniques to the classroom which could make a huge difference on the implication of any said strategy. The authors state the purpose of this research was not to validate the many strategies mentioned, rather, individuals would have to be studied in a systematic and controlled study. The purpose was to inform and supply the tool belt of all teachers with strategies in working with children with special needs.

Summary of Assessment Instruments

The researchers Griswold, Barnhill, Smith Myles, Hagiwara and Simpson, in their 2002 *Asperger Syndrome and Academic Achievement*, answer the implications for identifying and developing educational plans and strategies for children diagnosed with Asperger Syndrome. These researchers used three new scientific assessments to discover themes and patterns in answering the strengths and weaknesses of children on the Autism spectrum.

Three assessments were given to a group of children diagnosed with Asperger Syndrome. The psychological board all scientifically based the tests. They were the Wechsler Individual Achievement Test (WIAT), (Psychological Corp., 1992), the Test of Problem Solving-Elementary, Revised (TOPS-R), (Zachman, Barrett, Huisingh, Orman & LoGiudice, 1994) and the Test of Problem Solving-Adolescent (TOPS-A; Zachman, Barrett, Huisingh, Orman & Blagden, 1991).

Griswold, et al. (2002) explain, “The WIAT is a comprehensive assessment used to evaluate the academic achievement of student’s ages 5 years to 19 years 11 months and grades kindergarten through 12. The WIAT consists of eight subtests: Basic Reading, Mathematics Reasoning, Spelling, Reading Comprehension, Numerical Operations, Listening Comprehension, Oral Expression, and Written Expression. The assessment provides four composites (Reading, Mathematics, Language, and Writing); each of the subtests and composites yields a standard score that allows comparison of a student’s performance with the national standardized norm, as well as providing an overview of the student’s current academic performance” (p. 95). These researchers continue to analyze these connections: The TOPS-R/ TOPS-A elementary and adolescent levels, respectively, are diagnostic tests of problem-solving and language-based critical thinking abilities. A student’s ability to clarify, analyze, generate solutions, evaluate, and use affective thinking skills is assessed by evaluating his or her verbal responses to questions asked by the examiner. The R test uses 14 picture scenarios with 72 questions asked about the pictures. The A test uses 13 pictured scenario’s with 50 questions asked about the pictures (Griswold et al., 2002, p. 96).

Graduate students who were members of the AS Assessment Team had received in-depth training in AS through academic study and practicum experience gave these three assessments in a clinical setting. Twenty-one children and adolescents with Asperger Syndrome who lived in a large Midwestern community in the US participated; there were nineteen boys and two girls who ranged in age from 6 years 9 months to 16 years 8 months (mean age: 10 years 0 months). All participants were Caucasian and all were part of a more extensive Autism study. These children were diagnosed with

Asperger Syndrome by a licensed psychiatrist, psychologist, or medical doctor in accordance with the DSM-IV guidelines.

The WIAT showed that help in applying principles, understanding functions, and performing accurate calculation may be needed in the mathematical department. Ideas for teachers include hands-on instructional activities or visual representations such as an abacus for place value visual representation.

Listening Comprehension showed attention and sensory integration problems for the child on the Autism spectrum. Problems organizing their thought and processing auditory stimuli requires visual supports (outlines, wire diagrams, organizers). This finding is important because most instruction is given verbally and lecture material of course is lecture style; if the teacher assumes the student possesses grade-level listening comprehension skills than failure is sure to occur. Griswold et al., (2002) argue, “These students will likely experience learning difficulties unless auditory-based instruction is augmented by visual and other supports. Students may benefit from the use of videos or participating in drama/role-playing activities as a means to learn about literature and historical events” (p. 100).

The testing for reading showed that oral expression, decoding and basic reading are the strengths of the child with Asperger’s. Reading comprehension, especially nonfactual information and recalling information to make judgments or conclusions about selections are the weaknesses in reading. The TOPS test related difficulties with problem solving and language-based critical thinking. No suggestions for modification were made for reading.

Theory of Mind is a person's capacity to think about, and take actions based on, their own and others' intentions, value, beliefs, and mental states. Griswold et al. states, "The TOPS require that students being examined draw inferences, predict conclusions, and state others' perspectives related to the characters and events that are shown on the test stimuli" (p. 100). The suggestion for this area includes incorporating curricula that teach language-based critical thinking skills to help students increase their reasoning abilities. The TOPS-Adolescent Kit: Tasks of Problem Solving by Bowers, Huisingh, Barrett, Orman and LoGiudice (1992) was suggested as curricula to use in teaching Theory of Mind.

This study agrees that children with Asperger's need to be in general education but with a few modifications to their curricula and social needs. The following quote from Griswold et al., (2002) sums up what all the studies have been saying: "Information from such efforts is needed to develop an academic database and an empirical foundation for understanding the academic characteristics of students with AS. Clearly, more research on this topic is needed in order for educators to identify and implement the best methods of instruction for students with AS" (p. 100).

Naturally, not all children with Asperger Syndrome or High-Functioning Autism are alike. Just as each child with AS/HFA has his or her own unique personality, "typical," Asperger symptoms are apparent in ways specific to each individual. As a result, there is no exact design for classroom approaches that can be provided for every child with AS/HFA, just as no one educational method fits the needs of all children not afflicted with Autism. Given this statement, the more research we do as teachers and the more strategies we have in meeting the needs of our students will define the success we

will have in our careers. This chapter has introduced an overview of the testing involved in the academic arena to determine the strengths and weaknesses of the children we serve. It has also given an overview of the major core subjects that we will be teaching our students. The subsequent chapters will illustrate further research in isolated subject matter by first addressing the needs of the child on the Autism spectrum and then with proven and tried strategies that may or may not generalize to every child diagnosed with Asperger's or High-Functioning Autism.

Writing Strategies

The academics of writing are very complex. As early as first grade, students are expected to organize their thoughts and write effectively. The skills required in the academia world of English increasingly become more complex when students are required to read material and then synthesize by integrating their own experiences within the material. According to the Washington State Grade Level Expectations (GLE's), students are responsible to four overarching goals in writing: understanding and using a writing process, writing in a variety of forms for different audiences and purposes, writing clearly and effectively and lastly, analyzing and evaluating the effectiveness of their written work. To narrow my research I centered on the GLE most difficult for students diagnosed with AS, Washington State standard GLE 2.1: students will write in a variety of forms for different audiences and purposes (OSPI, 2009).

Under Washington State standard GLE 2.1 adapts writing for a variety of audiences, skills increase from knowing that an audience exists outside of self in kindergarten to applies understanding of multiple and varied audiences to write effectively in fifth grade. Children diagnosed with AS have difficulty with theory of mind

which is understanding the hidden curriculum acknowledging different forms of perspective; this population struggles with recognizing audiences exist outside of self and have trouble with oral communication. When adding the elements of the written word to this expectation, mechanics such as penmanship, spelling, grammar, and concise thought magnifies AS deficits. In this chapter, deficits in writing and four strategies found in quantitative and qualitative research reveals: The Self-Regulated Strategy Development model (SRSD), group work in strengthening imagination, TREE strategy (note topic sentence, note reasons, explain each reason, note ending), adaptations and accommodations through IEP's, and the use of integrating special interest prompts (Myles, Rome-Lake, Barnhill, Huggins, Hagiwara & Griswold, 2003; Delano, 2007; Harbinson, Alexander, 2009; Weiss, 2008).

Comparing Written Performance

Myles , Rome-Lake, Barnhill, Huggins, Hagiwara and Griswold, (2003) employ quantitative research testing to answer questions pertaining to the strengths and weaknesses in writing for children diagnosed with AS. The purposes of this study were to analyze written language samples of children with AS using both formal and informal measures, and to identify effective means of providing written language instruction for these children. Sixteen children were designated to two groups, one consisting of children diagnosed with AS and the other a stratified sampling control group. The children diagnosed with AS were part of a more extensive study conducted by a large midwestern university. The participants with AS included: 15 males and one female ranging in ages from 8-years to 16-years with a mean of 11 years. Fourteen males and two females whose ages ranged from 8-years, 2-months to 16-years, 1 month (mean = 11-years 6-months)

comprised the control group. All were Caucasian and had been diagnosed by a licensed psychiatrist using DSM-IV criteria (APA, 1994).

Testing sessions were held in a small classroom with worktables, adequate lighting and minimal auditory and visual distractions. Graduate students enrolled in an AS/autism graduate program were trained in the administration of standardized measures and had extensive experience administered the Test of Written Language (TOWL-3; Hammill & Larsen, 1996). Graduate students seeking degrees in speech-language pathology and AS scored the TOWL-3 protocols. A licensed occupational therapist with an undergraduate degree in occupational therapy and was completing a graduate degree in special education scored the written language samples using the Evaluation Tool of Children's Handwriting (ETCH), (Amundson, 1995).

The TOWL-3 is a norm-referenced measure designed to identify students who have difficulty in writing that requires special assistance, determine students' strengths and weaknesses in writing, and documents progress in writing achievement through assessment of the three components of the written language: conventions, linguistics, and cognition (Hammill & Larsen, 1996). The TOWL-3 contains eight subtests and three composite scores that measure the foundation of writing. The subtests were vocabulary, spelling, style, logical sentences, sentence combining, contextual conventions, contextual language, and story construction. The three composite tests were overall writing, contrived writing and spontaneous writing. An informal analysis of the TOWL-3 written language samples was conducted to measure the complexity of the work products. This test measured the use of morphemes, amount of sentences used and the complexity within the sentences.

The ETCH is a norm-referenced measure used to evaluate legibility and/or speed of writing tasks that are similar to those performed in the classroom. It measures letter, word, and number legibility; letter and word formation; letter and word spacing; and letter size and alignment in individual sentences and composition.

The analysis of the TOWL-3 assessment demonstrated that students with AS scored higher than their nondisabled peers on four of the eight subtests, no significant differences existed in the TOWL-3 subtests or composite scores obtained by children with AS and the control group. The informal analysis of the TOWL-3 written language sample showed that the control group produced significantly more morphemes than did their peers with AS. In fact, morphemes generated by the participants without disabilities nearly doubled that of their peers with AS. A similar pattern was seen in t-unit production with the control group generating a means of 14.5 t-units and 139.25 words to the 9.31 t-units, 77369 words written by those with AS. Both groups scored evenly with the amount of sentences written, control group wrote an average of 10.88 sentences while students with AS wrote a mean of 8.94 sentences.

The ETCH handwriting revealed a significant difference in the percent of legible letters generated by the two groups with 89.94% and 75.02% of legible letters written by adolescents without AS and those with AS. A similar pattern was seen in legible word production, specifically, 87.80% of the words generated by students without AS were legible while only 71.09% of the words written by children with AS met the same criteria.

Myles et al., (2003) argue that without further investigation, it could be concluded that students with AS do not need additional assistance in written composition skills.

However, a visual analysis of the data reveals that children with AS demonstrated more variability in their written language performance than did their control group peers. As evidenced by the standard deviation scores of the six subtests, conventions, and composite scores on the TOWL-3. The informal analysis revealed a different picture of the students' skills. Students with AS demonstrated that they can produce sentences similar in number to their peers, but sentences generated are brief and not as complex as demonstrated by the number of morphemes, t-units, and words.

Self-Regulated Strategy Development

Given the test results above, Delano's (2007a) article on Improving Written Language Performance of Adolescents with Asperger Syndrome, addresses strategies improving the amount of words written. This research employed the self-regulated strategy development (SRSD) model to answer the question of how to increase the rate of words written by children with AS. SRSD instruction provides students with strategies for planning, writing, revising, editing, and monitoring their own writing. SRSD involves interactive learning between teacher and student and is structured so that students gradually learn to select and implement specific writing strategies independently. This strategy has shown positive results when used with other disabilities but this is the first time it has been documented with Asperger Syndrome. This research also used a program called TREE (note topic sentence, note reasons, explain each reason, note ending) (Graham & Harris, 2005) to improve the context written in essays. The purpose of this exploratory study was to evaluate SRSD instruction with students diagnosed with AS by monitoring the effects on the rate of words written and rate of functional essay elements.

Three participants whose scores on the Asperger Syndrome Diagnostic Scale (Myles, Bock & Simpson, 2001) supported a diagnosis of Asperger Syndrome and each identified writing as an area of difficulty: Peter: 13 years, 6 months; Alan: 15 years, 11 months; and Justin 17 years, 4 months. A multiple baseline design in qualitative testing was used to monitor responses across participants. The baseline recorded how many words written and what elements of literature were used within the essay. For both baseline and research, dependent measures were used for reliability. Interobserver agreement was assessed across all experimental conditions and participants.

The first SRSD intervention, words written, had each student participating in one 30-min session with the experimenter to create a video of the student modeling a self-monitoring strategy. The experimenter provided the student with a bar chart, sample essay, and written script that discussed the purpose of the self-monitoring strategy and described how to implement it. After reviewing the script, the student was instructed to make a movie about the self-monitoring strategy. Following the script, the student talked aloud as he modeled the strategy by counting the number of words in his essay, recording the number on a bar chart, determining if he met his goals, and setting a new goal to increase his writing output by at least 10% in his next essay. After the session, the experimenter edited the video to remove all verbal prompts and to make certain that the script was not visible in the video. At the beginning of each intervention session, the student viewed the video about self-monitoring. The student was then given the monitoring materials and asked to write to persuasive prompts. After the student demonstrated at least a 10% increase in the total number of words written for three

consecutive sessions, he began instruction on the second skill and no longer viewed the self-monitoring video.

The second SRSD intervention, functional essay elements, had each student participating in one 60-min session with the experimenter to create a video of the student modeling a strategy using the mnemonic TREE to plan and write a persuasive essay. A blank outline was used for the students to note topic sentence, note reasons, explain each reason, and to note the ending of the essay. A video recorded the student talking aloud as he used the outline to organize and write his essay. At the beginning of subsequent intervention sessions, the student viewed the video about composing a persuasive essay. Substituting expository writing for persuasive writing used generalization probes. Follow-up probes were conducted 1 week and 3 months after the final intervention sessions.

Positive results were shown for all three categories in amount of written words, duration of writing, and the use of literary elements within writing. Alan increased from writing 100 words in his baseline to 384 after intervention; his duration during writing time increased from 52 minutes of writing to 82 minutes and lastly his elements used in essays rose from 2 elements to using 11 elements during essay writing. Peter showed progress by increasing his words written from 52 to 102 while his elements increased from 3 to 17; his duration time during writing only increased by one minute yet the production during that time demonstrated a better usage of his time writing. Justin increased from 17 words written to 46 words, his elements used within the essays increased from 2 to 10 per essay; his duration only increased by 3 minutes but again production showed better organization of writing time.

Though the goals showed extreme growth, the sustainability was not there to maintain that growth. The time and technology involved in this strategy may not be available to many general education teachers. The strengths of this study is that SRSD has been performed and used with other writing disabilities and has had success in the past. This strategy can be viewed as a metacognitive skill in that the study uses the participant to model enhancement within a skill. The weaknesses of this study are first, neither video self-modeling nor strategy instruction was evaluated in isolation. Another weakness of this study is its reliance on production-type measures. Finally, the shortness of each phase and the artificial setting are weaknesses.

Given these strengths and weaknesses it must be noted that this study provides many directions for systematic research to be done in finding the best known strategies in helping children who struggle with writing become successful in the classroom. The more strategies that surface and that can be analyzed and tried out in the classroom only leads to hope in finding the right fit for each child in their learning.

Self-Regulating Strategy Development modified

Delano (2007b) wrote an article about another exploratory study using SRSD with a single participant named Vincent titled Use of Strategy Instruction to Improve the Story Writing Skills of a Student with Asperger Syndrome. A psychologist with AS using the DSM-IV-TR test and the Asperger Syndrome Diagnostic scale had previously diagnosed Vincent. This study differed in two areas: first, the SRSD strategy was tested in isolation therefore videos were not used during strategy training and secondly, the dependent measures differed: total words written, action words used, describing words implemented, revisions to essay, and quality rating of essays.

This study used both quantitative and qualitative data. Quantitative data included the baseline and increase of amount of words written, amounts of action and describing words used, how many revisions it took for a final draft and the use of a holistic quality scale devised in assessing the quality of the writing samples. The scale measured writing quality based on overall organization, word choice, focus, and elaboration. Qualitative data included the experimenter observation and interview subject material which was used as research design. Personal background knowledge was obtained to determine prior knowledge and special interest in creating meaningful writing prompts. Two scorers independently read each writing sample and assigned a score from 1 to 7 points, with higher numbers indication higher quality. Their scores were averaged to provide a single rating. Interobserver agreement was assessed across all experimental conditions, and an agreement check was conducted with 100% of the writing samples.

The first step of the research used qualitative information to produce picture prompts to be used as a visual when Vincent was writing his story. For example, if the story was to write about a basketball game then a picture of a basketball hoop and ball was placed on a card to keep Vincent focused. Strategy 1 included training, action words, and had Vincent producing action words along with prompts from the instructor to place on his picture card. The experimenter and Vincent then wrote a story that included words from their list. The experimenter wrote the story on a flipchart. She modeled writing sentences with action words and gave Vincent an opportunity to dictate sentences that he wanted included in the story. After finishing the story, they read it together and Vincent and the experimenter made revisions by adding or substituting word to improve the quality of the story. Each training session followed this format, but gradually the

experimenter reduced the amount of modeling and feedback she provided. Training sessions continued until Vincent could use Strategy 1 without prompts from the experimenter. This instruction consisted of five 1-hour sessions. Strategy 2 training implemented describing words and it proceeded in the same manner as in the previous training. This training continued until Vincent could use the strategy without prompts from the experimenter. This instruction consisted of two 1-hr sessions. Strategy 3 training employed making revisions. Vincent learned how to brainstorm up to six ideas to better the story, and then with the experimenters help, he chose three to improve the quality of his story. Instruction for strategy 3 continued until Vincent could use the strategy without prompts from the experiment. This instruction was completed in one 45-min session due to the modeling of revisions throughout all three stages by the experimenter.

According to this research, during baseline testing, Vincent wrote no more than 11 words per writing sample. His stories contained one or two action words and no describing words, and he made no revisions. Following strategy 1, Vincent wrote an average of 26 words per story and included an average of 6.7 action words in each story. After strategy 2, the average length of Vincent's stories increased to 47 words, and each story contained an average of 6.3 describing words. He also included an average of 7.0 actions words per story yet refrained from making revisions. After strategy 3, his average length of story rose to 84 words, and the average number of action words and describing words increased to 13.6 and 7.6, respectively. Vincent also made three revisions to each story written in this phase. The quality of Vincent's writing samples also increased after participating in strategy instruction. During baseline, each writing sample received a

rating of 1 out of 7. His mean quality rating scored increased to 2.6 after strategy 1, then to 3.6 after strategy 2 and maintained a score of 5 after receiving strategy three training. The strength of this research is in the writing output Vincent demonstrated, increasing from an average of 11 words per essay to averaging 77 to 95 words per essay. The quality of Vincent's writing gradually improved throughout the study, indicating that the potential benefits of SRSD include improved quality as well as increased quantity. Only one test subject was a huge weakness, the artificial setting of one-on-one training, pictorial interest writing prompts, and issues of maintenance and generalization were not assessed. Regardless of the strengths and weaknesses of this research, it can be noted that given the correct strategies, children with AS/ HFA have the possibility of succeeding in school both academically and socially when good communication and research are collaborated between current research and the general educational teacher.

Writing Fiction

Testing recorded in the beginning of this chapter demonstrated a correlative deficit in children with AS when writing fiction stories due to an imagination weakness. Research with Harbinson and Alexander (2009) addressed this problem through group work discussion to promote understanding of the imaginative element. Quantitative research was used in this study based on a hypothesis due to the documented learning style of children with AS. This study took place in Northern Ireland utilized by a group of English teachers within the mainstream classroom comparing non-disabled students working in groups with students diagnosed with AS working in groups. Students were asked to complete similar tasks at the beginning and the end of a 16-week program to compare what they were able to do pre- and post-intervention. Qualitative

questioning was used in this research to discover patterns in the following areas: which areas in the English curriculum do students with AS find difficult? Do these students perform better with non-fiction tasks? Can students with AS write creatively? And, do these students read with understanding appropriate to their age? These questions produced several skills identified by four English teachers but it was decided that the research intervention would center on creative writing and inferential reading skills. The actual intervention involved a specially designed creative writing framework and an inferential reading scaffold.

The creative writing framework consisted of a grid that had five subheadings: Who? When? Where? What? Why? These subheadings were supplemented by visual cues. The intention was the more formal structure of a grid would help students to plan their ideas. The inferential reading scaffold was designed to aid students to read between the lines through trying to encourage them to decode figurative language, understand what a character's behavior revealed, and to address empathy skills in trying to relate to how someone is feeling.

Group work was used through discussion in trying to establish a sense of purpose of imaginative writing. This was done through informal discussions about the importance of stories, where they came from and what they add to our lives. The group work had better success only with the students who acknowledge that they needed help. There was a direct impact upon progress for those students who had not accepted their diagnosis since, if they did not see themselves as 'different', they did not want to be part of any small group situation. The assistant was able to work with students on a one-to one basis and for some students this reinforced the structure they needed.

The subjects in this research included 12 students diagnosed with AS. During the grouping portion of this study, the demographics consisted of three groups: group one had four male 12-year-old students, group two consisted of two 14-year-old students (one male, one female) and two 13-year-old male students; the last group consisted of two ten-year-old male students and two 11-year-old male students.

Overall, the strategies did not seem to work very well but the teachers did find out two very important themes when working with this diverse population: professionals must try to understand the world a little more from an ‘Asperger’ perspective and there is a direct impact upon progress for those students who had not accepted their diagnosis.

There are questions left about this article. The skills they were trying to teach are useful skills but ones that needed to be addressed starting in primary school not secondary for any results to occur. Putting all children with HFA together in one group doomed these new strategies—they had no significant model to observe and interact with. The strategies themselves seemed like useful scaffolding material but the subject material of writing fictional discourse is difficult at best for any child diagnosed with AS/HFA.

The strength of this study was in the teacher caring enough to look for new strategies and trying them out which brought some useful insight that I hope the school will act on. The participants show a weakness because we have scant data on them and no referral to how they were diagnosed. The whole article read as an experiment case within several English classes vs. a controlled scientific research where variables are controlled. The strict adherence to writing an imagination story sabotaged students who lacked imagination; could not the students with AS write factual stories? No mention of special services or an IEP was addressed which brings up the question of where the disability

labels came from and why label if no one is aware of the label or how to address the label?

The study begins by comparing the deficit of AS consisting of an impairment of the imagination. This is the only impairment the article looks at and the research tries to fit their strategies within this one box without really knowing what the impairment is or who the child is. The study takes a generalization of diagnosis and tries to apply it to a curriculum unit.

The lesson they learned at the end of the article was priceless: professionals must try to understand the world a little more from an Asperger perspective. This echoes in the introduction of this chapter portraying a qualitative study where you met several children with AS in a filmed interview. The interviews were run very professionally and you got a chance to really get to see what it is like to learn through their eyes. The need for research in getting to know these diverse individuals and to acquire the best teaching strategies to best help them to be successful individuals and citizens of our society validate the rationale of this paper.

This subheading looked at the testing involved determining the strengths and weaknesses in writing for children who are diagnosed with AS. Testing showed strengths in factual writing with a high rate in recall of facts but weaknesses utilizing imagination or inferential writing. When unknown subject matter was used, frustration elicited smaller production in words per sentences and a weakness in using story elements to produce high quality work. Three research studies were reviewed to demonstrate strategies in helping students diagnosed with AS. More research is needed in this area and thankfully more articles are appearing each day due to the rise of this diagnosis. The

last article researched in this chapter shows a correlation in deficits of reading when trying to produce an expository essay, a skill needed during mid-level and above education. The next subheading in this academic setting explores strengths and weaknesses in reading and what current strategies are being used to help students diagnosed with AS.

Reading Strategies

In the introduction to chapter three, strengths and weaknesses were portrayed during two research studies using scientific testing material. The researchers (Minshew et al., 1994) utilized the Woodcock Reading Mastery Test-Revised (Woodcock, 1987) (WRMT-R) to test for word identification, word attack (nonsense words), word comprehension (synonyms, antonyms, and analogies) and passage comprehension (cloze design). Significant differences were found for those composites that contrasted procedural and mechanical skills on the one hand with comprehension skills on the other. Children with autism actually did better than the control group at word attack relative to word identification. The reading strengths of children diagnosed with Autism consist of an adequate word and decoding knowledge, a large information bank (long term memory), and fluency in oral reading. Strengths in comprehension are recalling facts and details. Weaknesses include understanding what is read specifically in nonverbal cues, understanding the motivation of characters or formulating inferences about story events or elements. Inferences and reading between the lines is the hardest skill to maintain while reading for the targeted group.

The second set of researchers Griswold et al., (2002) used the Test of Problem Solving-Elementary, Revised (TOPS) (Bowers, Barrett, Huisinigh, Orman & LoGiudice,

1991). The testing for reading showed that oral expression, decoding and basic reading are the strengths of the child with Asperger's. Reading comprehension, especially nonfactual information and recalling information to make judgments or conclusions about selections are the weaknesses in reading. The TOPS test related difficulties with problem solving and language-based critical thinking.

Fluency

The above overarching data found in testing research studies concentrated on reading alone. Patterns of Reading Ability in Children with Autism Spectrum Disorder, (Nation, Clarke, Wright & Williams, 2006) warns educators that this population falls through the cracks when it comes to getting help in reading because fluency is used as the red flag. Though fluency is a huge component we still need to be aware of the overarching goal of reading: comprehension. Children with AS/ HFA can usually read a passage fluently but to answer any question other than factual, frustrates them to the point of a meltdown. This quantitative research study with multiple baselines across participants asked four main questions:

1. What is the level of reading ability in a relatively large and relatively broad population of children with ASD?
2. What are the levels of component reading skill (accuracy and comprehension)?
3. Do discrepancies between (relatively strong) reading accuracy and (relatively weak) reading comprehension characterize the reading profile of children with ASD?
4. What are the levels of nonword reading in our sample and how does this correlate with the pattern of reading skills seen in a relatively large population of children with ASD?

Chronological age was the first criterion (6 -15 years). Second criterion was that language skills were sufficient enough to allow children to participate in the study. On this criterion, 68 families were sent invitations to the study, 40 responded with one family having two children making the research total of 41 (36 boys and 5 girls). According to ICD-10 (World Health Organization, 1993), diagnosis on the ASD had to be made by experienced clinicians using research diagnostic criteria in a multidisciplinary diagnostic forum. Sixteen children fulfilled criteria for autism, 13 for high-functioning autism and 12 form Asperger's Syndrome. Nine children were released from the survey because they were too young or were completely unable to read. Mean age of subjects was 10.85.

Children were tested in their homes or in a quiet room in their schools. The tests were presented in a single session lasting approximately 1.5 hours. Rest periods were allowed as required. Four assessments of reading, three tapping aspects of reading accuracy and one tapping reading comprehension was made. The first measure of reading accuracy was decoding measured by a nonword reading test, The Graded Nonword Reading Test (Snowling, Stothard & McLean, 1996). The second measure of reading accuracy tapped word recognition using the reading subtest of the British Ability Scales. The third reading accuracy assessed how well children read connected text; they used the Neale Analysis of Reading Ability II (NARA-II) (Neale, 1997). The NARA was also used to assess reading comprehension. To test oral language skills, the British Picture Vocabulary Scale-II (BPVS-II) and the WISC-III was used.

As a whole, the group showed normal-range levels of reading accuracy, but reading comprehension was lower. A large proportion of children showed impaired reading comprehension: 65% of the sample obtained reading comprehension at least 1

standard deviation below population norms, and about one-third of the sample showed very severe reading comprehension impairments. Nation et al., (2006) states, “In our sample of children, we identified children with poor reading comprehension and children with poor nonword reading, relative to word ability. This observation offers a cautionary note for the assessment of reading in this population. Put simply, reliance on tests of word recognition is likely to over-estimate children’s reading competence in other areas, most notably reading comprehension skills, but for some children, decoding ability too” (p. 919).

This was a solid research study with much known scientific testing materials. Unfortunately, you can find solid research testing data such as this and very solid testing data on reading strategies for at-risk readers but you usually can never find the two together. This is why I chose to annotate this research in conjunction with my literature review on marring the two subjects together; more needs to be addressed in the future.

The strengths of this research were the use of solid quantitative data with four hypothesis correlating with conjectures. Participants were screened thoroughly in alleviating skewing variables to the testing material. Each reading test was taped. Each test component was backed with scientific research-based testing material. Very strong correlations in reading skills consisting of 99 or 95% validity were strengths of this study. There were no real weaknesses in this research.

In many of the testing on reading skills with children on the ASD, the same conclusions are usually met: high fluency or word call with low comprehension. This study differed in testing the nonword area of decoding. I have seen this as a problem

during reading specifically for Asperger's; it was interesting to note the correlation with this study.

Reading Intervention

What best known reading strategies have been applied to individuals on the Autism Spectrum, is the question that Whalon, Otaiba and Delano (2009) answer in their meta-analysis evidence-based reading review based on quantitative research studies. To be included in this review, articles had to meet the following criteria: (a) published in a peer-reviewed journal, (b) include one or more school-age participants (ages 5-18 years) identified as having an ASD, and (c) describe research studies that tested the effectiveness of interventions in code-focused and/or meaning-focused skills as defined by the National Reading Panel. Studies were excluded from the review that (a) lacked a formal research design, (b) provided only sight word instruction and/or (c) included a reading measure, but an intervention targeting a skill other than reading.

The conceptual framework for this review is based off the research of Gough, Hoover and Peterson (1996) which categorizes the essential reading instructional components recommended by the NRP into two broader sets of skills. The first set includes code-focused skills, or phonological awareness, phonics, and fluency, which are required to accurately and fluently decode words in text. The second set is comprised of meaning-focused skills (vocabulary and comprehension).

The search began with online ERIC and PsycINFO databases using keywords: Autism and reading. From this preliminary search, journals frequently publishing intervention research with a focus on children with ASD were identified: the *Journal of Autism and Developmental Disorders*, *Autism*, *Focus on Autism and Other*

Developmental Disabilities, the *Journal of Applied Behavior Analysis*, *Research and Practice for Persons With Severe Disabilities*, and *Education and Training in Developmental Disabilities*. These were hand searched for abstracts of interventions implemented to increase the reading skills of children with ASD. The range of years within these journals ranged from 1989 to 2008. Eleven quantitative research articles qualified: 4 targeted code-focused skills, 5 targeted meaning-focused skills and 2 studies addressed both code-focused and meaning-focused skills.

Since no research exists with the reading panel report regarding students on the ASD, these authors have taken the meta-analysis of two quantitative research projects and married the results to discover patterns within reading strategies for students on the ASD. Whalon et al., (2006) state, “The purpose of this review is to examine the effects of such reading interventions for school-aged children with ASD” (p. 4).

Subjects included school-aged students (5-18 years) who have a professional diagnosis somewhere on the Autism spectrum. Majority of participants were High-Functioning Autism or Asperger Syndrome cases, due to looking at research before 1994, some participants were referred as Pervasive Developmental Disorder-Not Other Wise Specified (PDD-NOS).

Each of the four code-focused interventions used computer-assisted instruction with a pretest and a posttest design. Also allowing children with ASD to read aloud proved to help with fluency. In the NRP review, it was found that oral reading fluency practices increased proficiency and fluency with code-focused skills which in turn heightened comprehension of material.

Five studies looked at the impact of meaning-focused interventions: two targeted vocabulary, two comprehensions and one vocabulary with comprehension. Two strategies were used amongst these five studies: peer-mediation (cooperative groups) and one-to-one instruction. The authors summarized the findings in this category as following participation in meaning-focused interventions, students with ASD made gains on vocabulary and/or comprehension quizzes (Dugan et al., 1995; Kamps et al., 1995), question generation and responding during reading (Whalon & Hanline, 2008), ability to follow written directions (Rosenbaum & Breiling, 1976), and retelling the important events of a story (O' Connor & Klein, 2004).

Two studies combined both the code-focused and meaning-focused strategies. These studies included peer-mediation and class wide peer tutoring which resulted in increased number of words read correctly per minute and comprehension questions answered correctly.

General patterns in strategies shown amongst all the studies were simplify the task, provide scaffolding through modeling and think aloud, and implement procedural prompts (self-monitoring checklist, visual cue cards, and generic questions). A child with ASD can be taught to generate questions with a visual cue card paired with a script. A weaning process of removing the script and then the visual cue card can occur until the child generates questions independently. The self-monitoring checklist, which can also be faded, allows the child to stop and ask him/her questions during reading. The teacher needs to explain the purpose of the strategy and model using the strategy with the intended prompts as he or she thinks through the process aloud so that the child with ASD buys into the new strategies.

This research was printed recently and the language is very familiar: scaffolding, modeling, etc. This was a very strong review in that they showed how and why research studies were chosen using scientific based reading strategies proposed by NRP and supported by NCLB. An interesting fact discovered while reading this article is a strategy that can be used, is the difference in being able to differentiate between fact- and inferential-based questions. It seems the higher functioning student can understand inference while others cannot therefore modification in only focusing on fact-based questions can be made.

Thorough research across many years of trial and error reading implementation strategies makes this a strong review. A good synthesis of literature on reading instruction with an interest in patterns across reading implementation strategies also makes this a strong study. One of the largest representations of children on the ASD: 61 participants ages 4 to 17 make this study very strong. Citing and researching the NRP, NCLB and IDEA to demonstrate that all children, including children with ASD, can be taught to read in ways that are consistent with reading research makes this a very important study. Whalon, Otaiba and Delano (2009) state, “To gain a better understanding of how individuals with various characteristics spanning the autism spectrum benefit from reading instruction, researchers must include detailed descriptions of participant characteristics, any individualization of instruction, and the duration and intensity of instruction needed to facilitate progress. Future research should investigate not only the effects of comprehension strategy interventions on reading comprehension but also language, social communication, and engagement levels of children with ASD” (p. 13).

By studying and knowing the child on the ASD and the disability itself, we can find patterns that may lead to strategies benefitting the child in our care. As each study addresses, each child is unique and the more strategies and the more knowledge we have about this impairment, the better prepared we will be in helping our student succeed and grow within a social environment. Research addressing the reading skills of children with ASD is just a beginning. Practicing and knowing these strategies and using them is the relevant question at hand.

Reading Review of Strategies

Another literature review with test subjects was performed by Gately (2008) matching qualitative research on ASD reading deficiencies with qualitative research on reading strategies. There were three test subjects: Joshua, 12, interest level: civil war, reading level: fluent; Jamie, second grader, fluent reader; Michelle, fifth grader fluent reader. All three students are on the ASD.

Based on the findings of the research, the following areas in reading need scaffolding for children on the ASD: poorer silent reading skills than oral reading skills; as well as significant differences between factual and higher order, inferential comprehension. Quill (2000) noticed it was challenging for children on the ASD to integrate language, social understanding, and emotional intent of messages in understanding their social world. He also noticed that these same children tend to focus on details and interpret information in a fragmented manner which caused them to be stuck in one mode of thinking.

According to the reading research, the following strategies for higher order reading comprehension skills should help children on the ASD: (a) priming background

knowledge, (b) picture walks, (c) visual maps, (d) think-aloud and reciprocal thinking, (e) understanding narrative text structure, (f) goal structure mapping, (g) emotional thermometers, and (h) social stories.

Overall, this was not a very strong article and as a literature review, it quoted some popular qualitative studies but lacked in a quantity of resources. It was chosen because some of these reading strategies that this article had researched needed to be analyzed. It was interesting how the article begins with three individuals who carry many of the traits associated with Asperger's in the reading domain. It is implied to assume that these reading strategies will work with these individuals or if they were even implemented. This article was unique in that it demonstrated the strategies through a known classic as Sarah, Plain and Tall that brought more meaning to the strategies themselves.

Introducing some unheard, therefore, new information in the reading realm of strategies was the main strength to this article. It was unique and quite genius to first bring to light three individuals and their reading problems as a child on the ASD and then to interject through a novel experience how to implement these reading strategies in scaffolding instruction to improve comprehension. The use of color strips to show varied states of emotion is an engaging technique to help teach empathy skills through novels.

This study connects because of the referencing to many studies already researched dealing with testing of children on the ASD, their strengths and weaknesses in reading and on some of the reading strategies mentioned in the article. Social stories and comic strips are pretty common in many of the studies dealing with scaffolding for hyperlexia. Though each child on the ASD is their own individual, research does find common

patterns where varied reading strategies help children overcome hyperlexia by giving them tools to comprehend what they are reading. Fluency or decoding are strengths and can be used to help implement the higher order reading comprehension skills that are needed in understanding what is read.

Comprehension Scaffolding

Exploration of Strategies for Facilitating the Reading Comprehension of HFA was a quantitative study performed by O'Connor and Klein (2004) determining how to improve comprehension for children diagnosed with AS/HFA. A criterion was based from mean age, mean Stanford-Binet Intelligence Test, and mean Woodcock Johnson Reading Mastery Test-Revised. Psychological DSM-IV testing to verify participant was diagnosed with in the following categories: HFA, AS, and PDD-Not otherwise Specified.

A control (grade level, sentence level, non-fiction, emotional composition, etc.) story was used in four different versions; this type of story was read twice: (1) the control version was unaltered, (2) the cloze version contained 12 blanks throughout the story where the information could be found in the surrounding three sentences (pronouns were excluded), (3) the anaphoric cueing version contained 12 instances of pronouns, evenly distributed and underscored; three referent words appeared under each pronoun, student was to pick appropriate word, and, (4) the prereading condition version in which five questions were designed intended to elicit common knowledge and experiences relevant to the main ideas of the story.

For each passage, a set of 12 questions was prepared, permitting a total score of up to 25 points. Session lasted approximately one hour in a quiet setting. Participants

were comfortable with this research due to this being a two-year over-all encompassing project.

There were nineteen males and one female in this study. The mean age was 15.11 with a standard deviation of .99. Four attended segregated classrooms, six attended regular classrooms with resource support, and ten attended split mainstream/special education. All twenty participants were labeled with either HFA, AS, or PDD—Not Otherwise Specified. All twenty had a significant deviation between decoding and comprehension.

The total reading comprehension mean scores did rise yet not significantly: control 1 (12.79), control 2 (12.86), Cloze (13.83), Prereading questions (13.88) and Anaphoric cuing (15.41). One particular finding was that the prereading strategy seemed to backfire more than it helped. This population tends to obsess with facts and when prior knowledge was questioned, the subjects tended to dwell on this material instead of analyzing the material being read. The testers noticed that the subject's answers were confused with the prior questions that were asked before the reading section.

This study was valuable in that we learn procedural facilitation vs. substantive facilitation helps children on the autism spectrum utilize their strengths. In procedural facilitation, the teacher assists the student with a task by prompting executive processes (anaphoric cueing) instead of directly assisting students with the content of a task. Procedural facilitation also differs from cognitive strategy instruction because the teacher does not expect that the student will necessarily internalize the procedure and perform it independently at the end of the intervention. Given the metacognitive difficulties of students with autism, procedural facilitation seems to provide a more attainable goal.

The strengths of this study are the number of participants was large. The study group was well known due to this research group/study lasting two years. The researcher's intro contained much prior research; it was almost like a literature review within an experiment. Explanation of each test method was explained in great detail. The weaknesses included an overall reading comprehension score was taken unlike the initial baseline where comprehension was broke down into subcategories: word comprehension, passage comprehension and language comprehension. This group added PDD—Not Otherwise Defined which I could argue into my question but I feel would affect the validity of my findings. I do not see the cross over between these strategies from the controlled testing format to the inclusive reading format.

AS Reading Skills

Analysis of Reading Skills in Individuals with Asperger Syndrome was the second study recorded assessing strengths and weaknesses in reading. Many classrooms use some form of reading inventory to assess levels of independent, instructional and frustrated reading levels so that children are directed to the proper reading material. Myles, Hilgenfeld, Barnhill, Griswold, Hagiwara and Simpson (2002) illustrated that for children with AS, this type of testing proves very little because there is very little difference found between the three forms of reading. This means that selecting an appropriate classroom text would be difficult because there is little variance between the level at which the child can effectively read and the level at which comprehension and word recognition begin to slip to a point of frustration.

This quantitative study attempted to extend limited research base through the administration of an informal reading inventory to assess both the word recognition and

comprehension skills of students with AS. The Classroom Reading Inventory (CRI) (Silvaroli, 1993) was used for the testing. All participants were from a large Midwestern community in the US and all had diagnosis of AS based on findings by a licensed psychiatrist tested with DSM-IV; American Psychiatric Association, 1994. This study included 14 boys and 2 girls who ranged in age from 6 years 6 months to 16 years 9 months with a mean age of 9.43 and who had IQ's from 66 to 133 with a mean IQ of 100.33.

Either the student came to the University for testing or the assessors went to the child's school to administer the assessment. Testers were grad students, as part of their master's program; the grad students received intensive training and field experience in administering the CRI and other testing material to AS students. Students were first asked to read lists of words to determine which grade level to begin reading fluency. Each list contained 20 words, when four or more words were missed, the instructor was to refer to a lower grade level. When the proper reading level was determined, students read a story out loud to the researcher, if too many mistakes were made then this level was determined to be at a frustrated level for the child and a lower grade level test was used. If the child read the section with no mistakes, it was determined that this level was too easy and a higher level was attempted. Reading a section with a few mistakes but with success determined the instructional reading level for the child.

In addition to determining various reading levels, the CRI provided information on factual/literal, inference, and vocabulary questions. To compare differences in participants' concrete and abstract comprehension, the study calculated participants' correct responses on the factual/literal and the inference questions. At times the

researchers were baffled at which reading level to place the child at because the oral fluency did not coordinate with the comprehension of the story which was usually lower.

Little deviation was found between the independent level, the instructional level and the frustration level of reading in this test. It was inferred that selection of an appropriate classroom text would be difficult due to the test findings. Oral reading resulted in higher comprehension over silent reading. It was inferred that additional auditory stimulus may have helped or the oral leant to better focusing strategies verses silent. It was also inferred that due to this children in this population would have continuing struggle in upper grades when it came to reading because their reading material became more silent reading. Literal and factual questions were excelled in, but two-thirds of the inferential questions were answered incorrectly.

This research illustrated the need for modifications and scaffolding of reading instruction and testing for children diagnosed with AS/HFA. The CRI demonstrates the strengths and weaknesses in reading: higher fluency, good level of factual recall but deficiencies in reading between the lines and claiming the gist of the story. The strengths of the study were a researched based testing unit was used to perform the study. Participants had to meet qualifying criteria. Testing personnel had to meet qualifying criteria. Testing was done in a controlled setting. The weaknesses were that all students had an established rapport with the test administrators, the CRI was administered in a one-on-one setting with no distracters, and efforts were made to control and monitor the pace at which the materials were presented, as well as the students stress level and fatigue, therefore, reading performance in this setting might actually exceed students' school reading performance. Population was small and from the same general area,

therefore, it would be hard to generalize any findings due to lack of diversity. The testing simulations are unlike conditions found in a mainstream classroom therefore the means of the comprehension may be exaggerated.

This study was different because it was based on grounded theory by developing the hypothesis via the data. This would be informative research to have on hand in recommending accommodations for the student with AS during reading. It was interesting to note how oral reading affected both fluency and comprehension which could lend to more testing in this area.

The following section discovers best know teaching practices for children with AS/HFA in mathematics. Many of the strengths and weaknesses uncovered in this section will also flow over into other subjects due to the need to comprehend interdisciplinary.

Math Strategies

Mathematics is an area in which many students with Asperger Syndrome have difficulty. Currently, in many schools, teachers use a mathematics program that is based upon abstract concepts and uses investigative, inquiry-based learning. Students with AS usually need help understanding this approach because it requires a great deal of abstract thinking. Students with AS need repetition and consistency to be able to learn basic math concepts; once learned, they can then learn advanced concepts using the same techniques as their peers. However, if the teachers make adaptations to the teaching method, these students may find investigative, inquiry-based learning interesting and enjoyable.

Found in the introductory of this chapter is the Griswold et al., (2002) study which is the first empirical study focusing on the academic achievement of students with AS. This study found that students with AS had mathematical deficits based on the

information that their numerical operations subtest score on the Wechsler Individual Achievement Test (WIAT) was among the lowest subtest scores. However, it should be noted that their mean standard score for the mathematics composite on the WIAT is within the average range.

Strengths and Weaknesses

Chiang and Lin (2007) performed a literature review of a total of 18 articles published in the period during 1986 to 2006. These studies involved 837 individuals with AS/HFA who ranged in age from 3 to 51 years. The purpose of this study was to answer the following questions: Do individuals with AS/HFA have mathematical deficits?; A relative weakness in mathematics?; and, Mathematical Giftedness? Chiang and Lin write, “Standardized academic achievement test were only used in eight of the eighteen included studies. In general, the overall mean mathematics score from score from participants (n=332) in the eight studies was 92.5 (SD = 7.1), which fell within the average range” (p. 551). The answer to mathematical deficits would be ‘no’.

Do individuals with AS/HFA have a relative weakness in mathematics? Chiang and Lin (2007) write, “To determine the significance of differences between the mean arithmetic subtest score and the mean of the WISC scale scores, a related-samples t-test was calculated. The mean difference is 0.7, which is significant beyond the 0.05 level” (p. 551). These results yield a significant but clinically modest mathematical weakness in individuals with AS/HFA. Mayes and Calhoun (2006) reported that 23% of referred children with HFA had a learning disability in mathematics. To answer this paragraph’s opening question, there is a correlation of mathematical weaknesses in students diagnosed with HFA/AS.

Do individuals with AS/HFA have mathematical giftedness? Chiang and Lin write, “The reported maximum scores on mathematical achievement tests ranged from 115 to 135. These scores indicate that some individuals with AS/HFA have high average to very superior mathematical ability. In particular, the maximum score of 135, as measured by WIAT, indicates that some participants’ mathematics scores are above the 99th percentiles on the norm. This information suggested that some individuals with AS/HFA are mathematically gifted” (p. 552).

It is interesting to note that this study warns about confusing savant with giftedness. Savants generally occur in people with autism yet have a very low working IQ. Arithmetical savants are persons who possess outstanding numerical skills, performing mental calculations that are impressive in their speed, extent of computation or both. Mathematical giftedness demonstrates people who are able to solve difficult mathematical problems. The problem with this category is that it tests for computation yet not necessarily application.

What appears to be relatively easy are rote skills that do not require an interpretation of meaning, and are not tied to a particular body of knowledge. Prior (2003) documented a case study amplifying the above hypothesis. He states:

A young man with AS, known to me, had a remarkable calculating ability. He was as accurate as an electronic calculator and a great deal faster (given the human user). The staff in a secure unit (for habitual arson) where he resided were trying to teach him a job in the hospital, to occupy his time and give him a possible vocational skill. They attempted, at various times, to get him to use a calculator for bookkeeping, to enter data on computer spreadsheets, and to manage the cash register at the hospital canteen. These “low-level” skills would appear to be far below his calculating ability, and yet he could not master them. He had no insight into his own capacity to calculate, and slowing it down and making it explicit and transparent seemed to destroy the ability. At a

practical level, then, his remarkable ability reduced to a “party piece”, and training him to do a job required starting from “scratch.” (p. 81-82)

Life Skill Strategies

We need to look at each individual and test for skills needed to survive in society. The following study Cihak and Grim (2008) looks at counting-on strategies to enhance independent purchasing skills. Even though some students with HFA/AS can memorize and plug in numbers in subjects such as calculus, it may not necessarily mean they can operate at everyday living skills that we take for granted. The criteria of this study consisted of the following: a documented diagnosis of autism, skill deficit in purchasing items, current participation in a high school program with regularly scheduled community-based instruction (CBI), the ability to imitate behavior modeled by the instructor, no physical disability which impeded the performing of the skill, agreeing to participate in the study, and parental permission. Two girls and two boys between the ages of 15-17 participated in the study.

Baseline and classroom phases occurred in the students’ resource classroom in an area free from distraction. The bookstore phase occurred at the students’ school bookstore. Community and maintenance phases occurred during community-based instruction at a local department store. Students attended CBI three times weekly.

Students learned how counting-on skills with real money by counting out the required money needed for purchases. Students also learned how to count back change when purchasing items. Phase one began in the classroom using flashcards and play money with modeling from the teacher. During most of the training the teacher was the cashier. Phase two took place at the school bookstore. In this phase, students were presented with three purchasing trials per session of various amounts within the specific

price group. Criterion for this phase was 100% independent purchases for three consecutive sessions. In phase three, students practiced purchasing items at a departmental store in a community setting. As in the prior two phases, the teacher used a least-to-most prompt hierarchy until the student correctly counted-out the correct amount of bills to compensate the price using counting-on procedures. A criterion again was 100% for three consecutive tries. Follow-up probes occurred 6 weeks later at the same department store without any prompts.

This study demonstrated that students with HFA/AS could be taught to acquire, maintain, and generalize purchasing skills of various dollars amounts and across setting using the next-dollar or the one-more than technique. The criterion of ultimate functioning is performing a skill in the natural setting, under natural conditions with natural materials. After initial classroom criterion was reached, students were able to generalize to counting on skills to make successful purchases across multiple settings. The students in this study make purchases at the school bookstore with an average of 98% across all dollar amounts. Moreover, students generalized the use of counting-on and purchasing skills to a community setting and retained the skills 6 weeks later.

This study portrays the real life experiences our students need to succeed in the world. Even in the regular math education classes, counting back change from purchases as simple as selling ice cream at school is a skill not always obtained in our curriculum. It was ideal that this high school had access to CBI and that skills could be generalized in a community setting—this is a benefit many children need in everyday living skills to make it as successful adults in our communities. Another strength to this study was the use of an Interobserver and independent scoring for reliability. The use of six-week

follow-up independent studies showed strength in sustainability. Weaknesses of this study, as with any single subject research design, involved the small number of students in the study disallowed generalizability of the results. Students were taught math strategies in a one-to-one instructional format which does not follow general classroom education. Finally, this study used a system of least prompts as the correction procedure—other counting on skills could have been used to compare and contrast results. For school programs that do not have the luxury or freedom of the facilities in the above study, teachers need to find other curricular strategies in making math meaningful. For those with HFA/AS, most problems with mathematics do not involve calculation but generalizing procedures to other contexts, including real-life ones, and understanding processes such as estimation where there is no exact answer. Many children with HFA/AS enjoy doing pages of “sums” at school but have little idea of what they mean or how to use them as problem-solving tools. Some children with HFA/AS resist even this task, seeing no point in doing something they can already do, over and over again. The following research addressed this dilemma.

Curriculum Design

Banda, McAfee, Lee and Kubina, Jr. (2006) asked the following two questions: Do students express preference for mastered tasks or non-mastered tasks? Do students express preference for digit facts or word problems when similar mastery level problems are presented simultaneously? *Math Preference and Mastery Relationship in Middle School Students with Autism Spectrum Disorders* was a quantitative concurrent-schedule testing research design with a criteria of middle school students on the autism disorder spectrum in general education classes.

The teacher wanted to increase the students' preferences for word problems. It was assumed students would choose computation over application as a preferred work format. It was also assumed that these students would choose a mastered task over an unmastered task equivalent to choice for easier work problems. Mastery problems were written up on ditto sheets while as preference problems were given as flash cards. No reinforcements were given through either format of testing. Participants were given 20 minutes to complete task within one setting, if more time was needed, an additional setting was offered. When a student demonstrated 90% on a given task it was then considered a mastered task for that student. For the purpose of this experiment, preference was defined as 69% or greater choice for a particular task. Four types of problems were identified: mastered digit facts, mastered word problems, non-mastered digit facts, and non-mastered word problems. Banda et al., (2006) states, "The participant was simultaneously exposed to two formats: mastered vs. non-mastered or digit vs. word. The concurrent design schedule demonstrated which of the available formats affected preference across the six problem formats. Problem formats were presented in a random order across days" (p. 213). For each student, it was recorded which preference they chose over a total of 10 trials. A total of three sessions were conducted in each format for a period of 3 days resulting in a maximum of 30 trials. The design used Interobserver agreement and procedural integrity for validity.

Five middle school students with ASD from a small town in Pennsylvania who attended the general education classroom yet received support help through resource participated in the study. All five students had math goals on their IEP. One girl (sixth grade) and four boys from sixth through eighth grades were the participants of this study.

The assumptions turned out to be wrong. There was no significant preference to computation over application and no preference towards mastery work; one student was recorded as stating that he preferred the more challenging word problems. Banda et al., (2006) quoted: “teachers who intend to use preferences to enhance academic or behavioral skills of students should directly assess preference, possibly from multiple sources such as direct observations and/or interviews” (p. 221).

This study tried to prove the matching law in that completing brief math problems may enhance reinforcement rates in children because they are more likely to result in correct responses that produce more opportunities for reinforcement. Thus, students might prefer six 1-digit addition problems over one 6-digit addition problem because of the higher reinforcement rate. According to matching law, students’ choice behaviors can be predicted and controlled (Skinner, 1996). As a whole, the students preferred mastered problem formats in half of the total formats presented indicating a weak and equivocal relationship between the task mastery and preference. This study illustrated that human behavior cannot be predicted with behaviorist theory and that reward and feedback can be intrinsic.

The strengths of this study were many, graduate students trained with ASD students performed research. Interobserver agreement data was collected on the mastery assessments and an independent observer coded the trials for the interobserver agreement. The interobserver agreement for preference assessments coded at 99.3%. Procedural integrity data was collected for assessments and trials. Separate checklists were developed and the independent observer checked the experimental procedures following

viewing of videotapes. Procedural integrity for both the accuracy assessment and for the preference trials was 100%.

Weaknesses in this study were the small sample size and the lack of reinforcement agents. There were only four participants which allowed for no generalizations to be made when concerning the preference of materials in students on the autism spectrum. Many theories were discussed with internalized patterns of reinforcement agents that may or may not have contributed to the results of this study. Had the study used reinforcements, many of these speculations would have been answered and a better control of results would have occurred.

Processing differently

This study illustrates the danger of generalizations when applied to groups of children. Each child holds strengths and weaknesses that teachers need to get to know per individualized cases. This form of stereotyping began with the discovery and labeling in 1944 when Hans Asperger performed the first research study of children with AS/HFA. It is interesting to look at a few case studies when determining how and why children with AS/HFA were thought to have trouble with mathematics.

Case 1, question 1: Work out 5 plus 6, the child responded, "I don't like little sums,

I'd much rather do a thousand times a thousand." After he had produced his 'spontaneous' calculations for a while, Hans insisted that he solve the given problem.

He then presented the following original but awkward method: "Look, that's how I work it out; 6 and 6 equals 12, and 5 and 6 is 1 less, therefore 11"

(Attwood, 2003, p. 75).

Another child, Harro, used the following method, which would be more likely to be used by an adult than a child:

2 Question: 34 minus 12. Answer: “34 plus 2 equals 36, minus 12 equals 24, minus equals 22; this way I worked it out more quickly than any other”.
 Question: 47 minus 15. Answer: “Either add 3 and also add 3 to that which should be taken away, or first take away 7 then 8.” (Attwood, 2003, p. 55)

What is amazing is that due to their way of thinking these children were classified as having trouble with mathematics when first diagnosed with AS yet today it is this very same method of thinking that we are striving for in our math classes. At a professional development that I went to on May 14, 2009 with guest speaker Ruth Parker, Ph.D., we were taught the very same methods of manipulating numbers as these children did in reference to teaching today’s children. The seminar was titled: Mathematics and Your Child’s Future: The Basics and Beyond.

As teachers, we must be prepared to examine the strategies the child is using and not make a value judgment that they are wrong just because they are dissimilar to other children in the class. They are just different, and for the child, they may be easier than the conventional alternative. Thus, it is very important to consider not only what the child can do, but also how they do it.

In the next subheading, research shows how differences within ‘special interest’ items, which were perceived as a weakness, can be turned into strengths for the child diagnosed with AS/HFA.

Strategies in Special Interest Areas

One of the main red flags in diagnosing individuals with AS/HFA is found in Criterion B of the DSM-IV (American Psychiatric Association, 2000, pg. 77):

Restricted repetitive and stereotyped patterns of behavior, interests, and activities
 As manifested by at least one of the following:

1. Encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus,

2. Apparently inflexible adherence to specific, nonfunctional routines or rituals,
3. Stereotyped and repetitive motor mannerisms (e.g., hand or finger flapping or twisting, or complex whole-body movements),
4. Persistent preoccupation with parts of objects.

According to Attwood (2003), the social and interpersonal world is confusing, but the world of objects and machinery is easier to understand and more reliable than people; objects do not change their mind or become distracted or emotional. Some of the circumscribed interests are developmentally appropriate and typical of their peers yet the reason for the interest is usually idiosyncratic and not that the topic is popular with peers. The complexity and number of interests vary according to the child's development level and intellectual capacity.

The following five studies will shed some light on this phenomenon. The first study by South, Ozonoff and McMahon (2005) will demonstrate without doubt that these special interests are apparent in individuals with AS/HFA and to what degree they can be a controlling factor in an individual's life. The second study, Klin, Danovitch, Merz and Volkmar (2007) looks at the nature of the circumscribed interest in how it generates to building knowledge and how this lends to the process of learning. Baron-Cohen and Whellwright (1999) breaks down special interests into feasible topics found in education today and how this phenomenon may relate to the learning process of individuals with AS/HFA. Winter-Messiers (2007) looks at special interests and how they originate and how this can be developed or integrated into most effective learning strategies at home and in school. Lastly, Winter-Messiers, Herr, Wood, Brooks, Houston and Tingstad (2007) show through a qualitative exploratory study what strategies can be developed through special interests and how these can promote the educational well being of the AS/HFA child.

The Existence of Special Interests

In this first study, South et al., (2005) the first goal was to characterize repetitive behavior in HFA, examine the frequency, developmental course, impairment, and relationship to the four defining traits in the DSM-IV-TR. The second goal was to look at differences in repetitive behaviors between HFA and AS. The primary hypothesis of the study was that special interests would be more common, with a greater degree of impairment, in AS than in HFA; secondly, it was hypothesized that other repetitive behavior symptoms would be more common and interfering in HFA than in AS.

Qualitative research design was used through the use of two interviews to assess repetitive behavior symptoms and associated functional impairments. Individuals with autism spectrum disorders were recruited from the Child and Adolescent Specialty Clinics at the University of Utah Health Sciences Center and from a pre-existing database of research participants. Typically developing control participants were recruited from an existing participant database and by word-of-mouth in the community. HFA and AS were diagnosed using strict DSM-IV-TR criteria, based on information obtained from the combination of a detailed parent interview, the Autism Diagnostic Interview-Revised (ADI-R) (Lord, Rutter & LeCouteur, 1994), and a standardized, semi-structured assessment of the child, the Autism Diagnostic Observation Schedule-Generic (ADOS-G; Lord et al., 2000). HFA diagnosis consisted of abnormal functioning in social interaction, language, or imaginative play by age 3, and Full-Scale, Verbal, and Performance IQ scores all above 70. Diagnosis of AS was considered only after autism had been ruled out. An AS diagnosis required the presence of at least two DSM-IV-TR

defined social symptoms, one repetitive behavior symptom, and normal onset of language.

Typically developing control participants were recruited from an existing participant database and by word-of-mouth in the community. Participants were seen at either the Psychology Department or the Child and Adolescent Specialty Clinics at the University of Utah for further testing and interviews. Examiners who were unaware of the diagnostic status of all the participants collected all data about repetitive behaviors.

This study contained nine tables of data: (1) Group Comparison of Age and IQ; (2) Diagnostic Ratings for Autism Spectrum Groups; (3) Percentage Demonstrating Specific Behavior from the Repetitive Behavior Interview (14 categories); (4) Percentage Demonstrating Most Frequently Reported Interests and Associated Activities from the YSII (12 categories); (5) Summary Scores for all Repetitive Behavior Categories for the ASD Groups; (6) YSSI Scores by Developmental Stage, Domain of Interference, and Diagnostic Group (Preschool, School, Adolescent); (7) Internal Consistency of Repetitive Behavior Categories; (8) Bivariate Correlations Among Repetitive Behavior Categories (Lifetime Worst Severity); (9) Bivariate Correlations Among Repetitive Behavior Scores and Diagnostic Scores.

The semi structured parent-report interview asked for information about 50 different repetitive behaviors and their severity and impact on family life. The Repetitive Behavior Interview (RBI) items were independently assigned on the basis of face validity to one of four repetitive behavior categories by each of two raters, both experienced in diagnosing autism. Each category was comprised of 12 items. Disagreements between the two raters' categorizations were discussed until consensus was achieved.

Frequency was measured on an 8-point scale from (0) “never” and (1) “1-2 times per week”, up to (6) “more than 30 times per day” and (7) “almost constantly.” The duration of the behavior during a typical occurrence was measured on a 5-point scale from (0) “less than 60 seconds” and (1) “1-3 minutes” to (4) “more than 30 minutes”. The RBI asks about impairment caused by the behavior, using a 4-point scale from (0) the behavior does not exist for the child, or usually does not affect the routines and well-being of others to (3) the behavior is pervasive, inflexible, and often has a severe impact on the family and others around the child.

The Yale Special Interests Interview (YSII) was a semi-structured parent-report interview that was designed specifically to collect information about circumscribed interests. An identical set of questions was asked for up to three periods of development depending on the age of the child: preschool, school age, and adolescence. Questions about family impairment involve how much of the child’s time interacting with the family is related to the interest, how much the family needs to plan activities and routines around the child’s interest, and how much distress the family feels related to the interest. The interviewer rates each category of interference on a 4-point scale that ranges from (0), no interference related to the child’s special interest, to (3), a major disruption caused by an all-encompassing circumscribed interest.

Out of 72 potential participants, 61 were chosen due to meeting the criteria. In the sampling group 21 individuals were diagnosed with HFA, 19 diagnosed with AS, and 21 typically developing controls (TD). There were 45 males and 16 females. Ages included: HFA mean age was 14.10 years, AS mean age was 14.28 years and TD mean age was

13.34 years. Overall, one-way analyses of variance (ANOVA) indicated no significant effect for age or any IQ measure.

Post hoc t-test comparisons showed that for every variable the typical developing group had significantly lower scores than either the HFA or AS groups. Comparing the TD group with the HFA and AS groups separately showed that the HFA group demonstrated a significantly higher frequency than the typical groups for all behaviors in the table except for sucking on objects and the AS group demonstrated significantly higher frequency than the typical group for all behaviors but compulsions. The mean percentage of HFA participants demonstrating specific symptoms measured by the RBI was higher than that of the AS group for most items. There were no group differences between participants with and without language delay in circumscribed interests, again failing to support the proposed association between AS-like symptoms and special interests. In contrast, the Circumscribed Interests category, measured by the YSII at several time points across development, indicates gradual increases in mean impairment over time.

The repetitive behavior profiles in AS and HFA show that incessant talking about one topic and the inability to flexibly adapt to ongoing changes in family schedules were the most difficult aspects of autism. In discovering differences in repetitive behavior between AS and HFA—no support for the hypothesis that circumscribed interest are a diagnostic bell-ringer for AS was met. There is likely a difference in the earliest developmental patterns of most cases of AS and HFA (because of the intact early language stipulation for AS), and the results of the study suggest that this difference may also be observable in the earliest course of repetitive behavior. However, the study

showed, as these children grow older, the distinctions between AS and HFA wane across all symptom domains.

South, Ozonoff and McMahon (2005) discussed the possibility of importance that if diagnosis was made when the child was further along in school or adulthood that problems would arise in the proper classification because repetitive behaviors is a classifying issue. This discussion addresses my entire question in that too much attention is placed on the label of AS versus HFA because the majority of strategies used in teaching, learning and living are the same for both populations.

South, Ozonoff and McMahon (2005) hypothesized, as does the recent Text Revision of the DSM-IV (American Psychiatric Association, 2000), that circumscribed interests would be more frequent and cause greater impairment in a group diagnosed with HFA. This hypothesis was proven wrong in this study, it will be interesting how this will affect the categorizing between HFA and AS—will language onset be the only qualifying marker? And will the DSM be revised to take in consideration studies such as these?

This study was chosen to open this section of circumscribed interests to illustrate the nature and frequency of these interests. This study also validated that these interests exist and the problems that can be caused by them existing.

A major strength is on using the Yale Special Interests Interview was that it reported good test-retest reliability for a checklist version of the interview that has been administered to over 800 participants. The content of the interview and the checklist are identical, with the only difference being the format (rated by parent versus interview). Another strength of this study was the analysis of convergence with diagnostic measures suggesting the validity of the interview used in this study. There were significant

correlations among the RBI, the YSII, and the ADI-R, which was completed at a different time by different interviewers, as well as strong correlations with the ADOS-G, which was rated by a trained observer who was not aware of results from the RBI and YSII.

The Nature of Special Interests

Now that we have established that special interests are definitely a precursor to individuals with AS/HFA, we will now look at the nature of these special interests and how they pertain to the learning process with Klin et al., (2007). Diagnostic characterization included the Autism Diagnostic Interview Revised (ADI-R) (Rutter, LeCouteur & Lord, 2003) and the Autism Diagnostic Observation Schedule-Generic (ADOS-G) (Lord et al., 1999). All subjects met criteria on the ADI-R and met criteria for autism or an ASD on the ADOS-G. Two experienced clinicians confirmed the diagnosis of an ASD independently.

The Yale Survey of Special Interests (YSSI) (Klin & Volkmar, 1996) was used for the survey. It is an open-ended questionnaire eliciting information about areas of particular interest to children with ASD and the extent to which pursuit of these interests dominate the child's learning activities and communication with others. This survey only pertained to two developmental growth periods due to the age of the participants: preschool years (ages 2-6) and elementary school (7-12). For each section, parents were first asked whether their child exhibited an unusually intense interest at the corresponding age and if the response was 'yes', they were instructed to list up to three of the child's topics of interest and provide 'examples of the things the child knew or did involving this topic'. Parents then completed ratings of how much of the child's free time were spent on the topic of interest when by him or herself and how much of the child's interaction with

their family, peer, and other adults was related to the topic of interest. The ratings of interference utilized a 3-point scale that consisted on “sometimes” (less than 25% of the time), “quite a bit” (between 25% and 75% of the time), and “almost always” (more than 75% of the time).

Topics of interest were coded into eight descriptive categories. Rather than focus on the object or topic of interest, this study used the categories to capture the nature of the child’s knowledge and interest-related behaviors. The categories were (1) Facts/verbal memory and learning; (2) Facts and activities/visual memory and learning; (3) Sensory behaviors; (4) Math; (5) Classifying/ordering information; (6) Dates and time; (7) Hoarding; and (8) Letters and numbers. There were 250 specific topics of interest recorded for the 96 individuals over the various developmental periods. The system adopted allowed for overlaps in the way that a given interest was manifested, but each category represents a sufficiently distinct code that place emphasis on underlying learning processes.

Two trained individuals coded the topics of interest listed by parents on the YSSI. For children who had more than one topic of interest at a given age, the coders considered all of the topics listed. Across the two age groups, kappa ranged from .81 to 1 and percent agreement ranged from .93 to 1.

Ninety-six individuals (five females) with normative IQ ASDs were recruited from the Autism Program at the Yale Child Study Center. The mean age for this group was 14.3 years. The breakdown resulted in 41 individuals with HFA, 36 individuals with AS, and 19 individuals with PDD-NOS (Pervasive Developmental Disorder-Not Otherwise Specified).

This survey found that interests involving verbal memory and learning were by far the most prevalent in the two age groups, followed by interests involving letters and numbers (among preschool age children) and interests involving visual memory and learning. These results suggest that verbal memory and learning, such as memorization and recollection of facts, is the predominant behavior associated with special interests in children with ASD. Due to overlapping of special interests, with the exception of verbal memory and learning, which was often the only characteristic observed in individual children, children's behaviors rarely occurred in isolation. This pattern suggests that children may exhibit multiple types of behaviors associated with special interests rather than focusing on just one aspect of their topics of interests.

During the years, 37 individuals displayed verbal memorization of facts on a given topic of interest without pursuing their interests in a different way; 21 others pursued their given interests via both verbal and visual learning and activities; 8 individuals combines verbal learning with hoarding of examples of that interest; and it is of interest that in 6 of the 10 cases exhibiting sensory-seeking behaviors, 6 of them sought sensory stimulation in ways that were related to special interests pursued through verbal or visual learning and memorization. Thus, special interests involving verbal memory and learning were about equally likely to occur in isolation or with other types of behaviors, but other categories of special interest were very unlikely to happen without some form of verbal learning and memorization, at least for the top four categories. The predominance of verbal learning and memorization as the idea of expression of special interests was also observed for the elementary school years.

When going from preschool to elementary school years, there was a significant increase in number of individuals exhibiting circumscribed interests, as well as in the categories facts/ verbal memory and learning and hoarding.

The relationship between circumscribed interests verses interference with learning or with interaction with others and developmental trends showed that in both preschool age years and in elementary school years, the level of interference was high (with group means above score 2) and stable for the two age periods across the four situations, indicating that self-guided activities and activities involving others were substantially shaped by the child's circumscribed interest. None of the paired comparison across the two age groups was significant, suggesting that the high level of interference across all situations remained stable during preschool and elementary school years.

In regards to relationship between interference and adaptive behavior, children who special interest interfered with their learning and social interactions more frequently during the elementary school years displayed lower scores on communicative and maybe social adaptation as well.

The most obvious by-product of this study was the documentation of frequency of circumscribed interests in this population. Of the 96 individuals in this sample, 72 of them displayed such interests during pre-school years and 85 of them did so in elementary school years. Thus, it would appear that circumscribed interests are the norm, not the exception. The most frequent form of special interest involved amassing facts and information through verbal learning and memory. In preschool years, a third of the sample displayed fascination with numbers and letters and activities involving them. Thus, language, letters, and numbers, including reading, appear to be the most prevalent

means to learn about, explore, and memorize aspects of the world that are important to these children.

This study was important for teachers because it would appear important to fully appreciate what might be the impact of this phenomenon on the very tools of learning and adaptation of individuals with ASD. It is not surprising that children with ASD may attempt to make sense of their surrounding world through learning about special interests as it may be the means that comes to them most naturally and is most enjoyable. It is important to remember that whereas typical children integrate the facts they learn through verbal memory into activities such as play with other children or into a larger body of conceptual knowledge, children with ASD do not. It would be beneficial to harness this tremendous learning potential to advance social and communicative competence and adaptive behavior in individuals with ASD. The possibility of making use of these talents in a way that both encourages socialization and results in the child with autism being a valued member of the peer group would benefit in the classroom. Asperger's (1944/1991) initial optimism that circumscribed interests would naturally transfigure into vocational opportunities may be possible. The key is how to accomplish it.

The strengths of this survey were the use of Interobserver raters and the coding of a scientific known YSSI survey. This research also included two appendixes which helped with understanding the research. The first index showed the 250 exemplars of circumscribed interests and the second index was a represent of the actual special interests survey complete with questions asked of the participants.

A weakness mentioned in this study was the lack of a control group as compared to other studies. Yet, I felt the authors explained this decision very well in that they

wanted to stay away from comparisons to obsessions found in other participants such as OCD (Obsession Compulsion Disorder). Obsessions are very different from the special interests found with people on the ASD spectrum. Though both may be controlling the life style, one can be seen negatively while the other is seen positively. Another weakness was the recording of information from memory from the parents allowed for error. The authors noted that it would be ideal to record these special interests at the time they were occurring, and measurements of interference would be more detailed and for a much wider numerical distribution. The only problem with this idea is that most children are not classified as AS/HFA until they start school when differences are truly noticed.

Content Analysis of Special Interests

The next study looks at the content analysis in terms of core domains of cognition when pertaining to special interests. Baron-Cohen and Whellwright (1999) also performed qualitative research using surveys answered by parents of children with AS/HFA. This survey was completed by parents of the content of “obsessions’ or fascinations in a sample of 92 children with ASDs with a mean age of 11.2 years and a male-female ratio of a 5 to 1. Their comparison group consisted of 33 children with Tourette syndrome, 7 of whom had comorbid ADHD and 9 had OCD. The focus of the study was on the content of such obsessions. Thus, the subjects of obsessions were coded in terms of 15 categories: physics, mathematics, biology, psychology, language taxonomy, attachments to specific objects, crafts, routines, memorization of facts, food-related activities, people, sports or games, television or video and sensory phenomena. Individuals with ASD showed more obsessions in the realm of physics (machines, vehicles, computers, astronomy) and less in the realm of psychology (imagination,

relationships, gossip, desires, beliefs) than the group with Tourette syndrome, thus corroborating the authors' main hypothesis that the groups would differ in terms of a more pronounced fascination with "folk physics" relative to "folk psychology" in individuals with ASD. The group with ASD however, showed "obsessions" at varying degrees, in most of the categories coded by the investigators. Although a fascination with physics was shown by 84% of their sample, they also had fascination with topic related to biology (38%) such as plants, animals, and nature; math (35%); taxonomy (73%) such as sorting, categorizing, and lists; TV/Video (64%), among others. However, it was surprising that individuals with Tourette syndrome also showed obsessions (although to a lesser degree) in physics, in taxonomy, and had in fact significantly greater fascination with sensory phenomena (91%) relative to individuals with ASD (63%). The emphasis of this study was on the subject matter of the fascination exhibited by these individuals, and there was no attempt to more systematically address the possibility that a child's topic of interest could be scored in several of the categories allowing for overlapping.

Integration of Special Interests

The next two studies show how to take this new information and apply strategies in helping students with special interests incorporate these interests as strengths in learning. Winter-Messiers (2007) addressed the question of what are the origins and development of special interests in children and youth with AS and how can these special interest areas (SIAs) be integrated most effectively into school and home. These questions were analyzed through literary review and through a qualitative exploratory study performed with interviews and parent surveys. Researchers were part of the Project PASS (Preparing Autism Specialists for Schools) and the author of this article.

Participants had to have a formal diagnosis of AS, have an IEP and be enrolled in ESY (extended school year) program in the Pacific Northwest.

Two instruments were designed as data collection tools. The first was a 14-item set of interview questions, with clarifying questions to use as needed. Clarifying questions also served as alternative wording for older participants. The second instrument was a 40-item written survey for caregivers. Winter-Messiers states, “The research team used a sequence of tasks to guide the data analysis process: (a) transcribing all interviews, (b) developing code themes, (c) coding the transcripts, (d) grouping the coded text into subcodes, (e) organizing subcoded text into brief paraphrased statements on each major theme, (f) searching parent surveys to find relevant citations, (g) identifying supporting quotations of children and youth to add to memos, and (h) identifying theories that emerged from the evidence” (p. 143). More than 400 hours were spent transcribing the interviews producing a 226-page document. Table 1 listed the testing tool along with how it was used in this study. Triangulation was used with the recorded interview, field notes on participant, and parent survey.

Thirty letters went out to parents who met criteria; 26 agreed, representing a response rate of 88%. Twenty-four of the children agreed to be interviewed—a response rate of 92%. Twenty-one participants were male and three were female. Twenty-two children were European American and two were Native American/Alaskan. Participants were between 7 and 21 years of age. One of the females had to drop out because she did not have a diagnosis of AS. Out of the 30 letters to parents asking for surveys, 18 returned their surveys, a response rate of 60%. Winter-Messiers (2007) found, “For the purposes of this study, SIA were defined as those passions that capture the mind, heart,

time, and attention of individuals with AS, providing the lens through which they viewed the world” (p. 142). It was also discussed that SIA’s helped the AS child cope engaging with the world by aiding their disadvantages.

There were 23 special interest area’s discovered and these were placed in 8 general themes: transportation, music, animals, sports, video games, motion pictures, woodworking, and Art. Winter-Messiers (2007) argue, “SIA –related themes were grouped into the following categories: content, self-image, social skills, emotions, communication, fine-motor and sensory skills, parents, and skill development. Using these themes, three principal theories concerning the participating children with AS emerged” (p. 144). Half of the AS children recognized reading as their favorite information gathering when researching their SIA. One recognized game playing not only as an escape from reality but also a way for learning other skills, skills he stated he couldn’t learn in normal life. SIA’s can be used as a self-calming agent for behavior (an example would be a stuffed frog if frogs were the topic of interest); this item could be used during a melt down during school. Winter-Messiers (2007) report, “With little additional effort, SIA can be integrated into all core academic areas, including English, reading, writing, spelling, math, science, speech, and history” (p. 149). An example of how to incorporate this strategy was given.

What a novel idea and so simplistic, why not use the strengths of the individual and play to them? This strategy can be used in all subject matter dealing with the AS or HFA child. It is interesting to note that a SIA should not be integrated into every academic assignment yet what a motivator to learn skills and to complete assignments. It was interesting reading about all the safeguards they did with this study because Winter-

Messiers (2007) did not use qualitative software for coding. It was amazing to view the seventeen validity demonstration techniques used in this study and the corresponding applications. Triangulation was explained completely and concisely. Because this study was done via a qualitative autism research class designed to teach them to identify a research question, design a study, organize and conduct action research, analyze data, and build evidence-based theories; it was easy to learn all of these core subjects along with the graduate students in the PASS program.

The strengths the article mentions are a relatively large sample from a variety of school districts, high response rates from parents and participants and their enjoyment of quality interactions with participants. The study was limited in interviews (one only) by the school districts' institutional review board. It was stated that second interviews would have been helpful. Participants may have experienced fatigue but interview couldn't be stopped because there could be no follow-up interview. Interviews were sanctioned to 20 to 25 minutes long; no longer. The female population was small but due to boys being genetically more prone to AS and autism than girls, this would always be the case. The inclusion of more participants from diverse ethnic and SES backgrounds might have affected the results of this study.

As with other studies, the study opens up with review of AS symptoms through prior literacy and research. Strategies were given on how to service this population fully within a public mainstream setting. Reoccurring authors are noticed in reference to this study, Attwood (2003), Frith (1991), and Hans Asperger (1944). Coping mechanisms noticed by researchers that AS children use to hide or mask their differences or to survive

amongst others. The need for strategies to be in place in offering equality and excellence to this population of students is reiterated.

There are strategies that will help AS and HFA children to succeed in school and constant research and awareness will help prepare a highly qualified teacher to serve this special population of children.

In the last research on special interests, Winter-Messiers, Herr, Wood Brooks, Gates, Houston and Tingstad (2007) looks at strategies that special interest area can be used in promoting the educational well-being of the child labeled with AS.

SIA's Used as Behavior Modification

When talking about their SIA's, some of the participants' AS typical impairments were diminished. When the topic shifted to their special interests, the whole tenor of the conversation changed. Participants used more appropriate social interaction, verbal language, and body language, and their communication skills improved when discussing their SIA's. When engaged in SIAs, children with AS can communicate effectively, using fluent speech, sophisticated vocabulary, and good conversations skills. Participants referred to their SIA's as future career choices. Engaging in special interests seemed to mitigate any sensory stressors in the environment. Children with AS used their passion for involvement in their SIAs to persevere in difficult fine-motor activities. Executive function (EF) deficit include difficulties with organizing, planning, sequencing tasks, regulating emotional awareness, setting goals, initiating plans, screening and prioritizing stimuli, managing transitions, and monitoring personal behavior. When students with AS were engaged in the special interests, their EF deficit seemed to disappear.

Many adaptations were recognized as strategies in helping children with AS succeed in school. Winter-Messiers et al., (2007) argues, “The purpose of these adaptations is to teach a student with AS the concepts and skills outlined by his or her school’s core curriculum within a context that allows him or her to accurately represent his or her knowledge and skills” (p. 74). The adaptation for a suggestion in math, for example, is writing the SIA topic into story problems or placing stickers on a worksheet corresponding with a special interest. The article states that not every assignment needs SIA adaptation but promises of future assignment can get students to focus on the assignment at hand.

A third option for applying SIA’s in the classroom is to allow the student with AS to use his or her preferred method of researching information on his SIA to learn about nonpreferred classroom topics. Winter-Messiers et al. (2007) write, “Fifty percent of the participants in the current study indicated that reading books was their preferred strategy for learning about their SIA” (p. 75). Valuable vocation skills can be learned by creating a school-based job related to the student’s SIA.

This study contained a mass of information incorporating SIA’s when working with children on the autism spectrum. This study includes two tables on how to incorporate SIAs into several academic subjects: reading, writing, spelling, history, speech, math, science, art and Internet skills. The suggestions found in this article truly pertain to this document.

The last research article for special interests hints at the problems in the realm of speech for children diagnosed with AS/HFA. The next subheading investigates the exact

deficiencies in speech for these children and the varied strategies that research has uncovered.

Strategies for Speech

The American Psychiatric Association and the World Health Organization refer to language skills in their criteria for children with AS/HFA, but state that there is no clinically significant general delay in language. Unfortunately, this may be interpreted as an absence of any unusual qualities in language skills. By the age of five, the child with AS/HFA does not have a general delay in language, but does have problems with specific language skills. The significance is in the area of pragmatics or the Art of Conversation. In this section of chapter three, four research cases portray the need for scaffolding in the area of speech. The first three studies pertain to establishing a need for intervention through scientific establishment of a problem. The last study looks at strategies in addressing this need. The first quantitative design develops a scale and nine categories of problems with speech with children who are diagnosed with AS/HFA: Villiers, Fine, Ginsber, Vaccarella and Szatmari (2007). Next, is a study by Louskusa, Leinonen, Kuuskko, Jussila, Marja-Leena, Ryder, Ebeling and Moilanen (2007) which looks at the use of context in pragmatic language comprehension. The third research study by Saalasti, Lepisto, Toppila, Kujala, Laakso, Wendt and Jansson-Verkasalo (2008) looks at poorer performance due to difficulties in language development. Lastly, Sansoti and Powell-Smith (2008) present a few strategies to answer the need of difficulties in language development for the child diagnosed with AS/HFA.

New Qualitative Qualification in Speech

Before 2007, there was never a pragmatic scale to rate difficulties for children with AS/HFA—only qualitative studies had been performed till this time. Villiers et al. used qualitative interviewing and scientific data in creating a qualitative scale to be used in diagnosing language problems for children with AS/HFA. The question they set out to answer was what scale would develop using quantitative research on conversation with children on the ASD spectrum?

Four psychometric tests were used to determine qualification of participants: first, the test of language development-2 (TOLD-2) by Newcomer and Hammill, 1988. This test measured grammatical comprehension and usage. Second, McCarthy oral vocabulary test (McCarthy, 1972) was used to assess children's abilities in expressive language. Next, the Arthur adaptation of the Leiter performance scales (Levine, 1986) was used to measure nonverbal problem solving. Lastly, the Stanford-Binet intelligence scale, 4th edition (Thorndike, Hagen & Sattler, 1986) was used to measure overall cognitive development in four domains: verbal reasoning, quantitative reasoning, abstract/visual reasoning and short-term memory skill.

Children diagnosed with ASD were audio taped having semi-structured conversations with a research technician for 10 minutes per setting. The same research technician conversing with the participants was blind to the purposes and objective of the study. Conversations took place in the child's home and covered topics of school, hobbies, and family life.

The codes for the human analysis of transcripts (CHAT) transcription and coding format of the child language data exchange system (CHILDES) was used for analysis

(MacWhinney, 1995). A second transcriber checked the transcript. A coding scheme was developed to measure types of conversational breakdown based on an initial analysis of 23-recorded conversations using a broad systemic-functioning linguistic framework. The group of 46 consisted of children: age range 124-164 months, mean 142 months, Leiter IQ ranged from 48-123, mean 82. Thirty-two had a diagnosis of HFA while fourteen were diagnosed with AS. The age and IQs of the two groups did not differ significantly.

Nine features were first defined, and five subscales were derived from these to simplify the framework. The nine topics were formal intonation, topic switching, terseness, pedantic speech, perseveration, pausing, disengagement from verbal context, attention to outside environment, and atypical stress selection. The five final categories were atypical intonation, semantic drift, terseness, pedantic and perseveration.

There were weak but significant correlations between atypical intonation and terseness ($r = .35$, $P < .02$), as well as between pedantic speech and perseveration ($r = .36$, $P < .01$). Generally speaking however, there was little or no correlation between the five scales. The language scale terse was also significantly but marginally correlated with the Leiter IQ ($r = -0.33$, $P = .04$). The higher the IQ, the lower the score was on this scale. None of the five subscales was correlated with variation in age in this sample.

It is interesting to note that the author thought the goal was for a quantitative scale, realized that a more thorough qualitative scale could have been achieved by using the original nine categories. Overall, this study is only informative in the education of a person working with children on the ASD to be familiar with the terminology and deficits of language in this population.

The strength of this scale is that it was based on a careful microanalytic approach and that it was rated directly from the data (no middle person to skew results). The use of an inter-rater for reliability was strength to this study. The use of the original nine categories verses the compactness of the five scale was seen as a weakness in explaining correlations. This was a preliminary scale with a relatively small sample size without a control group. And lastly, a standardized script was not used questioning the fact of quantitative vs. qualitative interpretation.

The problem is the use of language in a social context. This is very evident when involved in conversation with someone with AS/HFA. During such conversations one becomes aware of several noticeable errors. The child may start the interaction with a comment irrelevant to the situation or by breaking the social or cultural codes. For example, the child may approach a stranger in the supermarket, their first utterance being, “Do you own a light saver?”, and then proceed to give a monologue demonstrating encyclopedic knowledge of Star War weapons. Once the conversation has begun there seems to be no ‘off switch’ and only ends when the child’s predetermined and practiced ‘script’ is completed. Sometimes the parents can predict exactly what the child is going to say next. The child appears oblivious of their effect on the listener, even if the listener shows distinct signs of embarrassment or desire to end the interaction. One has the impression that the child is not listening to you, or does not know how to incorporate your comments, feelings or knowledge in their dialogue.

The following research by Louskusa, Leinonen, Kuusikko, Jussila, Mattila, Ryder, Ebeling and Moilanen (2007) is a quantitative research design to identify if

children with AS/HFA can use context when answering questions and giving explanations for their correct answers.

Using Context within Conversation

In this study, diagnoses of these children were assigned by using the Autism Diagnostic Interview-Revised, ADI-R, Lord, Rutter and LeCouter (1994) to acquire developmental and symptom history from the child's parents, and by using the Autism Diagnostic Observation Schedule ADOS, Lord, Rutter, DiLavore and Risi (2000) to observe the child's behavior and communication skills. After careful investigations the diagnoses were defined by using ICD-10 criteria based on patient records, ADI-R and ADOS.

The methodology in this study was based on relevance theory and the tasks were constructed to investigate contextual comprehension abilities. Relevance theory aims to explain how the hearer interprets speaker's meaning on the basis of context. These interpretations are not as likely to come into a hearers' mind, because comprehension is driven by a search for relevance, and therefore the hearer utilizes only the relevant contextual information when interpreting the meaning of a conversation. This methodology was used with 210 normally developed 3- to 9-year-old Finnish children with the 8- to 9-year-olds achieving mastery in pragmatics. The material contained questions with varying contextual demands as predicted by relevance theory. There were 9 reference assignments, 9 enrichment, 9 basic implicative, 9 routine, and 5 feeling questions in the material. Answer score was calculated by adding up the child's correct answers in all question types (total of 41 questions).

In addition to these questions, the children were asked to give explanations for their correct answers to routine questions, basic implicative questions, and feeling questions so that it would be possible to see if the children were aware of how they derived answers from the context. There were 22 questions (9 routine, 8 basic implicative, and 5 feeling) where a follow-up question was presented if a correct answer was given. The explanation score was calculated by adding up the number of the child's total correct explanations.

The questions were given in a quiet room with the interviewer sitting directly across from the child so that the child could look at the researcher. The test materials were presented to the table directly in front of the child. The children were told that the researcher would ask some questions about pictures and stories, and they were instructed to listen carefully, to what the researchers say or read to them.

In some cases a child gave both a correct and incorrect answer, and in these cases the answer was scored as being correct. The reliability of scoring was confirmed by calculating interrater reliability. Group differences in different answer and explanation types were calculated with Mann-Whitney U-test by ranks. The hypothesis for this study was for the control group and the older HFA/AS to do better than the younger HFA/AS group, therefore only one-tailed tests in all of the comparisons involved the younger AS/HFA group. It was not possible to know whether the older HFA/AS group would perform less well than the control group, and therefore two-tailed test were used in these comparisons.

All children in this study came from comparable socioeconomic backgrounds, they were in mainstream schools in Finland, and they had Finnish as the first language. A

total of 39 children took place in the study (27 children with AS and 12 children with HFA). The children were broken into two groups: Younger AS/HFA with a mean age of 8.6, 12 boys and 4 girls and the Older AS/HFA with a mean age of 11.2, 16 boys and 7 girls. The group of control children consisted of 23 randomly selected healthy 7- to 9-year-old children from two mainstream schools in Oulu, Finland. The age range of the control group was chosen to be equal with the younger AS/HFA. This way the study verified that the control children did not have more experiences than the children with AS or HFA, which could affect their answers to pragmatic questions.

Pragmatic answer scores for the control-group were higher when compared to the younger AS/HFA group ($t(37) = 4.7, p < 0.001$), and the older AS/HFA group ($t(44) = 2.4, p = 0.010$). The effect of age on performance was significant, since the answer scores of the older AS/HFA group were higher than the answer scores of the younger AS/HFA group, ($t(37) = 2.3, p = 0.014$). Explanation scores of the control children were higher than explanation scores of the younger AS/HFA group ($t(37) = 5.9, p < 0.001$) or explanation scores of the older AS/HFA group ($t(44) = 5.03, p < 0.001$). In this study the older AS/HFA group performed better than the younger AS/HFA group when answering contextually complete questions. This suggests that difficulties in context use decrease with the progressing development.

Reference assignment questions were not a problem for any of the groups. The younger AS/HFA group had some difficulties with enrichment questions. Both the younger and older AS/HFA group had some difficulties with basic implicative questions, which were contextually the most complex question type and demanded an ability to combine the information given with world knowledge via deduction. It was also

discovered that difficulties with routine questions, suggesting that children with AS or HFA do not utilize learned schemas as efficiently as normal developing children. In this study children with AS or HFA have difficulties in providing explanations for their answers, so they were not as conscious of the understanding process as normally developing children. It is important to note that these children indicated inefficiency but not an inability to use context in comprehension.

Knowing the child with AS/HFA allows others to help the child understand his/her surroundings better. Miscommunication can result in peer discrimination and is often one of the reasons for the social problems seen in these individuals. As noted by the study, these children can utilize context within pragmatics but it usually develops critically at a later age. With this said, it is important to pay attention to the developmental stages of children with AS/HFA or they may be missed, and therefore pragmatic context use may remain lacking or fragile.

One strength of this study was the use of a pediatrician or a psychologist both trained in the use of the ADI-R and the ADOS when interviewing parents and children; having professionals on board during criterion diagnosis is essential for liability. Another strength is the use of an interrater for the reliability of scoring. The intra class correlation coefficient between two raters and a sample of 12 children was high at 0.996. The last strength of this study was the inclusion of the questions asked of the children with corresponding sample correct and incorrect answers. This allows for the reader to get a direct picture of the strengths and weaknesses of sample children with AS/HFA.

One weakness mentioned in the study was the need for two more groups showing increasing age for children with AS/HFA. Hypothesis was made for increasing

progression of answering questions correctly. It would be interesting to study whether these difficulties in giving explanations continue, indicating an abnormal pattern or whether there is a similar pattern of delay as in the development of the pragmatic answers. To discover what developmental stages produce greater results of using contextual information in pragmatics, longitudinal studies are needed to follow up on the developmental changes in the pragmatic language comprehension of children with AS or HFA. Lastly, this study was only quantitative yet the need for qualitative coding was seen in the types of incorrect answers given to reveal more about the qualitative differences and similarities in answer strategies between normally developing children and children with AS/HFA.

A characteristic of all young children is to vocalize their thoughts as they play alone or with others. By the time they start school they have learned to keep their thoughts to themselves. However, self-talk was considered by some members of the public as a sign of madness. Children with AS/HFA may continue to vocalize their thoughts many years after one would expect their thoughts to be silent. This often disrupts the attention of other children in the class, or causes teasing when they talk to themselves while alone in the playground. The child may also fail to hear the instruction of the teacher because they were too engrossed in their personal conversation. The following quantitative research study addresses the difficulties in language development and how that may or may not manifest poorer performance in the selected measures for the AS/HFA population.

Speech Deficiencies Effecting School Performance

The list of criteria for Saalasti, Lepisto, Toppila, Kujala, Laakso, Wendt, Wendt and Jansson-Verkasalo (2008) included children recruited from the Helsinki University Central Hospital (HUCH) and the Helsinki Asperger Center at the private medical center Dextra. Only children who had met the ICD-10 (WHO 1993) criteria for AS, and had acquired language within the normal milestones (words at the age of 1 year and sentences at the age of 2 years) were included in the study. All of the children had to have a full scale IQ of 85 or above, be on no medication, have no hearing difficulties, no learning disabilities, no depression, and no other diagnosed neuropsychiatric conditions.

The method of testing involved a 1 to 2 hour battery of language tests with a break mid-way for the participants. Vocabulary and naming abilities were measured with the Finnish version (Laine et al., 1997) of the Boston Naming Test, in which the children were asked to name pictures. If they were unable to name them, they were given semantic and finally phonetic prompts to help the word finding process. The Rapid Automated Naming Test (Ahonen et al., 1999) was conducted to measure the word finding process in more detail. In this speed naming task children were asked to name colors and mixed symbols. The two word finding tests were selected because of their relevance to speech comprehension and semantic processing. The Sentence Repetition subtests measure the linguistic short-term memory. Verbal Fluency evaluates verbal expression, fluency and inventiveness. In the Word Fluency task children are asked to say as many words as possible in a certain semantic or phonetic category in one minute. The Non-word Repetition task measures children's ability to analyze and reproduce phonological knowledge. The Phonological Processing subtest ascertains children's ability to perceive

word structure. In this test children are asked to change the syllable or phoneme structure of different words. Subtest of Comprehension of Instruction evaluates verbal comprehension and auditory working memory. Children are given verbal instructions, according to which they have to touch colored geometric figures. The Comprehension of Sentences subtest evaluates knowledge of syntactic structures of language. In this subtest children are required to answer complex questions.

The participants of the study were 22 children with AS; there were 16 boys and 6 girls. The mean age of this group was 8.9 years with a range from 7-to 10-years of age. The participants of the control group were 23 typically developing children; 17 boys and 6 girls. The mean age of this group was 9.0 years with a range of 7.6-years to 10.6-years of age.

Significant differences between the children with AS and their controls were found in the Comprehension of Instructions subtest. Children with AS scored significantly lower than their control. No other significant differences were found on the language measures used in this study. The results showed that children with AS had more difficulties following verbal instructions when compared with typically developing children as suggested by their significantly lower scores. A failure to use language as inner speech to plan and direct their behavior is seen as a weakness according to the test scores of children with AS. Consequently, it is possible that difficulty in using inner speech in directing performance contributed to the performance on the subtests of Comprehension of Instructions as well as in Phonological Processing.

The tendency to focus on details and not to integrate information coherently was proven with test scores of this data. In this study, children had to be able to disengage

from details of the instructions heard and perform on the basis of the whole sentence. It is possible that children with AS paid too much attention to single words, due to which meaning of the whole sentence and was not comprehended in the control group. Thus, the meaning of the instruction heard was to be integrated with an action for which coherent linguistic processing is required.

The strengths of this study was the group size was significant, the testing was controlled and the control group matched each of the requirements in the AS group. The weakness of this study was that the AS group was recruited from the Helsinki University Central Hospital, and the Helsinki Asperger Center at the private medical Center Dexta; this skew the comparison to public education.

The findings of this research does speak clearly for the need of modifications and scaffolding in the realm of language abilities on the IEP of children with AS. Another strategy that could be inferred from the above data is the need for children with AS to seek clarification and use a check-in system where any type of directions is involved. Following is the last study that refers to other strategies due to testing when working with children with AS/HFA.

Communication Skills Enhanced

Sansosti and Powell-Smith (2008) looked at using computer-presented social stories and video models to increase the communication skills of children with AS/HFA. The research design used was a qualitative multiple-baseline across-participants design. Participants were selected from an established educational program for students with ASD located in a public elementary school in West Central Florida. For inclusion in this study, participants (a) had a current diagnosis of autism, AS, or PDD-NOS that was

provided by an outside evaluator using the *DSM-IV-TR*; American Psychiatric Associations, 2000; (b) displayed current levels of cognitive functioning in the low-average to above-average range on a published standardized measure (*Reynolds Intellectual Assessment Scales*); (c) demonstrated the ability to communicate functionally as evidenced by a standardized language instrument (*CELF-3*); or had no communication concerns and (d) were included in the general education curriculum for 100% of the school day. In this study there were three boys ages 6 years 6 months to 10 years 6 months with a mean of 8 years, 6 months.

Computer-presented Social Stories and video models were implemented and direct observations of the participants' identified target behaviors were collected two times per week during unstructured school activities (e.g., recess). The effects of the computer-presented social stories and video models were very positive. Improvement in social communication skills (e.g., greeting behaviors, joining in, sharing, initiating and maintaining conversations) rose on an average of 70% between baseline and follow-up. A multiple-baseline was used to strengthen internal validity. Procedural fidelity occurred through a checklist that the teacher, para, or special education teacher filled out after intervention was done. Trained graduate students performed observation of target behavior. During recess time, students would tally the amount of times social skill target behaviors occurred with peers on the playground.

The strengths of this article is the length the researchers went in training their data collectors, the stringent measures of qualifying participants, their control over variables, and their dependent measures (how they determined what social skills they were targeting). The detailed explanation in creating the baseline on what values the observer

was looking for and the fact that intervention was needed due to working with an element of human nature. This experiment even saw the need to create data on a normal developing mean age subject so that compare and contrast of social skills could be seen. Implication for practice within a general education setting was also strength to this research.

Only three test subjects were performed in this qualitative study; which may not be sufficient to base future academic practices. Computer social stories were combined with computer video modeling therefore one practice could have had the effects without the other yet there is no way of determining this in this research. The computer is an enticement with this population and teachers need to teach to their interest fixations yet a population that is already having trouble with social skills may find the computer as a crutch over correspondence with people. If time permitted, copied social stories via programming and Internet programming so that the stories could be read with a peer would be more beneficial. This variation would allow for human interaction.

The follow-up data to the skills required only occurred during a two-week span. After phasing out of intervention (social stories and video modeling techniques), data was performed on each child (tallying of social skill performance at recess with peer groups), no decline in social skills was noticed. Was there social skill performance two months later, six months later or possibly a year later? Did this intervention instill permanent markers for social skill interaction? No sufficient follow-up data is definitely a weakness to this study.

Social stories have shown to be useful while working with children with AS and/or HFA. Personalizing the skill you are trying to work on and placing it in a familiar

setting plus rereading when the skill needs reinforcement are all positive strategies in communication skill enhancement.

Given the weaknesses of this study, monitoring the time spent on the computer via curriculum study time would change the social stories to either the para reading the stories to the child or the child if capable reading the stories to a significant other. A complete year follow-up strategy with the first few participants before implementing this procedure in a permanent curriculum plan for this population of students would also be recommended.

This study connects with the previous three studies because the focus is similar, it is widely agreed upon with many of the articles that social skill curriculum is needed for both AS and HFA. The findings in this particular research study received the highest positive review so far in this genre. The occurrence of combination of social stories and video modeling combined could be the positive influence. The methods in the criteria, the population targeted and layout of experimentation is similar to other articles cited.

The emergence of connections is a reoccurring theme in each journal reading: not enough research has been obtained on this particular population of students. It is hard to compare and contrast because research studies are few and the time span done is within the last five years when geared to this particular group of students. More and more information is being recorded in just this year than the previous five years. In the next category of this chapter, the need for strategies in building stronger social skills for children with AS/HFA will be continued.

Strategies in Social Skills

In Hans Asperger's original papers, he describes how the child does not join with others and may even panic if forced to participate in a group (Asperger, 1991). The young child with AS does not seem motivated or know how to play with other children of their age so that they are 'in tune' with the social activity. The next two qualitative research studies, *AS and the Children who 'Don't Quite Fit In'* by Portway and Johnson (2003) and *Do You Know I Have AS?* by Johnson and Portway (2005) look at the phenomenon of children on the ASD spectrum fitting in with society.

Growing Up with Asperger's Syndrome

In Portway and Johnson's (2003) study, the authors ask the question: What was childhood like growing up Asperger's? A qualitative design was chosen and the methods used were informed by grounded theory methodology which enables the identification of common themes while also encompassing and contending with the natural difference that exist by virtue of people's individualities: different experiences, circumstances and personalities. This project grew out of a three-year small autism support group. All interviewees either were diagnosed with Asperger's or was a parent of a child diagnosed with AS.

Interviews were taken where it was convenient for the participant. All were to be recorded but some were not due to participant request. Tape-recorded interviews were transcribed and all data entered into the QSR software for storage and management of both the raw and coded data. Ethics approval was granted before the study but problems still arose due to language barriers. Because of the three-year study monthly steering group meetings had been formed and with their help and that of academic supervision

support steering of the project occurred. Participants comprised of eighteen adults diagnosed with AS and 16 of their parents.

Portway and Johnson (2003) state, “The overall core finding is that children with Asperger Syndrome do not ‘quite fit in’ to many aspects of life including babyhood, developmental patterns, schooling, expectations, friendships, and family life and society” (p. 437) Four main categories or themes developed: early differences in infancy, ‘little loners’, ‘in school but not of school’, and ‘feeling different and unhappiness’.

Studies such as these need to exist and bring brought to the fore light. Too many children with AS/HFA slip through the cracks in our system both in education and society. Too many wander our streets with no direction or hope for their purpose in life. The stories in this study are powerful accounts of children who from an early age ‘looked normal, talked normal’ but never seemed to ‘quite fit in’. They went through school and moved into adulthood feeling and being treated as ‘different’ with nobody seemingly understanding why. Many were expelled from school while others were excluded by their peers within school; thus leaving them feeling like ‘outsiders looking in’.

Information gathered from a three-year study with a larger group of individuals, eighteen participants with AS/HFA and their parents lent strength to this study. The use of qualitative software for validity and coding represented the validity of this study. Additional strengths included refreshing first person accounts and wonderful references to some very recognizable authors in this field. Weaknesses noticed were the disappointment of sample interview scripts and sample questions asked of the participants. Interviews took place in inconsistent places and haphazardly. Some interviews were recorded while others were not. Other weaknesses included very little

antidotal evidence, no medical records in criteria mentioned nor professional diagnosis mentioned.

There is a definite need for early detection and services for these children as those with AS and HFA are perceived as living outside of society's rules. They run the risk of depression and possibly hurting themselves or others. Strategies are needed to help this population learn positive coping mechanisms to live a happy and fulfilling life. The next research study looks at these problems.

Risks with Social Deficits

In *Risks of a Non-Obvious Disability*, Johnson and Portway (2005) look at the risks involved for marginally different children with AS/HFA and how this affects the decision of being diagnosed or not.

Qualitative criterion sampling using methods of inquiry was the research design for this study. Johnson and Portway (2005) state, "Due to the small number of adults that were known to be diagnosed with Asperger's syndrome at the time of data collection (1998-2000), participants known to three local autism charities and a local autism diagnostic unit for children were purposively recruited by contacting all families with a young adult (aged 18-35) with Asperger's syndrome" (p. 75). Interviews were tape-recorded and/or noted, transcribed and analyzed using constant comparative analysis. The identified risks associated with marginal normality were sub-categorized into everyday and long-term risk.

Participants were given and received a diagnosis of Asperger's syndrome and agreed to be interviewed. Eighteen sets of parents (one or both) and eighteen young adults were interviewed, and participants were asked to tell their life stories in their own

words (No questions were formulated or asked). Incidents across the data sets were compared and contrasted and became organized around a category of not quite fitting. Other common themes pulled from life stories were risks to everyday and long term quality of life for AS individuals and also the lack of intervention for this population during childhood and adulthood.

Twenty-five families applied, four female representatives and twenty-one male participants. Johnson and Portway (2005) state, “This sample is reflective that AS is more commonly diagnosed in males than females although this was an unintentional sampling effect since we had simply contacted all those known to have AS in a local area” (p. 75). Three sets of parents felt their adult child was coping with too much already so they opted out of the survey and one participant lived too far away and two were unaware of their diagnosis therefore the survey group dwindled to 18 young adults between the ages of 18-35.

Everyday risks: undiagnosed AS found children being misunderstood, bullied, isolated, lonely and few if no friends. The purpose of school was a mystery and the confusion of the many unwritten rules and codes of conduct formed many problems. When undiagnosed, teachers didn’t realize the implication of sensory problems; participants reported having unusual perception to sounds in the school setting. Problems arose due to AS only recognizing literal meanings and explicit rules and having a great difficulty with hidden or implicit social conventions. If a teacher stated, “get out your book and turn to page 10,” other children would see problems to be answered on this page and get to work; an AS child would *literally* do as told, open the book and turn to page ten and wait and wait and wait. Bullying was another problem for the AS child,

forms of ridicule, teasing, name calling, shoving and pulling, exploitation, and being ostracized were many experiences of the participants during school. Isolation and loneliness were two distinct themes to everyday risks experienced by the AS child. Some wanted friendships to the extreme while others shied away because relationships were so difficult that being alone became a form of solace. Most children with AS state that they prefer to work in one-on-one friendships to groups.

Longer term risks: the underlying core disability of AS is that restricts both their psychological and social resources for coping, as a result of rigid inflexible thought processes, dislike of change, difficulties in social interaction and lack of supportive friendship health matters occur—depression, anxiety, obsessions and expressions of suicide. One interviewee sadly stated that the more severe autism was better because you are unaware that you are different. One stated that there is a different soul within him, and he said that he was a mess within himself. Portway and Johnson (2005) argue, “Underachievement at school and in employment amongst participants was apparently high” (p. 78). They continue to explain, “In most cases, parents wanted their child to be able to gain greater independence, but there just wasn’t any service available to help or guide them” (p. 79). Today there are still no such services and according to Governor Gregoire none will be coming because of the budget cuts. No new programs will be initiated. For the AS and the HFA population this means no help available because none has ever existed.

To label or not to label: labeling a child is a risk in itself, the child becomes the “other” and can be discriminated against not only in school but for future employment. Sometimes the label takes on a personality of its own and the individual is not seen for

who they are. Yet research shows that the sooner AS and intervention is detected, the better for the individual. The sooner training begins to offset the effects of an impaired ToM system the better new synaptic gaps can be formed instead of incorrect behavior patterns.

Letting participants recant their life story can be strength in that no leading questions skewed results. Having no interview removes any bias from human interface. Having both parent and child to verify life experiences lends credit to the study. The study also discussed comparable risks for other people who were marginally different whether as a result of disability, mental health problems or simply personality; these generalizations could be made. Prolonged social engagement was used in these two years of data collection. Persistent observation was used to distinguish themes and patterns in two distinct risk factors. Peer debriefing occurred because of constant comparative analysis; therefore triangulation was used in this study.

Weaknesses could be seen as a total unorganized, unstructured study with no protocol to a constructed interview process, any questions developed, and a haphazard way of interviewing all leading to negative validity. Because of the lack of organization the following three strategies were not employed: negative case analysis, progressive subjectivity and member checks. Criteria was very lax in that no verification of testing occurred to verify these participants truly contained a diagnosis of Asperger's and not some other syndrome. Prior records from school would have been a nice negative cases analysis to counter or prove allegations. This study differs in that grown AS participants were interviewed and their perspectives of growing up with AS was reviewed; problems with memory can affect this type of study.

Research is needed for this population. Because of this being a new diagnosis, very few studies of grown AS participants are available to verify the causal relationship of being labeled or not. The following two research studies address these issues, the first with defining friendship for this group and the second recommending a strategy in aiding social skills needed by children with AS/HFA.

The Definition of Friendship

Carrington, Templeton and Papinczak (2003) look at the perceptions that adolescents with AS believe about friendship. This qualitative multiple-case study approach used interviews to compare and contrast in a very insightful literary review. To be included in this study, students had to be enrolled in public education, mainstreamed and have a diagnosis of AS or HFA through a psychiatrist and through documented testing.

The method of this study began with an inductive approach to data analysis resulting in a number of broad themes in the data. Carrington et al., (2003) states, "Semi-structured interviews were used to collect data regarding students' understanding of friendships". (p. 212) Interviews were 20 to 40 minutes long and were audiotaped for later transcription. Carrington et al., quotes, "The first and second authors interviewed students over a period of 3 weeks". (p. 212) This study used a qualitative software device to allow for a more systematic and complete analysis of interview transcripts. The software stores, decodes, looks for patterns and then came up with five broad categories for the research team to discuss and analyze.

Participants in the study included four teenage boys and one girl, ages 14 to 17 with a mean of 15.5; all adolescents were diagnosed with Asperger Syndrome and all were mainstreamed within public education.

Interviewers discovered difficulty with participants understanding language in question format, therefore, questions were put in declarative form with room for the student to complete. Carrington et al., (2003) felt this supported Myles and Simpson's (1998) research "findings that individuals with AS may have difficulties with information presented orally" (p. 214). It was easier for participants to describe an acquaintance than a friend, which also lent to the above study in that AS do not seem to comprehend the nature and reciprocity of friendships. All participants referred to rigidity with rules, friendships could dissolve if even minor rules were broken or participants perceived rules of society. During this time of adolescent and identity forming, children look for ways to bend the rules—this causes problems for the child with AS. Professionals who work with this population need to understand their idiosyncrasies and language barriers when conversing or advising them.

There were five broad themes established in this study.

- a. Understanding of concepts or language regarding friendships
- b. Description of what is a friend
- c. Description of what is not a friend
- d. Description of an acquaintance
- e. Using masquerading to cope with social deficits

This research could be used for any child needing social skill training. The interview lends nicely in performing an individual interest inventory where friends are

concerned. In utilizing a tool such as this, a teacher can inadvertently help many marginal students through cognitive reflection about the effects of socialization, what it means to be human and what a good friend looks like, acts like and talks like. Not only are you helping the marginal child be aware of these friendship perspectives that other children take for granted, you are also reminding all children that friendship, tolerance and awareness is needed. The data gathered from the inventory can then be made into individualized personal growth plans for any child in the classroom needing help with social skills.

The strengths of this study were many: first, the question was answered; second, software was used for validity; a criterion was met with test subjects; data collection was controlled in that there were more than one interviewee and these were kept separate from parents who were interviewed; pseudonyms were given to protect participants; and interviews were audio-taped for integrity. Lastly, prior research was presented along with observations.

There were only two weaknesses to this study--though initial subject group was large, it was narrowed to five participants. Generalizations were made to prior research data. Not enough prior data to make generalized statements to.

Social Skills Training

The last study in this section of social skills looks at a strategy used in training for social skills. Bock (2007) introduces us to the impact of social-behavioral learning strategy training on the social interaction skills of four students with AS. This was a quantitative research study with four male students with AS ranging from 9 years 3 months to 10 years 6 months. Average IQ of 100 was noted and the testing for theory of

mind resulted in 91%. Three of the participants were Caucasian and one was Native American.

The list of criteria enlisted middle class families of a rural plains region of the United States. An independent child psychiatrist diagnosed each with AS prior to study participation. Nonverbal IQs fell within normal range, and each met the criteria of DSM-IV-TR 2000. No prescribed medications were taken. For one year prior to the study, each participant received social skills instruction within the Theory of Mind 'mind-reading' intervention model. The control group was selected at random to match in gender and in age.

The special education teachers, four paraeducators and two university students were trained in SODA (Stop, Observe, Deliberate and Act). SODA is a strategy some people use to figure out what to do and say when confused. It is a short story geared to the child and a particular event or environment combined with a teaching script that follows after the student has read the story. An example of this strategy during social studies alerts the child not to be obsessed with nonrelated facts and monopolizing the conversation. The S stands for stop in which the student will look for a place to observe his setting, determine the room arrangement and decide what the routine is. The O stands for observe in which the student will stop any action to observe certain criteria about the assignment, the group actions and what the topic is. The D stands for deliberate in which the student will rehearse what the students want to say and how this may be perceived by the group. The A stands for act in which the student will make a plan on how to act appropriately so that group cooperation will occur. The story will contain ideas for the student to utilize. Each phase contains three questions that the child with AS/HFA will

ask before joining a group. The teaching script occurs after the story is read and the teacher makes sure the student has applied the story, understands it, and has made a plan of action. The student then joins the group and data collection begins.

Data was taken three times a day throughout the study, during cooperative learning activities in social studies, noon recess, and lunch in fourth or fifth grade classes. Maintenance probes occurred once per month for 5 months following completion of intervention activities. The paraeducators and graduate students were blind to the study's purpose to ensure infidelity. They were trained in which social skills were to be tallied; examples included listening to their peer's conversations, while in a cooperative group using skills such as listening, providing on topic insight, and overall cooperation.

The mean percentages of the four boys spent participating in cooperative learning activities in social studies, playing organized sport games at noon recess, and revisiting with peers at lunch during baseline fell at or below 23%. They increased significantly the first day each participated in SODA training. Further, they maintained high performance levels over a 5-month period after they finished SODA training.

Theory of Mind is the ability to attribute mental states—beliefs, intents, desires, pretending, knowledge, etc.-to oneself and others and to understand that others have beliefs, desires and intentions that are different from one's own. This theory parallels Piaget's early stages of egocentrism. In both theories, individuals with Theory of Mind (ToM) impairment would have a hard time seeing things from any other perspective than their own. As you can see an individual trained in ToM will have had training relating to social situations and social skills. According to this article these children experienced this

training yet did not experience any effects until after the SODA training therefore one would wonder if SODA could stand alone, it would be interesting to test this theory.

The strengths of this study was that it was used within a curriculum study to teach cooperative learning skills in an organized play setting, no cueing of participants other than the study was needed. This study lasted six months lending credibility to the strategy. The results were extremely positive and maintained after the study via the probes that were performed.

Weaknesses were that only four participants were studied. These four received prior training in ToM, a requirement of the study; all four were not utilizing their cognitive strategies that they learned through ToM until after receiving this research study in SODA. Due to uncontrolled variables it is hard to determine where the credit of success lies.

The SODA stories seem similar to the social stories used with lower IQ or younger children. This strategy could increase social skills in students diagnosed with AS/HFA. Due to the reading involved, this strategy should not be used below 5th grade and implementing the strategy without ToM training would be interesting to see if the benefits were the same.

Given the weakness of this study, inferred generalizations can be made due to the slightly above IQ criterion used in this study and how that may have leant to the memory needed and the comprehension of this program and may not be suited to other students with AS/HFA in this age bracket. Results would not be seen this high with SODA training only; which means ToM not being performed prior to the study. If trained properly in writing SODA stories, one could write them for different age group abilities.

This study connects with all the other studies because the focus is similar, it is widely agreed upon with many of the articles that social skill curriculum is needed for both children diagnosed with AS or HFA. The findings in this particular research study have been one of the highest positive viewed so far within this genre. In one of the participants it was noted that his procedural knowledge recall extended beyond the study conditions to their classes throughout the school day; It would be interesting to follow this thread in other studies where memory enhancement in students with AS and curriculum subjects are examined.

There is a reoccurring theme in each journal reading; not enough research has been obtained on this particular population of students. It is hard to compare and contrast because research studies are few and the time span done in within the last five years when geared to this particular group of students. Both social skills training and training for speech/language arts mentioned Theory of Mind training to aide both of these categories. In the next section of this chapter, four studies on ToM and the connections they have with children diagnosed with AS/HFA.

Theory of Mind

Theory of Mind is the ability to attribute mental states—beliefs intents, desires, pretending, knowledge, etc.-to oneself and others and to understand that others have beliefs, desires and intentions that are different from one's own. Theory of Mind training programs are designed to teach individuals how to recognize mental states (thoughts, beliefs, desires, intentions, and emotions) in oneself and others, and to be able to make sense of and predict actions. For example, children with AS/HFA may not realize that their comment could cause offence or embarrassment or that an apology would help to

repair the person's feelings. What seems natural for most people (people skills) must be taught to the child with AS/HFA.

In this section of chapter three, four research studies will be presented. The first study by Kaland, Smith and Mortensen (2007) explains what is theory of mind tasks, the need to monitor amount of cognitive time it takes to perform these tasks and what this means to the individual with AS/HFA. Secondly, Kaland, Callensen, Moller-Nielsen, Mortensen and Smith, (2008) show how academic performance is affected due an inefficient ToM. The third study by Beaumont and Sofronoff (2008) introduces us to a New Computerized Advanced Theory of Mind Measure (ATOMIC) used in obtaining the strengths and weaknesses in individuals with AS/HFA so that strategies can be put in place. Finally, Feng, Lo, Tsai and Cartledge (2008) present the effects of a ToM and social skill training strategy that they used with a student with HFA.

Theory of Mind Tasks

Kaland, Smith and Mortensen (2007) looks at the response times of children and adolescents with AS on an advanced test of theory of mind (ToM) by asking is there a difference in efficiency of answering and understanding physical-state inferences in a story context verses mental-state inferences. This quantitative study contains the following criteria in its design: The participants in the AS group were recruited from Kasperskolen in Copenhagen—which is a special school for children and adolescents with Pervasive Developmental Disorders, and from the Center for Autism in Copenhagen. About 40 individuals were potential participants to the study, but only those who the psychiatrists regarded specifically meeting the ICD-10 criteria for AS were included. Each person had been independently diagnosed in clinical settings by an

experienced psychologist. The diagnosis of AS was only given when there was an agreement on the diagnosis between the two diagnosticians working with a particular child.

All the participants in the AS group had been assessed on ADI-R (Lord, Rutter & Le Couteur, 1994) and on ADOS (Lord et al., 1989). The psychologists and psychiatrists had no knowledge of the purpose or the design of the study. Thus, the selection of the participants was as stringent as possible.

After the criteria, there were 21 children and adolescents (age 10-20 years) with AS and a control group of 20 normally developing children and adolescents (age 10-20 years) participated in the study, which was part of a more extensive investigation of AS and cognitive functions.

The test material Stories from Everyday Life comprised 13 short stories about physical events and mental state everyday-life communications, such as Lie, White Lie, Figure of Speech, Misunderstanding, Double Bluff, Irony, Persuasion, Contrary Emotions, Forgetting, Jealousy, Intentions, Empathy and Social Blunders.

The stories were divided into a physical state and a mental state section. The physical elements appeared in the first part of each story and the mental state towards the end. The participants were given maximum three or four stories in each test sessions in order to avoid fatigue or boredom.

The first part of each story described a physical or mechanical event, and a question assessed the participants' ability to make an inference about a physical state when answering. The action of each story ran toward a climax, where a mental-state inference—like a lie, a metaphor, a misunderstanding, etc., was involved. There were 10-

15 questions attached to each story, most of which were control questions (factual questions from the story to ensure the participant had the gist of the story). The response times were recorded and all answers were transcribed by a second experimenter.

Each participant was tested individually in a quiet room by two experimenters, and participants were told that their response times when answering the test questions were recorded. The response times were measured in the same way for all participants. Each of the 13 pairs of stories was read out, about 4-5 stories in each test session. The answers were recorded and written down. A stopwatch was used to record the response time of the participants when answering the justification questions. When incomplete answers were given, the researcher stopped the watch, gave prompts for more clarification and then started timing again once the participant began again with their answer.

There were 7 qualitative tables in this study recording the amount of prompts that were needed in reaching the complete correct answer, the amount of time each answer took, the amount of correct vs. incorrect answers there were and a compare and contrast between control group and variable group, and a compare and contrast between physical- and mental-state inferences.

The children with AS were significantly slower than the typically developing individuals on both types of tasks of the test battery called Stories from Everyday Life. They were especially slow on the mental-state inference task. They also provided less correct responses as compared with the control group. When only the correct answers were recorded (no prompts given), they were still slower than the control group in an average of up to 7 seconds per question. Participants with AS also yielded many context-

inappropriate responses and provided strikingly much irrelevant information in their answers, especially when they were required to make mental-state inferences. On both types of tasks they also needed significantly more prompt questions than the controls group. When answering the questions requiring acknowledgment of mental states, about 20 percent of the answers of the participants in the AS group were very odd or amounted to an “I don’t know” answer. In contrast they more frequently gave correct answers to the physical state inference questions. The authors of this study concluded that persons with AS have a social-cognitive deficit, comprising a problem in understanding mental states in context.

Much discussion completes this study with comparisons to prior testing done in establishing the degree in which people with AS metacognitively makes decisions. At one point Kaland et al., (2007) imply the problem could be conceived of as a general processing deficit, as opposed to a social –specific deficit. Kaland et al., mention that individuals with AS tend to have more advanced written than spoken language skills and that they often prefer to communicate in writing (Frith, 2004), presumably because in this way they avoid the constant battle of having to decode another person’s verbal and nonverbal communication signals.

This study looks at a prior study with Ozonoff et al., (1991) to imply that the response time deficit may partly constitute a performance problem. Individuals with AS may demonstrate some awareness of other minds but fail to apply this knowledge in their reasoning due to constraints on processing due to an executive problem. Regardless of why there was such a remarkable difference in response time, the qualitative analysis of

the present participants with AS show that they solved the cognitive tasks in a different way, as compared with the control group.

They had an unusual tendency to provide longwinded and often irrelevant responses, especially to the mental-state inference test questions. The style of verbal response provided by the participants with AS could be related to the fact that they used more words, and therefore took longer to say them. For example, in the Forget story, where the story character suddenly remember that he has forgotten his money in the bank, one adolescent with AS answered that this poor man ran towards the bank, "... because he starts thinking that he has left 2000 DDK unguarded on a bar in a bank", using 10 seconds to provide his answer. The majority of the control persons simply answered that, "he forgot his money in the bank", typically using less than three seconds to provide their answers. Kaland et al., (2007) believe individuals with HFA/AS use non-mental strategies, or that they are 'hacking out' solutions when solving problems involving the attribution of mental states.

If one is interested in how the brain works or brain related research, this study is a gem to read. It includes four of the stories used in an appendix so you have a firsthand look at what Kaland et al., (2007) used during testing. Examples of responses are also offered to get a feeling of how answers were concocted. Even though this was a complete quantitative study, there were so many other studies referred to in the discussion that it felt like a literature review study combined. The most interesting note, is the theory on individuals with AS 'hacking out' solutions because when given ample time and patience on the listener's part, these individuals usually do have the correct answer, albeit the long

way about it. Mayhap there is a deficit processing problem but it seems that given more practice at it would help not cure the problem but lesson the problem.

The strength of this research is in the qualifying testing done in the criterion to ensure pure results. Using scientific data in the testing format also lends credence to this study. Finally, the research alluded to in the discussion backs up the findings found in this study. There were no weaknesses in this study.

Compare and Contrasting ToM Performance

After discovering exactly what Theory of Mind is, we will now look at how this affects the learning style of individuals with AS/HFA with a study by Kaland, Callesen, Noller-Nielsen, Mortensen and Smith (2008). The first purpose of this quantitative study was to assess the performance of individuals with AS/HFA as compared with matched control persons on the following theory of mind tasks: The Eyes Task, the Strange Stories and the Stories from Everyday Life—the latter two tasks, the responses were timed. The second and main purpose of the study was to assess whether performances on the three tasks were related.

The participants in the AS group were recruited from Kasperskolen in Copenhagen—which is a special school for children and adolescents with Pervasive Developmental Disorders, and from the Center for Autism in Copenhagen. About 40 individuals were potential participants to the study, but only those who the psychiatrists regarded specifically meeting the ICD-10 criteria for AS were included. Experienced psychologist independently diagnosed each person in clinical settings. The diagnosis of AS was only given when there was an agreement on the diagnosis between the two diagnosticians working with a particular child.

All the participants in the AS group had been assessed on ADI-R (Lord, Rutter & Le Couteur, 1994) and on ADOS (Lord et al., 1989). The psychologists and psychiatrists had no knowledge of the purpose or the design of the study. Thus, the selection of the participants was as stringent as possible.

Materials used in the method of this testing: The Eyes Task/ Child Version (Baron-Cohen et al., 2001) and an Adult version (Baron-Cohen et al., 2001). Black and white photos of the eye region were presented: 28/36—child verses adult. Multiple choice format with three foil words were used with each photo. The photos expressed mental states targets like thoughtful, admiring, flirting, bored, interested, arrogant and so forth. The adult and child versions differed in their use of simple or complex mental-states representations. The task was individually administered in a quiet room. In order to control for comprehension, the multiple choice words were viewed first to make sure the participant comprehended the words; if this was not the case, definitions were given then the picture with the choices was seen. All the participants could use as long as they needed and their response times were recorded. The tasks were rated on a 0-1 scale: correct (1 point) and incorrect (0 point).

Materials used in the Strange Stories Task consisted of 24 (12 pairs) of mentalistic vignettes (Happe, 1994). These stories comprised Pretence, Joke, Lie, White Lie, Misunderstanding, Persuasion, Appearance/Reality, Figure of Speech, Irony, Double Bluff, Contrary Emotions, and Forgetting. Correct performance involved identifying accurately the underlying intention behind a character's utterance that was not literally true. The stories were rated on a 0-2 scale as fully correct (2 points), partially correct (1 point), or incorrect (0 point). Responses to each question were taped and written down in

full at the time of the testing. Two persons administered the stories, and subsequently they acted as first raters. A third person, not being involved in the testing process, acted as a second rater. The degree of inter-rater agreement was calculated for each story type.

Materials used in the Stories from Everyday Life consisted of 26 short stories (13 pairs) of different types, divided into set A and B, each set including Lie, White Lie, Figure of speech, Misunderstanding, Double Bluff, Irony, Persuasion, Contrary Emotions, Forgetting, Jealousy, Intentions, Empathy and Social Blunders. The response times when answering the test questions were recorded. The response times were only recorded on one of the two story sets—the B set. The stories were presented in the same way as the vignettes of the Strange Stories task. Prompts were given if an incomplete answer was provided. Correct, partially correct and incorrect responses were rated in the same way as on the Strange Stories. As to the response times; if the answer given was wrong, the watch was stopped, and it was started again when a prompt question had been added.

There were 21 male participants with AS/HFA with a mean age of 15.9 who had a full scale IQ mean of 106.4 (range 81-134) for the test pilot. The control group consisted of 20 males with a mean age of 15.6 who had a full scale IQ mean of 122.7 (range 102-142).

With the child Eye Test there was no significant difference between groups with either incorrect answers or response time. With the adult Eye Test there was some significant difference in both incorrect answers and response time. Two theories reside with this finding, people with AS/HFA tend to be visual learners and with this being a visual representation test their learning style was enhanced though only to a degree. It

seems that the development rate of even the visual learning style was not on cue with the control group's performance. In both the Strange Story Test and The Stories from Everyday Life, there were significant differences in both the correct responses and in the response times.

The correlations between task performances and the performance of the participants in the AS group on the Eyes Task did not correlate significantly with their performance on the mentalizing Strange Stories as well as Everyday Life stories. In contrast, there was a significant correlation between performance on the mentalizing Strange Stories and the mentalizing Stories from Everyday Life. In the control group there was a correlation between the Eyes Task, Child version and the mentalizing Strange Stories. Performance on the Eyes, child and adult version, also correlated in this group but this relation was not apparent in the clinical group.

The authors felt their hypothesis was confirmed because of the correlation between verbal IQ and mental state inference. They feel that proving this lends to strong association between standard false belief performance and IQ and language than in typically developing individuals. On the Eyes Task, however, there were no significant correlations between these variables. In the control group there were no significant correlations between verbal IQ and performance on any of the three mentalizing tasks. This suggests that individuals with ASD may interpret the content of other minds via different developmental pathways; when solving advanced theory of mind task they may rely on IQ or on more general logical reasoning skills.

Several other studies were viewed in comparison to this study. Brent et al., (2004), suggested that story tasks and the Eye Task may tap different mentalizing

abilities, demonstrated a more consistent picture of performance in a control group as compared with a group of children with ASD assessed on the three tests in this study. This view tends to agree with the visual learning theory. Klin et al., (2003) stated that individuals with ASDs have a tendency to perform better on explicit tasks that can be reduced to a 'close domain' problem-solving situation as compared with more naturalistic, spontaneous or 'open domain' situations. The authors of this study agree with this because of the success rate of the Eyes Task and it being multiple choice (closed domain) and no pressures to perform fast (no timing).

Many of the beliefs associated with this study I have synthesized myself with working the children with AS/HFA. It has been documented in many studies about the visual learning strength across many domains for this group of children. What worries me with the Eyes Task is that even though the participants performed as well as the control group we cannot generalize that this form of interpretation of theory of mind can be transferred over to mastery when dealing with reading of human interaction via reading of the eyes. Many individuals with AS/HFA will refuse to make eye contact while in conversation because of the sensory overload—they feel they cannot concentrate on the conversation at hand because of all of the confusing signals in body language. As long as this test signals a difference of tapping into cognitive demand and is not held up to a mastery of performance than I agree with the results of this study.

Strengths of this study included having two persons administering each test as well as having the study video taped and having a third person, not involved in the testing process, act as a second rater. The degree of inter-rater concordance was calculated for each story type and mean value of kappa was .97. Another strength was a

sample version of both the Strange Stories and Stories Everyday Life accompanied this study; this allowed for a better understanding of what was being tested and what responses the researchers were looking for.

A weakness of this study as in any is that broad theoretical questions cannot be settled conclusively on the basis of a few studies. The sample size was relatively limited. Moreover, the use of a typically developing comparison group may limit the degree that one can be confident that the impairments identified on the advanced theory of mind tasks are specific to individuals with AS/HFA.

Development of a New Computerized ToM Test

In the prior two studies, testing was very extensive and time consuming. Beaumont and Sofronoff (2008) offer a computerized format of ToM testing that can be accomplished in under 40 minutes. The following study details the comparison of the ATOMIC with prior testing on ToM and how this new and improved method will be useful when determining the strengths and weaknesses of individuals with AS/HFA so that learning strategies can be put in place. This quantitative research study asks, “Will this new computerized, advanced Theory of Mind Inventory for Children hold up to prior testing”?

Children were recruited for this study via surveys, medical records and newspaper advertisement and mailers. Children with AS were only permitted to participate if their diagnosis of AS had been confirmed by a pediatrician. Parents were asked to complete the childhood Asperger syndrome test (CAST) and a brief questionnaire to check that participants met DSM-IV-TR criteria for Asperger’s disorder (Williams, Scott, Allison, Bolton, Baron-Cohen & Brayne 2005). Control participants were recruited from local

schools. All participants had to take a WISC-III and only participants achieving a Prorated Full-Scale IQ of 85 or greater and no current reading difficulties were allowed to participate. Final data analyses were conducted on a subscale from each group to ensure that the groups were matched on IQ.

A New Computerized Advanced Theory of Mind Measure (ATOMIC) consisted of 18 cartoons depicting a range of child, adolescent and adult themes, each followed by two multiple-choice questions. Twelve of the cartoons served as the test portion for the theory of mind items, with the remaining 5 cartoons making up for the coherence questions. Each story had either a theory of mind question or a coherence question along with a memory control question. Each question had four response options. Accuracy and response time scores were automatically computed by the ATOMIC program. The program took less than 25 minutes to complete.

The ATOMIC theory of mind questions asked the respondent to infer characters' mental states, and to integrate this information taken from the cartoon. Seven of the theory of mind questions involved inferring characters' emotions. The remaining five theory of mind questions were about characters' cognitions ('Why did Philip say, "I know, I can't wait to get on it!").

A selection of ten stories was chosen from Happe's (1994) Strange Stories Task to validate the theory of mind questions of the ATOMIC. The Children's Embedded Figures Test (CEFT) was used to validate the central coherence questions of the ATOMIC. This task involves finding hidden target shapes within more complex pictures (Where's Waldo?).

Participants were tested individually in either a small room at the Behavior Research and Therapy Center, University of Queensland, or their local school. Participants initially completed the ATOMIC computer program, followed by the WISC-III short form, as these were the most cognitively taxing. After a short break, participants were administered the Strange Stories Task and CEFT, with the order of test administration counter-balanced across participants in each group.

Strange Stories were read aloud to participants by the researcher, and responses to test questions were recorded on a response sheet. Responses to the justification questions of the task were scored according to whether they referred to physical or mental state phenomena, and whether they were inaccurate (score of 0), partially accurate (score of 1) or completely correct (score of 2). For the CEFT, participants were allowed a maximum of 30 seconds to find the hidden shapes in the complex figures. They were scored on the total number of shapes that they located on their first attempt and within the time allotment.

Thirty-nine children with AS aged between 8 and 10 years and an equivalent number of typically developing children were recruited for this study. A sub-sample of 25 children from each group to ensure that the groups were matched on IQ was settled for. Each group had 23 males and 2 females with the exact same mean of 9.52 years of age.

A significant correlation was found between participants' performance on the ATOMIC theory of mind questions and the accuracy of their mental state justifications on the abbreviated Strange Stories Task. This finding supported the validity of the ATOMIC theory of mind scale. However, no significant relationships were found

between participants' ATOMIC central coherence scores and the number of shapes that they located on the CEFT.

As in prior testing of the previous two research studies in this section of chapter 3, there were significant differences between the control group and the group with AS. Participants in both groups performed better on the adult-themed theory of mind questions than the child-themed theory of mind items. However, the interaction between these two factors was not significant.

The unexpected finding that participants with AS and controls responded to the ATOMIC theory of mind questions at an equally rapid pace may have been influenced by the higher IQ sampling of this study. Also, an unexpected result of both groups performing better on the adult theme vs. the child's theme, questions the effect that personal experiences have on a child's ability to infer the thoughts and feelings of others. A third hypothesis was also proven wrong, it was believed that the children with AS would perform significantly slower on the open-ended format of Strange Stories versus the closed format of the ATOMIC questions when pertaining to coherence questions. Children with AS did perform more poorly and took longer time but so too did the control group.

This study was unique in that a new computerized program was developed to test for theory of mind and coherence performance. The ATOMIC program seemed to perform as expected; it would be a nice asset to have when designing IEPs for children so you know where their strengths and weaknesses lie. With this information, the correct training strategies could be in place to strengthen these areas. This study mentioned future testing using neuroimaging studies to determine whether both neurotypical

individuals and those with HFA or AS use similar mental strategies to attribute mental states to people engaged in social interactions. This will be data to look out for pertaining to looking for the best known strategies in working with youth diagnosed with AS/HFA.

Strengths of this study was the use of a computerized program which is a known majority special interest object for many youth with AS/HFA and which may have aided the more positive results in this study. The use of a second rater, blind to participants' diagnostic status when testing for reliability in scoring was an additional strength. The percentage agreement between raters was 94% for accuracy of response, and 96% for the classification of responses as physical or mental state.

It was noted that a more rigorous screening methods would have been preferable. Participants were unwilling to do lengthy diagnostic testing prior to this study but the lack of this data may have skewed results. A second weakness seen was the lack of using random sampling when choosing from the AS sampling pool due to wanting to match the control group IQ accordingly. A third limitation was seen in the small amount of questions asked in the coherence section that may have skewed the more positive results. This lack of empirical support for the ATOMIC central coherence scale is a problem. The failure to find a significant relationship between participants' performance on the ATOMIC central coherence questions and their competency on the Embedded Figures Test and Block Design Tasks, suggest that there may have been a discontinuity between individuals' local verses global processing abilities. Finally, it was debated that if real-life footage of social interaction may have produced different results verses the cartoons that were used.

ToM Training

The final research article uses both animation and real life scenarios to demonstrate the effects of ToM and social skills training on the social competence of a sixth-grade student with HFA. Feng, Lo, Tsai and Cartledge (2008) research uses both qualitative style with interviews and coding in the social skills arena and quantitative data in the ToM area. The participant for this study was Lang, an 11-year-old sixth-grade student with HFA. Lang attended a general education classroom with 35 typically developing students and received special education services in a resource room for 45 minutes a day in an elementary school in Taipei City, Taiwan. His criteria consisted of the following: A diagnosis of HFA, according to the Diagnostic and Statistical Manual of Mental Disorders (4th ed.; American Psychiatric Association, 1994) and a full-scale IQ of 85 or above according to the Wechsler Intelligence Scale for Children-third Edition (WISC-III) (Wechsler, 1991) and a score of 79 on the Peabody Picture Vocabulary Test-Revised (PPVT-R) (Dunn & Dunn, 1994). A pretest of the ToM was conducted prior to the beginning of the study to determine Lang's ToM performance level and to target skills for training. The pretest administration lasted about 40 minutes. A baseline was created for the generalization setting; Lang's social interactions were recorded during 30-min lunchtime and 10-minute afternoon recess for a combined total of 40-minutes. All the observational sessions were videotaped. The tapes were then reviewed, transcribed, coded, and analyzed using a semi-structured, free-coding method. The observed-behaviors were listed and grouped into two broad categories, appropriate social interactions and inappropriate social interactions, with a total of 37 distinct behaviors.

A graduate student in special education was trained by the experimenter as the Interobserver for data collection on the learning outcomes. Another graduate student majoring in psychology was trained to conduct Interobserver data collection for the social interaction. To ensure the procedural integrity, the trainer used a step-by-step checklist (developed from training scripts) to self-evaluate the training procedure. A single-subject multiple-probe design across behaviors and settings was used to evaluate the effects of the ToM and the social skills training program on the learning outcomes of the taught skills.

Training was conducted four times a week, for 40 min each session in the resource room. Each skill was initially trained one-on-one with Lang. After an 80% accuracy on the learning outcomes on the taught skill was achieved for three consecutive sessions, the training was conducted in a small-group setting with three preselected peers in the resource room. After Lang performed at or above 80% accuracy on the learning outcome probes during the small-group training for three consecutive sessions, the training started with Skill 2 in the one-on-one setting and was followed by small-group training on the same skill. This same sequence of training was applied until all skills were taught in both one-on-one and small-group settings. Social interaction data were collected each time the training session was conducted (32 sessions during the one-on-one training and 29 sessions during the small-group training).

All training sessions were delivered using teaching scripts. First, the trainer introduced the skill by presenting an episode with animation on a laptop computer. Afterwards the teacher verbally explains the episode and then asks questions about the episode; the student responds to teacher's questions; if answer is correct then continue on

to step 2 if incorrect, do either indirect verbal prompt (animation cue), or indirect verbal prompt (question cue) or direct verbal prompt; after three tries the correct answer will be given. Second, the trainer and Lang role-played the animation episode, followed by an additional skill-related scenario. Verbal praise or corrective feedback was provided. Third, the trainer summarized the main points of the episode and had Lang share his daily experience related to the taught skill. Finally, a learning outcome evaluation probe was conducted.

Maintenance occurred through eight observational sessions that were conducted during the small-group instruction in the resource room to evaluate Lang's social interactions. Generalization data on Lang's social interactions were collected immediately following the skill mastery three times a week for a total of eight sessions. A posttest of the ToM was conducted again at the end of the study to obtain data. To check for social validity, each interviewee (Lang's other teachers, peers, and parents) was asked about changes on Lang's social behaviors and peer interactions prior to and after the intervention as well as how they perceived the training program was effective or not. Lang not only greatly improved the overall number of social interactions but also exhibited a higher percentage of appropriate skills. At Level 1 of the ToM, Lang scored 15 out of 22 (68%) on the pretest and 20 out of 22 (91%) on the posttest, with an increase score of 22.7%. Level 1 indicates the ability to identify one's emotions, basic belief, and vignette-related facts. Lang's scores on Level 2 were 7 (47%) and 14 (93%) out of 15 points, on the pretest and posttest, respectively. This indicated an improvement of 46.6% accuracy on the posttest compared to pretest. Level 2 refers to the ability to identify first-order false belief. At level 3, Lang scored 0 out of 3 (0%) on the pretest and received a

full score on the posttest. Level 3 refers to the ability of identifying second-order false belief. Overall, Lang had an improvement of 35.9% accuracy on the ToM.

With social validity, the general education teacher reported that Lang made great improvements on his social interactions, including expressing his needs clearly at appropriate times and expressing his anger with words rather than crying or throwing tantrums. The social studies teacher reported that Lang improved his appropriate social skills, such as initiating conversations, making positive comments to others, and saying hello to others appropriately. The peers also indicated that Lang was much nicer to be around.

The generalization qualitative study during the baseline showed that Lang was observed to engage in an average of 5.7 social interactions per 40-minute observational session, among which 29% were appropriate and 71% were inappropriate. After intervention, Lang engaged in 18.4 social interactions with 73% of those being appropriate. The increased levels of social interactions remained during the maintenance phase.

Included with the article are four appendixes that contain the questions and teaching format used in the article so that one can train themselves to implement this into their own classroom or to use with individuals needing ToM training and/or social skills and/or behavior modification.

Feng et al., (2008) attribute this triad of success to the following conditions: first, instruction for teaching ToM skills was conducted prior to introducing social skill training. This sequence of training may have given Lang the chance to gain prerequisite skills necessary for learning social interactive skills. Second, Lang received a double dose

of ToM and social skill training first from the experimenter in one-on-one setting and then again in small-group instruction with three peers. The opportunities to practice the skills with peers and to generalize to a more natural social environment led to the success of new skills. Third, this study used a variety of real-life scenarios through animated presentations for Lang to role-play and rehearse during both one-on-one and small-group teaching. Finally, the present study contributes to existing literature in incorporating technology or visual presentations, such as video modeling by using PowerPoint presentations and Flash animation during the training which increased the motivation for Lang in learning important ToM and social skills.

Feng et al., (2008) mention the following three limitations or weaknesses that may have effects on scoring: first, this study used a qualitative semi-structured, free-coding method to evaluate Lang's social interactions in various settings prior to and after the interventions (no functional relationship could be developed due to descriptive data). Secondly, generalization data were not available prior to the implementation of the intervention, making it impossible to assert that the training contributed to the changes in Lang's social interactions across settings. Finally, the current study is limited with only one participant.

This last research study introduced some of the behavior problems that individuals with AS/HFA have and the appropriate strategies needed in order to be useful citizens in society. The final section of chapter three will look at four research articles describing these behavioral idiosyncrasies and strategies recorded.

Strategies in Behavior Modification

My Greatest Fear is Myself

My greatest fear is myself.
 Control is not absolute: a constant struggle to maintain
 It drains my strength.
 I am always tired: I never get enough sleep.
 Events beyond my control happen around me: I do
 things that scare me. If I'm confused or angry or tired,
 I slip up and my body takes over.
 Watching your life like a void is scary. It takes an
 effort of will to take control again and not just let it happen.
 I'm afraid of what I feel. Emotion weakens my control,
 making its grip easier to break.
 When I think, I sometimes think of letting go, just
 letting it all slip away. It hurts fighting all the time.
 I just want peace and rest.

(Daniel Woodhouse)

An adolescent wrote the poem above with Asperger Syndrome (Attwood, 2003). This poem introduces the last section to chapter three: research into deficits in behavioral patterns in children with AS/HFA and the strategies best known in working with these individuals for mainstream education. The following research will examine the degree of anxiety, negative thoughts, behavioral problems and life interference in adolescents diagnosed with AS/HFA. This section will also look at what treatments are most commonly used by professionals today, how well teachers are prepared in knowledge of this material, and finally at a case study using one of the strategies that was researched Farrugia and Hudson, (2006); Shreck and Mazur (2008); Loiacono and Allen (2008); Sofronoff, Attwood, Hinton and Levin (2007).

The Problems with Anxiety

Farrugia and Hudson (2006) used qualitative research to ask, are adolescents diagnosed with AS more likely to experience symptoms of anxiety than adolescents in

the general population? The research design to this study was qualitative during the surveys filled out by participants and their parents but became quantitative when data was statistically analyzed. Adolescents with AS were recruited via two sources: 20% from local support groups and the remaining 80% from the Autism Association of New South Wales. All of the adolescents in this group had been diagnosed with AS by qualified mental health professionals. Adolescents from the Anxious Group (AD) sample presented for assessment and treatment at the Macquarie University Child and Adolescent Anxiety Clinic, Sydney, Australia. The nonclinical group (NC) consisted of adolescents recruited from the community via an advertisement placed in local newspapers. The inclusion criterion was that these adolescents have never sought treatment from a mental health professional.

There were 5 sets of surveys sent out to participants and their parents, following is a brief description of each of the measures.

The Children's Automatic Thoughts Scale (CATS) (Schniering & Rapee, 2002) is a self report of negative thoughts in children aged 7-16 years. It consists of 40 items yielding a total score and four cognitive subscales: physical threat, social threat, personal failure and hostile intent.

The Spence Children's Anxiety Scale (SCAS) (Spence, 1998) is a measure of overall levels of anxiety in children and adolescents. It includes six subscales based on DSM-IV criteria: panic, social phobia, separation anxiety, generalized anxiety, obsessive-compulsiveness, and fears of physical injury.

The Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997) is a brief behavioral screening measure consisting of 25 positive and negative attributes that

generates scores for five subscales: emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems and prosocial behavior.

The Life Interference Measure (LIM) (Lyncham, Abbott, & Rapee, 2003) is a self-report questionnaire consisting of 31 items scored on a scale from 0 to 4, which when added together gives a global life interference score.

The parents of adolescents with AS were asked to answer six additional questions written by the researchers pertaining to diagnosis', treatments, medications, and behavioral symptoms. These questionnaires were sent out with self-addressed envelopes and parents and participants were asked to fill out forms independently; it was estimated to take 30 minutes to complete all forms. Differences between the three diagnostic groups were investigated using one-way analysis of variance (ANOVA). The dependent measures for the analyses included the raw total scores and subscales of the SCAS, CATS, SDQ, and LIM, both parent and self-report. A Bonferroni correction was used to adjust for inflation of the Type α error rate on follow-up comparisons.

The sample consisted of 93 adolescents and one of their parents: 29 adolescents with AS, 34 adolescents with AD, and 30 NC adolescents. The 64 boys and 29 girls were between 12 and 16 years of age with a mean age of 13.8 years.

There was a positive correlation between adolescent and parent reports that the authors felt made for high reliability. On the SCAS which measured anxiety, the scores from low to high were NC, AS, and AD groups. Individuals with AS scored highest in Obsessive-Compulsiveness, and Social Phobia within this group. The SDQ (behavioral difficulties) showed the AS group having the highest level of behavioral problems, followed by the AS and NC. The AS group also scored significantly higher than both comparison groups

on the Hyperactivity/Inattention and Peer Relationship Problem subscales. In both the CATS (negative automatic thoughts) and LIM (life interference) showed that the AS scored significantly higher than both the AD and NC groups.

The rest of the study refers to prior research that basically had the same findings as this study. This research brought to light those adolescents with AS present with significantly higher externalizing problems than the general population. With this in mind, parents and educators should be aware of treatment, skills and awareness needed to help these individuals be successful citizens of today's society.

The article mentioned that the methodology of this study was strengthened by the use of non-directional two-tailed analyses and information obtained from both adolescents and parents. The correlation between adolescent and parent reports was seen as another strength to this study.

The weakness of this study was in the survey format. Parents and participants answered the questions; data was gathered independently in their own environment. The group with Asperger's was aware of the intention of the surveys for this research that may have also skewed results.

Treatment Plans

Schreck and Mazur (2008) look at behavior analyst use and beliefs in treatment for individuals of the ASD spectrum. They ask what treatments for children with Autism have BCBA's (Board Certified Behavior Analysts) continue to endorse, recommend, and use and what treatment factors may play a role in the use of treatments for people with autism? This study used quantitative design to survey 469 BCBA's using a questionnaire

with eight demographic questions related to professional practice and 204 questions about treatment.

The eight demographic sampling determined the list of criteria—the following questions were asked: (a) how many children with autism they have treated, (b) the average age of the people they treat, (c) the number of years treating people with autism, (d) occupation, (e) employment organizations, and (f) education related to autism and autism treatment. Only five BCABA responses were received therefore only BCABAs working in the field of autism constituted the final respondent sample.

It is interesting to note here that since the majority of the respondents reported working in educational settings, it corresponded that the participants reported treating young children with Autism.

The online-autism questionnaire contained the following three themes: (a) treatments for people with autism the professional personally provides; (b) treatments professionals witnessed being used by other professionals; (c) professional's beliefs in treatments' principles and theories; and (d) professionals beliefs in treatment effectiveness, cost effectiveness, behavior change capabilities, ease of implementation, and research support.

A five point and three point Likert scale was used to answer the survey questions. The questionnaire was developed and evaluated for face validity. Participant responses were entered and checked for accuracy. Chi-square analyses were conducted to determine relationships.

Following is the list of interventions and a brief description of each that the study looked at.

Applied Behavior Analysis: A science based on behavioral principles that are used to systematically change behavior

Auditory Integration: Individuals listen to music for a pre-specified amount of time to help retrain the auditory system

Discrete Trial Instruction: Skills are broken down into discrete parts with each part being taught individually

Facilitated Communication: An individual assists another in pointing to or typing letters as a means of communication

Floor time: A method of teaching play skills that involves following the child's initiations and teaching skills based on those initiations

Gentle teaching: A specific methodology for helping individuals using love and understanding as the basis for positive interactions

Music therapy: Using music to develop and maintain pro-social behaviors in individuals

Nonaversive treatment: A movement toward relying only on positive reinforcement procedures instead of aversive treatments

Occupational Therapy: A therapy that focuses on teaching fine and gross motor skills

Picture Exchange Com: The use of pictures as a means of communications

Person centered planning: A specific methodology based on values and ideas that focuses on improving the lives of individuals

Physical Therapy: A therapy that focuses on building strength in all of the muscles of the body

Positive Behavior Support: The use of positive approaches to changing behavior in school settings

Sensory Integration: A means of stimulating the sensory system to improve an individual's level of functioning

Speech Therapy: A therapy designed to teach individuals how to speak and use language

TEACCH: A specific intervention focused on arranging the environment to facilitate the learning process

Verbal Behavior: A focus on teaching language based on the Assessment of Basic Language and Learning Skills (ABLLS)

A national sample of BCBA and Board Certified Associate Behavior Analysts (BCABA) was compiled through registration in the BACB online-membership registry. No BCBA's reported having physical or occupational therapy training and only four had speech therapy training. Data was collected concerning where the participants received their Autism treatment education; respondents reported multiple venues, only 8% reported having graduate training. Many receive training through the Autism Society, workshops, conferences, school districts, etc. and then are tested for board certification. Out of the five most common treatments or strategies for Autistic people, ABA (Applied Behavior Analysis) was at the top of the list with 98.7% of therapist using this method, a 98.1% effective rating resulting in 97.2% changes in behavior. Therapist reported being the third easiest strategy to implement with a 63.5% cost effective rating. The ABA strategy also received a 97.4 research support rating. Many other findings relate to fifteen

other strategies; I was only interested in researching the ABA strategy and it is the only strategy that this article goes into depth.

The second highest used strategy found in this study was DTI or Discrete Trial Instruction. The DTI strategy breaks skills into discrete parts with each part being taught independently to the individual. This treatment was used 91% of the time with a 91.5 effective rate resulting in 91.5 changes in behavior for the participant. Implementers of this strategy reported that it was 40% easy to implement and on the list of treatment it came in at a 55.9% cost effective with 90% backing in research support.

The third top rating strategy came in significantly lower at 76.8% usage; it was the PECS system (Picture Exchange Communication System). The PECS used pictures as a form of communication. Professionals that used this system reported that it had a 74.8% effective rate that produced changes in the participant 75.5% times. This system reported easy to implement with a 39.7% rate and was viewed at 49.3% cost effective. Research supported with strategy 64.4% of the time.

Penn State University Office obtained approval for the research for Research Protections. National sampling from a registered on-line membership registry was used. The questionnaire was developed and evaluated for face validity by review of professionals in the field of autism. Participant responses were initially entered and checked for accuracy by an ABA graduate student. The database was then evaluated and analyses conducted by the first author. Chi-square analyses were conducted to determine number of relationships. Nice, clear-cut statistical chart representation.

Schreck and Mazur (2008) argue, "This study is limited by the drawbacks of subjective data collection: low response rates, treatment definition issues, limiting of the

fad treatments included in the study, inability to separate educational levels of respondents, etc.” (p. 211).

This study differs in that the participants are not the children but the professionals in the field implementing the strategies in that a teacher would be asked to know when working with ASD children. This study connects in answering the need for cognitive behavioral strategies for servicing these children. This study also reiterates the dramatic increase in Autistic Spectrum Disorder.

Themes are the dramatic rising numbers of ASD children, need for strategies in teaching this population and realization of the special education teacher working closely with the general education teacher due to this population of children being mainstreamed in general education.

Professional Training

Loiacono and Allen (2008) ask are special education teachers prepared to teach children on the Autism Spectrum with knowledge of the Applied Behavior Analysis (ABA) program? These researchers use quantitative data from the NY state pupil with disabilities data system. Qualitative data was collected from two interview questions to eighteen school districts. In addition, qualitative data was obtained from a random survey of 30 four-year undergraduate colleges and universities in urban, suburban, and rural communities.

The quantitative data did not need a list of criteria because the state education department reviews and analyzes this information already. The qualitative data was mainly in a yes or no style questioning and could be cross-referenced through public information so therefore no list of criteria was created.

The quantitative data was taken from a computer base analysis of the past five years concerning the enrollment and services of Autistic children. The qualitative data to these same 18 school districts contained the following two questions:

1. How many special education teachers does your school district currently employ?
2. How many of these special educators took a course in ABA as either an undergraduate or graduate student or received district in-service training in ABA?

The qualitative data collected from surrounding thirty colleges and universities contained the following two questions:

1. Do you require or offer prospective special education teachers the opportunity to take a course in ABA?
2. For the colleges that answered no to the above question—do you have future plans to offer ABA to their prospective special education teachers?

The participants for this study came from quantitative data from the last five years of Autistic children within the eighteen school districts in the Western Suffolk region in New York State. Qualitative data was also used in interviews with superintendants from these same 18 school districts. An additional set of qualitative data was collected from 30 nearby colleges and universities in this same area.

The findings in this study contained the following: Quantitative--the amount of Autistic children enrolled within these 18 districts increased by 469 students in five years that translated to a 212% growth. This information supported the hypothesis that the prevalence of autism appears to be increasing by 10% to 17% annually. Qualitative data showed that 114 special education teachers out of 1014 in the 18 districts were trained in ABA this translated to 11% were highly capable of teaching Autistic children while 88%

were not. Qualitative data asked of 30 surrounding colleges showed that only 6 colleges offered ABA training and only 11 answered yes to offering this program in the future.

The ABA program was the only scientifically proven therapy behavior program. Given this information and knowing behavior patterns with children on the Autistic Spectrum scale, being trained in this program is essential to being highly qualified in teaching these children. This information is essential to the research question on two counts: first, the statically data demonstrating that Autism is the fastest rising special education dilemma and that this population is mainstreamed and second, this is yet another curricular strategy in serving the population of children in this study.

Numbers could be skewed in the rise of Autistic children in this polled area because of the superlative educational programs for children diagnosed with autism. Many school districts do offer the in-service training for ABA but to not supplement it or pay for it therefore special educators do not take advantage of the training that could be seen as skewed data. The qualitative college data was further broken into rural, urban, and suburban data.

This study was actually a different branch of research than usually taken; it critiqued the preparedness of teachers within the strategy realm of teaching ASD children. The strategy for cognitive behavior modification is there through the ABA training but the research was actually on schools and not test subjects.

Cognitive Behavior Intervention

In the last research article for chapter three and behavior, Sofronoff, Attwood, Hinton and Levin, I. (2007) use a randomized controlled trial of a cognitive behavioral intervention for anger management in children diagnosed with AS. Two sets of questions

are asked in this study: Quantitative question: Whether a cognitive behavioral intervention for anger management would be effective with a group of children diagnosed with Asperger syndrome? Qualitative question: To evaluate whether strategies taught and rehearsed in the clinic setting would be generalized to the home environment and finally whether there would be any further generalization to the school setting.

There were two different types of research design in this study: Quantitative: purposeful/ theoretical sampling of Asperger children and their parents to complete pretest and posttest measurements paralleling a modified cognitive behavior theory program.

Qualitative: Two sets of questionnaires given to the parents and teachers of above experimental group that were subjected to content analysis by two independent raters and themes were extracted from both subgroups.

All children included in the study had a primary diagnosis from a pediatrician denoting Asperger Syndrome. The DSM-IV for developmental disorders was additional given to test participants for further verification along with the CAST test (Childhood Asperger Syndrome Test). A short form of the WISC-III was given to establish IQ also formed criteria.

Quantitative Method: A modified CBT program lasting six weeks was taught by postgraduate students. The program consisted of two hour sessions in which the children would work in a provided workbook via independent, small group and large group activities. Homework was assigned to practice strategies learned; homework was also reviewed during the first part of the following session. Parents attended a parental group to also learn strategies for follow through at home.

This CBT was modified with the Asperger syndrome disabilities in mind. Information on these was taken from research using neuro-imaging technology and prior peer reviewed documented research. Modifications took into account the impaired executive function of the participant; Sofronoff et al., (2007) states, “it is designed to improve the function of the amygdale in informing the frontal lobes of increasing stress levels and emotional arousal” (p. 1204). Other modifications included semantic confusions, literal thought process, lack of salient cues, and loss or excess sensory issues. This particular program also used comic strip conversations and social stories along with role play in order to teach the AS child.

Sofronoff et al., (2007) argues, “Cognitive Behavior Therapy generally consists of six components, assessment of the nature and degree of the mood disorder, affective education, cognitive restructuring, stress management, self-reflection, and a schedule of activities to practice new cognitive skills” (p. 1204). This particular program was established in the following six steps:

1. Two positive emotions explored: happiness and relaxation
2. Anger was explored and the changes that occurred in physiology, thinking, behavior and speech. The Tool Box analogy was introduced with the ‘fix the feeling’ tools (a constructive release of emotional energy would be to take a run or excuse yourself from the situation).
3. Social Tools and Thinking Tools were taught to the AS child.
4. Range in degrees of emotion was taught and an analogy of an emotion thermometer is explored via kinesics lesson plan.

5. Social stories are introduced and students work on antidotes to negative thought formation.

6. Individual program work and future outline is established with each child.

A baseline is established before therapy begins with all of the students, those receiving intervention and those on the wait list; it entails answering questions to a theoretical story called “Dylan is being Teased”. The student lists how many strategies they can think of in solving this dilemma. The child completed a questionnaire about her own anger issues, What Makes me Angry. This is a quantitative measure rating behavior. Parents also monitor outbreaks of behavior one week prior to beginning the program to establish a baseline.

Qualitative Method: Sofronoff et al. (2007) states, “A questionnaire was developed that asked parents to respond to a series of questions aimed at tapping information about change that may have been missed by the more standardized questionnaires” (p. 1208). Themes were developed through this type of questioning. Twenty teachers were also asked to perform a brief interview to note any changes that took place in the educational environment. Themes were developed through this type of questioning.

Forty-five families participated in this therapy program. Half were placed on a waiting list that established a control group. Intervention group contained 23 boys and 1 girl with a mean age of 10.79 and a mean IQ of 105.24. Eleven of the participants also had the common comorbid disorder: ADHD. Wait-List group contained 20 boys and 1 girl with a mean age of 10.77 and a mean IQ of 108.7. Nine of the participants also had the common comorbid disorder: ADHD.

Quantitative Findings: ChIA-P checklist parents filled out about child's level on anger across time: total score relayed a decreased rate of eleven incidents of inappropriate anger outbursts in the intervention group with only one decrease in the control group. These results record a six-week period.

Qualitative Findings: Parents reporting instance of child anger across time showed a decrease of 5.5 outbursts in the intervention group and an increase of .3 in the control group.

Parents reporting on confident in ability to manage child's anger showed an increase in confidence and expressed four benefits from the intervention: they learned practical strategies both from therapists and from other parents; they felt comfortable and validated sharing experiences with other parents; they learned that they were managing okay and that their child was not so difficult; and they were able to talk to their child using the language of the program.

The children's interviews also reported an increase in confidence and three benefits from the program: strategies to use, a language to talk about feelings, the ability to think things through, and made a friend in the program.

The teachers were aware of the child trying to use strategies to manage anger at least some of the time and three teachers stated that the child would ask to withdraw from the class when they felt angry. The teachers also stated a positive in that the child now had 'language' with which to talk about anger and this helped to reduce incidents of outbursts. CBT is a strategy for AS and HFA; it has been proven to be effective in mood disorder percipients for decades.

This was a pioneer study in that CBT has never been implemented with the AS population and yet they did a wonderful job taking in consideration modifications, baselines, measuring tools, predesigned AS strategies, and prior studies. Tony Attwood is much known in the research and study of the AS population and the fact that he trained the therapists lent strength to the study. CBT has been around decades, is used in many public establishments and has a track record for being very effective.

Were any of the participants that also had ADHD medicated? If so, the history of the effects of that medication should have been noted and a possible causal connection ruled out. It would have been nice if the teachers had not know intervention was occurring—more authentic feedback could have been formally documented. The document stated a small sample size and reliance for the most part on parent report measures.

In each study, there is an introduction explaining the conflicts as the child with AS experiences. The criterion seems to be the same in each study: diagnosis of pediatrician and/or psychiatrist of AS, the DSM-IV test, the CAST test and the WISC-III test.

Theory of Mind seems to be the underlying issue to many of the social, communication and behavior issues with AS children. Reoccurring authors of articles tend to give more credence within the subject matter.

Summary

Chapter three contained nine academic subjects referencing four research studies. The breadth of strategies available for general education teachers to use was in the areas of writing, math, reading, social, behavior and cognitive development. Norms testing was used in many of the research articles proving the need for modification in curriculum.

This chapter encourages the use of assessing for differential instruction to meet the needs of children diagnosed with AS/HFA.

Chapter four will describe the historical background in researching the best known teaching practices for working with children with AS/HFA in the mainstream. The research found in chapter three will link to the historical background of this question. This chapter will suggest recommendations and conclusions anchored in the research reviewed in the previous chapter. Recommendations for classroom strategies will be linked to the research on “best practice” identified in the previous chapter. Finally, future research topics will be discussed by posing unanswered questions regarding the best teaching practices used with children diagnosed with AS/HFA.

CHAPTER FOUR: CONCLUSION

Introduction

Chapter three provided a crucial review of current research on assessments and strategies for general education teachers to study and implement in order to best serve the cognitive, social and behavioral needs of children diagnosed with AS/HFA. It specifically addressed norm based testing to verify the need in modification of curriculum for these children in mainstream education.

This final chapter will describe the historical relevance of findings as well as summarize the findings in chapter three. Following, recommendations and conclusions will be drawn and anchored to these findings. Finally, further research needs will be posed in the need of unanswered questions.

Historical Relevance of Findings

All of the research cited in chapter three occurred after 1994 when AS became official in the DSM-IV (APA, 1994). The majority of the research escalated after the 1997 IDEA revisions where both special educational teachers and general educational teachers became accountable for educating children with AS/HFA.

Under the law PL 108-446 (2004), a critically important feature of the new law specifies that regular classroom teachers will be part of the team that develops each child's IEP. That is especially important since the law removes barriers to placing disabled students in regular classroom setting and ties the education of students with disabilities more closely to the regular education curriculum. The law also requires that IEPs include the program modifications and supports for the child and teacher to enable

the child to succeed in the classroom. Children with AS/HFA are educated in the general education population for the entire day borrowing time for specialists.

A final mandate linking historical events with current research is the No Child Left Behind law where special education students are held accountable for yearly testing supporting the proof of yearly growth. Teachers are experiencing the pressure to research and utilize the best known teaching practices for modifying curriculum when teaching students with AS/HFA.

Due to AS now having made an official medical condition, the rise in this syndrome has increased immensely. In 2001, the National Institute of Neurological Disorders estimated that autism affects 1 in 250 children. Six years later, 2007, the Centers for Disease Control and Prevention reports autism affects 1 in 150 children (DHSCD, 2007).

Besides the rise of documented cases, parents are armed with due process rights and are joining together to petition legislation for funding in research of this fast growing phenomenon. Even Hollywood has joined the fight thanks to Jenny McCarthy and her son, Evan's autism. This high visibility status has created much funding in current research and in global organization of groups such as TACA (Talk About a Cure for Autism).

These historical events have affected the amount of research produced yearly. Chapter three contains 36 peer reviewed qualitative or quantitative research articles. In 1994 the research in chapter three begins with one article. Ten articles written in the year 2008 demonstrate the rise in research for best known teaching practices for teachers to use with children diagnosed with AS/HFA. The year 2009 also is represented with five

articles with still half a year to produce more research. This document becomes a living project with the projection of more research to come.

Summary of Findings

Chapter three opens with a first person accounting what it is like growing up with Asperger Syndrome. Six boys, their mothers and their teachers are video recorded using qualitative testing (Collins, 2003). The major themes discussed are being bullied at school, feeling different and out of place and special interests as controlling and disruptive in the academic realm of schooling. To further investigate these themes, quantitative testing compares the norm-based testing used in determining the strengths and weaknesses of children with AS/HFA in the academic setting.

The section concerning writing, reviews deficits in writing and introduces four strategies found in quantitative and qualitative research: The Self-Regulated Strategy Development model (SRSD), group work in strengthening imagination, TREE strategy (note topic sentence, note reasons, explain each reason, note ending), adaptations and accommodations through IEP's as well as the use of integrating special interests prompts (Myles et al., 2003; Delano, 2007; Harbinson & Alexander 2009; and Weiss, 2008). Other writing strategies mentioned include using visual cues to prompt additional writing and to help keep students focused. Making up process charts for students to have at their desks to remember mnemonics in writing such as color codes used in curriculum Step Up to Writing. Technology such as Alpha Smarts and word processors can impede the amount of writing by alleviating the fine motor deficit found in manual writing. Finally, a scribe can be implemented in the IEP allowing for the child to dictate their thoughts to a paraeducator and have their essays written for them.

The section concerning reading reviews strengths and weakness in reading. Minshew (1994) related the strengths of children diagnosed with AS consist of an adequate word and decoding knowledge, a large information bank (long term memory), and fluency in oral reading. Strengths in comprehension are recalling facts and details. Weaknesses include understanding what is read specifically in nonverbal cues, understanding the motivation of characters or formulating inferences about story events or elements. Inferences and reading between the lines is the hardest skill to maintain while reading for this targeted group. Five other studies looked at the impact of meaning-focused interventions: two targeted vocabulary, two comprehensions and one vocabulary with comprehension. Two strategies were used amongst these five studies: peer-mediation (cooperative groups) and one-to-one instruction. The authors summarized the findings in this category as following participation in meaning-focused interventions, students with ASD made gains on vocabulary and/or comprehension quizzes (Dugan et al., 1995; Kamps et al., 1995), question generation and responding during reading (Whalon & Hanline, 2008), ability to follow written directions (Rosenbaum & Breiling, 1999), and retelling the important events of a story (O' Connor & Klein, 2004). General patterns in strategies shown amongst all the studies were simplify the task, provide scaffolding through modeling and think aloud, and implement procedural prompts (self-monitoring checklist, visual cue cards, and generic questions).

The section concerning mathematics, four research articles pose the following themes in math: strengths and weaknesses of children with AS/HFA in the performance of math, life skill strategies, curriculum design and adaptation within number sense. Chiang and Lin (2007) report that what appears to be relatively easy are rote skills that do

not require an interpretation of meaning and are not really tied into a body of knowledge. Children diagnosed with AS/HFA may find themselves doing calculus in a plug and chug format yet cannot perform simple life skill mathematics such as purchasing for everyday living. Cihak and Grim (2008) present strategies on how to use role enactment to teach life skills such as counting back of change or purchasing items at a community based department store. Banda et al., (2006) research the need for differential instruction for mastery in story problems. Use of special interest prompts help students focus better on the subject material in the problems. Lastly, case studies from research involving Hans Asperger (1944) illustrate the unique way children diagnosed with AS/HFA manipulate number sense in solving sums. This last research illustrates the need in getting to know the child with AS/HFA and what processes work best for them.

Special Interests are topics that children with AS/HFA will obsess over in obtaining encyclopedic knowledge. Five studies shed some light on this phenomenon. The first study by South, Ozonoff and McMahon (2005) demonstrated without doubt that these special interests are apparent in individuals with AS/HFA and to what degree they can be a controlling factor in an individual's life. The second study, Klin, Danovitch, Merz and Volkmar (2007) looked at the nature of the circumscribed interest in how it generates to building knowledge and how this lends to the process of learning. Baron-Cohen and Whellwright (1999) broke down special interests into feasible topics found in education today and how this phenomenon may relate to the learning process of individuals with AS/HFA. Winter-Messiers (2007) looked at special interests and how they originate and how this can be developed or integrated into most effective learning strategies at home and in school. Lastly, Winter-Messiers, Herr, Wood, Brooks, Houston

and Tingstad (2007) showed through a qualitative exploratory study what strategies can be developed through special interests and how these can promote the educational well-being of the AS/HFA child.

Many children with AS/HFA qualify for speech services due to deficiencies in reciprocity, pragmatic language comprehension and difficulty following verbal instructions. Four research cases portrayed this dilemma. The first three studies pertain to establishing a need for intervention through scientific establishment of the above problems. The last study looked at strategies in addressing these problems. The first quantitative design developed a scale and nine categories of problems with speech with children who are diagnosed with AS/HFA. This study was implemented by Villiers, Fine, Ginsber, Vaccarella and Szatmari (2007). Next, is a study by Louskusa, Leinonen, Kuuskko, Jussila, Marja-Leena, Ryder, Ebeling and Moilanen (2007) that looked at the use of context in pragmatic language comprehension. The third research study by Saalasti, Lepisto, Toppila, Kujala, Laakso, Wendt, and Jansson-Verkasalo (2008) looked at poorer performance due to difficulties in language development. Lastly, Sansoti and Powell-Smith (2008) presented a few strategies to answer the need of difficulties in language development for the child diagnosed with AS/HFA.

Research in the development or lack of development in social skills informs us of the need for teaching strategies. Portway and Johnson's (2003) study illuminate powerful accounts of children who from an early age 'looked normal, talked normal' but never seemed to quite fit in. Many were expelled from school while others were excluded by their peers within school, thus leaving them feeling like outsiders looking in. Facing rejection year after year builds insecurities and medical conditions such as anxiety and

depression. Two years later these same authors did another study looking at the risks involved for these marginally different children. Several cases of loneliness, dejection, depression and anxiety were noted in this qualitative study. Undiagnosed children with AS found them being misunderstood, bullied, isolated, lonely and few if no friends. The purpose of school was a mystery and the confusions of the many unwritten rules and codes of conduct formed many problems. Carrington et al., (2003) extended this research to discover what children with AS/HFA felt a friend consisted of and how many friends they had. They felt friends were others who liked the same things they did. When asked how many friends one child had, he reported he had four best friends. After interviewing his mother, we find out that two of those friends are dogs and the other two are brothers who live down the street. Children with AS/HFA have trouble with reciprocity and understanding social understandings such as white lies or telling someone they look fine so not to hurt their feelings. All the participants of this study referred to rigidity with rules, friendships could dissolve if minor rules were broken. After discovering the social make-up of the child with AS, we end this section with Bock's (2007) study on the best known teaching strategies for teaching social skills. This study used the script SODA (stop, observe, deliberate, and act) to teach children with AS people skills, how to fit in and how to carry a conversation within group work. This particular study worked with students who had already had some training with Theory of Mind tasks and it was unclear which training truly benefitted the children.

Theory of Mind is the ability to attribute mental states—beliefs, intents, desires, pretending, etc.-to one and others. In this section, four studies were reviewed to gain an understanding of what these skills looked like and how one teaches these skills. The first

study by Kaland, Smith and Mortensen (2007) explained theory of mind tasks, the need to monitor amount of cognitive time it takes to perform these tasks and what this means to the individual with AS/HFA. Secondly, Kaland, Callensen, Moller-Nielsen, Mortensen and Smith (2008) showed how academic performance is affected due an inefficient ToM. The third study by Beaumont and Sofronoff (2008) introduced us to a New Computerized Advanced Theory of Mind Measure (ATOMIC) used in obtaining the strengths and weaknesses in individuals with AS/HFA so that strategies can be put in place. Finally, Feng, Lo, Tsai and Cartledge (2008) presented the effects of a ToM and social skill training strategy that they used with a student with HFA. Many causes in negative or unacceptable behavior stems from an inefficient Theory of Mind approach that brings us to our last section in teaching proper behavior skills.

The following research examined the degree of anxiety, negative thoughts, behavioral problems and life interference in adolescents diagnosed with AS/HFA. This section looked at what treatments was most commonly used by professionals today, how well teachers were prepared in knowledge of this material, and finally at a case study using one of the strategies that was researched (Farrugia & Hudson (2006); Shreck & Mazur (2008); Loiacono & Allen (2008); Attwood, Hinton, Levin, & Sofronoff (2007)). If time is taken to educate these children, many incidents in school can be avoided and more friendships can occur which will take the mystery out of the purpose of schooling for these children.

In summary, the more strategies that teachers have in their tool belt, the more tools they have to meet the needs of all children. All children can learn and thrive, we, as

the educators, must discover how these children think, process, and work with the skills they already have.

Classroom Implications and Recommendations

The majority of the research articles addressing my question of best known teaching practices points to the issue of knowing the child you are teaching. This theme can be found in every section of chapter three with norm-based testing to discover the strengths and weaknesses of children diagnosed with AS/HFA. There are a few generalizations that tend to apply to the majority of children diagnosed with autism but never assume before getting to know the child. If these generalizations do occur in your classroom than the research done on learning as many strategies as possible will pay off. One such generalization is that these children are visual learners. In communication and language, materialistic aides such as charts, models, diagrams, posters and other visual materials help this visual learner (Minshew et al., 1994; Siegel et al., 1996; and Griswold et al., 2002). These same authors also propose that since children with AS/HFA are usually very fluent readers, teachers can use this to their advantage. To empower the individual have them give speeches on factual information, describe their special interest, recite a memorized item or just read daily instructions out loud to the class. Students tend to judge academic status on how well others can read—this fluency strength can help gain status for the marginal child.

Another generalization based on qualitative research is that children diagnosed with AS/HFA feel like they do not fit in. Unlike other disabilities, this neurological marker can not be seen by the general population therefore these children are considered odd. Much debate has occurred in the last five years on whether to label and then whether

to educate about the label. Collins (2003) interviewed children with AS/HFA and asked them what they thought about this dilemma. All of the participants agreed that they wished their classmates knew more about their condition and realized how hard it was for them to fit in. This same theme reoccurred in the many other qualitative research articles (Portway & Johnson 2003 & 2005; Carrington et al., 2003; and Bock, 2007). One such suggestion is to obtain a child friendly book and have either the student (if capable) or the teacher read it to the classroom and opens the floor to discussion. I have actually experimented with this in my son's classroom. Kathy Hoopmann writes two children books geared for the level of first grade through fifth grade: *all cats have Asperger syndrome* and *all dogs have ADHD*. My son has a triad of AS, ADHD and Tourette. After the class listened to these books and asked questions to both the teacher and my son, empathy occurred and the class became more accepting of his behavior. Acceptance is the key to social skills.

Educators need to be aware that we must address the whole child when educating those diagnosed with AS/HFA. In almost every IEP, social and behavior goals will need to be written. The general education teacher will need to law PL 108-446 (2004) mandates that all goals be written with both the special education teacher and the general education teacher (Vaughn, 2006). One can generalize that children with AS/HFA do not have the social skills needed to function in school or work in small group projects. These skills must be taught. There were two very good strategies highlighted in chapter three for teaching these skills: SODA and Social Stories.

SODA (Stop, Observe, Deliberate and Act) is a wonderful program that is very useful for older children (fifth grade and above). It is a strategy some people use to figure

out what to do and say when confused. It is a short story geared to the child and a particular event or environment combined with a teaching script that follows after the students has read the story. An example of this strategy during small group work alerts the child not to be obsessed with nonrelated facts and monopolizing the conversation. Bock (2007) explains this strategy in detail and it is a strategy that can be made with materials around the school and modified for most any child or situation. Social stories are wonderful for the younger child, age's preschool to fifth grade (Portway & Johnson 2003 & 2005; Carrington et al., 2003). Carol Gray designed this strategy and for a minimal cost, booklets can be made online at [www. Sandbox-learning.com](http://www.Sandbox-learning.com). These stories cover a mirage of social instances from waiting your turn in line to sharing your toys. What makes the stories so successful is that they are personalized to the child. Their name, and other pertinent material associated with them appears in the story. Even the character is designed with their physical attributes such as hair and eye color. Again I have used social stories with my own son and know it to be successful in teaching social skills. These stories become special to the child and hold their interest.

Another common marker or generalization that qualifies children as AS or HFA is obsession with special interests (DSM-IV) (APA 2000). Many research articles can be found on this phenomena and chapter three refers to several strategies that can be incorporated in the classroom. It is not surprising that children with ASD may attempt to make sense of their surrounding world through learning about special interest, as it may be the means that comes to them most naturally and is most enjoyable. It is important to remember that whereas typical children integrate the facts they learn through verbal memory into activities such as play with other children or into a larger body of

conceptual knowledge, children with ASD do not. It would be beneficial to harness this tremendous learning potential to advance social and communicative competence and adaptive behavior in individuals with ASD. The possibility of making use of these talents in a way that both encourages socialization and results in the child with autism being a valued member of the peer group would benefit in the classroom.

Baron-Cohen and Whellwright (1999) broke down special interests into feasible topics found in education today and how this phenomenon may relate to the learning process of individuals with AS/HFA. This research showed children with AS/HFA to have a fascination with “folk physics”. Qualitative surveys showed high correlations with physics, biology, math, taxonomy and TV/Video. This research also comes with a survey that can be used in any classroom in getting to know what the children in your classroom are interested in. If these interests are then placed into your curriculum, greater success with longer lasting sustainability. Winter-Messiers (2007) and Winter-Messiers et al., (2007) studies both give strategies on implementing special interests into curriculum. Some simple ideas as writing math problems with material that is familiar to the children. Having students read and report about their special interests will be a sure bet in a though assignment. Structuring writing prompts with the special interest in mind will glean more intense essays.

Other strategies to aide in the writing process found in chapter three was the SRSD (self-regulated strategy development). In 2007, Delano ran two research experiments with this strategy to verify its strengths when teaching children with AS/HFA. The first study had the students videotaping themselves applying this strategy. Students would follow a script where the student talked aloud as he modeled the strategy

by counting the number of words in the essay, recording the number on a bar chart, determining if he met his goals, and setting a new goal to increase his writing output. The second study only used picture prompts while writing to help the student motivate subject material. Both studies succeeded with longer essays, more literature elements used and the quality of writing improved. Furthermore, the probes showed sustainability in other subjects and further into the school year.

Issues with sustainability are important to remember when educating students with AS/HFA. One cannot assume that if a student can solve an algebraic math problem, that same student can also perform simple life skill tasks seen in purchasing. Again really knowing the child in your classroom is brought to light. Not much research exists correlating math strategies with children diagnosed with AS/HFA because it is assumed this is an area of strength. Many of these children do show brilliance with number sense and computation but when asked to apply that knowledge to society, the brilliance is lost (Prior, 2003). These children can be taught transferability through modeling, cueing and real-life scenarios (Cihak & Grim 2008; Banda et al., 2006).

In summary, each child is unique and should be diagnosed on an individual basis. This statement relates to not any one strategy being the fix-all for any one special educational child; thus, the reason for an IEP. The purpose of this research was not to validate the many strategies mentioned, therefore, individuals would have to be studied in a systematic and controlled study. The purpose of my suggestions and question was to inform and supply the tool belt of teachers with many strategies in working with children that have special needs.

Suggestions for Future Research

Given the literature in chapter three, there are still many areas that need further research on how to best serve students with AS/HFA. One such question stemmed from the unsuccessful research study of Harbinson (2009) where researchers tried to implement strategies in having students with AS/HFA write fictional essays. Due to the literal thinking of these students, many nuances of fiction cause much confusion, frustration and generally a disregard in compliance. I found no other literature addressing this question of teaching students with AS/HFA to successfully write fictional essays. Some might say to forgo this skill and let them write factual essays, but due to high stake testing, many of the story prompts are fictional. This skill would be a definite criterion for further study.

Another question that I feel was not addressed when researching strategies in reading was what to do when fluency and comprehension do not mesh. If you have a student who can read fluently at a seventh grade reading level but can only comprehend at a third grade reading level, what is a strategy for this phenomena. According to the many tests performed in chapter three regarding reading, this is a natural occurrence for students with AS/HFA (Minshew et al., 1994; Griswold et al., 2002; Nation et al., 2006; Whalon et al., 2009). Research on how to best serve the reading needs of these students is still needed.

I would like to assume because this is a newly classified mental and medical condition (DSM-IV, APA 1994) that the causation of such small studies is due to little data being found. I hope future research articles will contain larger data pools in participants due to the rising numbers of children being labeled with AS/HFA. More

research is definitely needed in this area so that generalizations can be made and more strategies can be developed in helping these marginal children.

Until a few years ago, most of the research was geared to social and behavior issues because of these children becoming mainstreamed within general education. I was able to find enough articles in the core academics of writing, math, and reading, but much more is needed. The amount of articles referring to social and behavior verses academic material is estimated at seven-to-one. Research has shown that cognitive differences occur as well (Collins, 2003; Minshew et al., 1994; Siegel et al., 1996; Griswold et al., 2002). Extended exploration of such could illuminate strategies to support the whole child rather than one aspect at a time.

Professional development is another area where future research is needed. Loiaconno and Allen (2008) paint a grim picture using quantitative data in a New York school district illustrating the lack of training both special education and general education teachers have in supporting this growing population of children in their classrooms. Further research is needed on how to best prepare teachers for the children that now fill their classrooms. Research supporting effective training models for professional development would increase the probability that the training would be utilized.

Finally, in many classrooms, children with AS/HFA are assigned paraeducators to help them deal with social, behavioral and organizational skills. Two areas of research needs addressing with this much needed help in the classroom. The first is strategies to implement when budget cuts take these very important people out of the school and second, how to best utilize and train these individuals in gaining success for the child. I

found no research correlating children with AS/HFA and paraeducators demonstrating the need for future documentation.

While chapter three did reveal significant findings, there is a need for additional professional research. For teachers and paraeducators, specific training is necessary to fully support students with AS/HFA. More research needs to occur in the cognitive domain in academic subjects. A few generalizations such as writing fictionally and the deviance between fluency and comprehension need to be addressed in aiding teachers with proven strategies to use in their classrooms. Finally, larger case studies will help to form more solid strategies to apply to generalizations.

Conclusion

Chapter one introduced the argument for effective strategies for general education teachers of students with High-Functioning Autism and /or Asperger Syndrome. It compared and contrasted the two diagnoses and gave proof that similar strategies would be beneficial to both populations of students. The chapter described the deficits inherent in both diagnoses to establish a basis when researching strategies to apply in the classroom. Statistics were provided to show the rising demographics in the Autism spectrum and the rationale of why these students are educated with the general population. In addition, it discussed the controversy of inclusion and the limitations of the literature review.

Chapter two provided the historical background in the discovery of Asperger Syndrome and High Functioning Autism. It described the historical exclusion and discrimination of individuals with autism as well as the history of public schooling in the United States due to Supreme Court cases. Finally, the chapter demonstrated how Autism

and Asperger Syndrome were categorized within special education, the law, and the diagnostic tool driving the process of education.

Chapter three was divided into nine subheadings regarding the research on the best known teaching practices regarding children with Asperger/ High Functioning Autism. Each subheading stemmed from the academic areas where modifications need to occur according to the DSM-IV (APA, 2000) classification of this neurological disorder. The research areas examined were testing and IQ, writing, reading, math, special interests, speech, social skills, theory of mind, and behavior; thus, encompassing serving the needs of the whole child. Two questions were addressed in each of these subheadings: what are the neurological impairments describing children on the autism spectrum classified under Asperger Syndrome and/or High Functioning Autism; how do they affect children's learning; and, what teaching strategies have been successful in addressing the needs of these children?

The research reviewed in testing and IQ showed that though these students have an average to above average IQ, they process differently, therefore modifications need to be made throughout their academic setting. The research in testing for writing showed strengths in factual composition with a high rate in recall of facts but weaknesses utilizing imagination or inferential writing. When unfamiliar prompts were used, frustration elicited smaller production in words per sentences and a weakness in using story elements to produce high quality work. Research in reading illustrated the need for modifications and scaffolding due to comprehension weakness in the areas of inference, author's purpose, and in most the literary elements involved with fiction narrative.

Strengths in reading included a high recall in factually information and in fluency; these two areas tended to mask the need for modification in comprehension therefore special attention is needed when doing formative assessment of students with AS/HFA. Research in mathematics showed that students with AS/HFA are strong in computation but are weak with application. Modifications for repetition, consistency and teaching to the child's numeric sense were viewed to work best within the classroom. Children with AS/HFA have special interests in which they become fixated with. The research in this area uncovered ways for teachers to use this fixation in each area of the student's day, therefore, creating a bridge from classroom content into their world. The research uncovered that many students with AS/HFA qualify for speech services due to deficiencies with the use of context in pragmatic language comprehension. Further research presented strategies to answer the need of difficulties in language development for the student during everyday studies through scaffolding of instructions and routine.

The research reviewed in the need for social skill training showed that students with AS/HFA need strategies while interacting with others during the school day. Lack of eye contact and reciprocity showed wrong assumptions made by school personnel labeled these children as rude or not compliant. Many strategies were suggested in teaching these children how to appropriately interact with others. In both of the subheadings of speech and social skills, research showed a deficiency with theory of mind skills in students with AS/HFA. The research reviewed theory of mind training programs designed to teach individuals how to recognize mental state in oneself and others, and to be able to make sense of and predict actions. Finally, the last subheading was the study of behavior issues of students with AS/HFA in the school setting. The research revealed that these students

tend to have meltdowns due to frustration in understanding the hidden curriculum found in everyday school settings. Strategies were examined to help these students understand their surroundings better. Chapter four included a summary of the findings, based on the nine subheadings from chapter three, implications for classroom practice, and suggestions for further research.

Due to the rising numbers of children with AS/HFA, the probability of a general education teacher having at least one child in their class yearly is high. These students need additional and/or modified support in both cognitive and social domains. The more knowledge and strategies teachers have in serving the whole child's needs, the better the success rate in preparing these individuals to be useful citizens in our world.

Appendix

The following thirteen terms were referenced in:

Vaughn, Bos & Schumm (2007). *Teaching students who are exceptional, diverse, and at risk in the general education classroom* (4th ed.). New York: Pearson

Asperger Syndrome: A disorder in which the individual has a normal IQ and language development but also exhibits autistic like behaviors and marked deficiencies in social and communication skills.

Autism: A developmental disability characterized by extreme withdrawal and communication difficulties.

Diagnostic and Statistical Manual of Mental Disorders (DSM-III): a reference book published by the American Psychiatric Association.

Executive functioning: refers to the ability to regulate one's thinking and behavior through the use of working memory, inner speech, control of emotions and arousal levels, and analysis of problems and communication of problem solutions to others.

Free appropriate public education (FAPE): the legal mandate that all children with disabilities be given a free and appropriate public education.

Individualized education program (IEP): a written plan, developed to meet the special learning needs of each student with disability

Individuals with Disabilities Education Act (IDEA): legislation designed to ensure that all children with disabilities receive an appropriate education through special education and related services

Least restrictive environment (LRE): the instructional setting most like that of nondisabled peers that also meets the educational needs of each students with disabilities

Pervasive development disorder (PDD): a disorder characterized by impairments in social interaction and verbal and communication skills, a limited number of interests, imaginative activity, and activities that tend to be repetitive

Pervasive developmental disorder not otherwise specified (PDD-NOS): a disorder in which a child exhibits stereotypical behaviors or delays in social interaction or communication, but does not meet the criteria for another PDD

P.L. 94-142: this legislation, designed to ensure that all children with disabilities receive an appropriate education through special education and related services, was originally referred to as the *Education for All Handicapped Children Act*, enacted in 1975, and later reauthorized and expanded as the Individuals with Disabilities Education Act (IDEA)

Pragmatics: the purposes or functions of communication of how we use language to communicate

Social Story interventions: social skill instruction involving individualized short stories designed to clarify a particular social context, the perspectives of others in that context, and the social skills to be performed

Applied Behavior Analysis (ABA): an applied science that develops methods of changing behavior. It is based on the scientific study of the principles of operant and respondent conditioning. ABA is applied (the outcome has practical significance), behavioral (behavior itself is of interest), analytical (functional relationships can be established) (Schreck & Mazur, 2008).

Childhood Asperger Syndrome Test (CAST): a survey filled out by parents, teachers, and psychiatrists used in the qualification and diagnosis of Asperger Syndrome (Williams et al., 2005).

Cogitative Behavior Therapy (CBT): involves recognizing unhelpful or destructive patterns of thinking and reacting, then modifying or replacing these with more realistic or helpful ones (Schreck & Mazur, 2008).

Delayed Processing: people with AS may take longer to process information prior to giving a response: particularly if the information is given only auditory (presenting the information also in a visual form can assist with this delay) (Minshew et al., 1994).

Hidden Curriculum: important social skills that everyone knows, but no one is taught, specifically in schools. An example would be knowing to discuss with others what you just did in the bathroom or when told to open to a page in a school book, work begins (Sofronoff et al., 2007).

Idiosyncratic Language: language usage peculiar or unique to an individual; patterns of language or specific usage of words that makes sense only to the individual or those familiar with his or her communication style (Loukusa et al., 2007).

Meltdowns: an emotional breakdown; often this term is used to describe a full-blown tantrum but is actually a form of anxiety due to frustration in understanding (Farrugia and Hudson, 2006).

Mindblindness: difficulty in sensing and appropriately reacting to the beliefs, desires, emotions, and intentions of others (Attwood, 2003).

Proprioceptive: capable of receiving stimuli originating in muscles, tendons, and other internal tissue (Attwood, 2003).

Prosody: refers to the 'tone of voice', used to convey emphasis and feeling in speech. Studying how people with ASD perceive and use prosody will make important contributions to our understanding of the core features of their communicative deficits

and to designing intervention programs that can improve their ability to partake in the emotional and interpersonal meanings of language (Saalasti et al., 2008).

Reciprocity: refers to the social give and take between humans. Example: if you smile at someone, the initial reaction is for that person to smile back. HFA/AS have a social deficit in reciprocity (Portway & Johnson, 2003).

Theory of Mind: the ability to attribute mental states—beliefs, intents, desires, pretending, knowledge, etc.—to oneself and others and to understand that others have beliefs, desires and intentions that are different from one's own (Kaland et al., 2008).

REFERENCES

- Ahonen, T., Tuovinen, S., & Leppasaari, T. (1999). Rapid automatized naming test. Jyväskylä, Finland: Haukkarannan Koulun julkaisusarjat, tutkimusraportit.
- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.) Washington, DC: Psychiatric Press Association.
- American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders: DSM-IV*. Washington D.C.: Psychiatric Press Association.
- Amundson, S. (1995). *Evaluation tool of childrens' handwriting*. Homer, AK: O.T. Kids Publishing.
- Asperger, H. (1944). Die "Autistischen Psychopathn" im Kindesalter, *Archiv fur Psychiatrie und Nervenkrankheiten*, 117, 76-136. Translation and annotation by U. Frith (Ed.) (1991). *Autism and Asperger Syndrome*. Cambridge, UK: Cambridge University Press.
- Asperger Syndrome: A Different Mind*. Dir. Chris Collins. British Broadcasting Communication, 2003. DVD.
- Attwood, T. (2003) *Asperger's syndrome*. Philadelphia; Jessica Kingsley Publishers.
- Attwood, T. (2006) *The complete guide to Asperger's syndrome*. Philadelphia: Jessica Kingsley Publishers.
- Banda, D., McAfee, K., Lee, D. & Kubina Jr, R. (2006). Math preference and mastery relationship in middle school students with autism spectrum disorders. *Junior Behavior Education*, 16; 207-223.
- Baron-Cohen, S. & Wheelwright, S. (1999). Obsessions in children with autism or Asperger syndrome: Content analysis in terms of core domains of cognition. *British Journal of Psychiatry*, 484-490.
- Baron-Cohen, S., Wheelwright, S., Hill, J., Raste, Y., & Plumb, I. (2001) The reading the mind in the eyes test revised version: A study with normal adults and adults with Asperger syndrome or high-functioning autism. *Journal of Child Psychology and Psychiatry*, 38; 813-822.
- Baron-Cohen, S., Wheelwright, S., Spong, A., Scahill, V., & Lawson, J. (2001) Are intuitive physics and intuitive psychology independent? A test with children with Asperger syndrome. *Journal of Developmental and Learning Disorders*, 5; 47-78.
- Beaumont, R. and Sofronoff, K. (2008). A new computerised advanced theory of mind measure for children with Asperger syndrome: The ATOMIC. *Journal of Autism and Developmental Disorder*, 38; 249-260.

- Bock, M. (2007). The Impact of social-behavioral learning strategy training on the social interaction skills of four students with Asperger syndrome. *Focus on Autism and Other Developmental Disabilities*, 22; 88-95.
- Bowers, L. Barrett, M., Huisingsh, R., Orman, J. & LoGiudice, C. (1991). Test of problem solving- elementary, revised; Examiner's manual and student stimuli. Each Moline, IL. LinguiSystems.
- Bowers, L., Huisingsh, R., Barrett, M., Orman, J. & LoGiudice, C. (1992). TOPS- adolescent kit. Tasks of problem solving. East Moline, IL. LinguiSystems.
- Brent, E., Rios, P., Happe, F., & Charman, T. (2004). Performance of children with autism spectrum disorder on advanced theory of mind tasks. *Autism*, 8; 283-299.
- Carrington, S., Templeton, E. and Papinczak, T. (2003). Adolescents with Asperger syndrome and perceptions of friendship. *Focus on Autism and Other Developmental Disabilities*, 18; 211-218.
- Chiang, H. & Lin, Y. (2008, November 19). *Mathematical ability of students with Asperger syndrome and high-functioning autism*. Retrieved March 19, 2009, from NCTM.org: <http://aut.sagepub.com>.
- Cihak, D. & Grim, J. (2008, February 26). *Teaching students with autism spectrum disorder and moderate intellectual disabilities to use counting-on strategies to enhance independent purchasing skills*. Retrieved March 19, 2009, from Research in Autism Spectrum Disorders <http://ees.elsevier.com/RASD/default.asp>.
- Delano, M. (2007a). Improving written language performance of adolescents with Asperger syndrome. *Journal of Applied Behavior Analysis*, 40; 345-351.
- Delano, M. (2007b). Use of strategy instruction to improve the story writing skills of a student with Asperger syndrome. *Focus on Autism and Other Developmental Disabilities*, 22; 252-258.
- Dugan, E., Kamps, D., Leonard, B., Watkins, N., Rheinberger, A., & Stackhaus, J. (1995). Effects of cooperative learning groups during social studies for students with autism and fourth-grade peers. *Journal of Applied Behavior Analysis*, 28; 175-188.
- Dunn, L., and Dunn L.M. (1994). Peabody picture vocabulary test-revised. Taipei, Taiwan:Psychological Publishing.
- Farrugia, S. & Hudson, J. (2006). Anxiety in adolescents with Asperger syndrome: negative thoughts, behavioral problems, and life interference. *Focus on Autism and Other Developmental Disabilities*, 21; 25-35.

- Feng, H., Lo, Y., Tsai, S. & Cartledge, G. (2008). The effects of theory-of-mind and social skill training on the social competence of a sixth-grade student with autism. *Journal of Positive Behavior Interventions*, 10; 228-242.
- Frith, U. (1991). *Autism and Asperger syndrome*. Cambridge: The Press Syndicate of the University of Cambridge.
- Frith, U. (2004). Emanuel Miller lecture: Confusions and controversies about Asperger syndrome. *Journal of Child Psychology and Psychiatry*, 45; 672-686.
- Gately, S. (2008). Facilitating reading comprehension for students on the Autism spectrum. *Teaching Exceptional Children*, 40-45.
- Gillberg, C. (2002). Asperger syndrome (and high-functioning autism) diagnostic interview (ASDI) preliminary study of a new structured clinical interview. *Sage Family Studies Abstracts*, 24; 3-139.
- Gough, P., Hoover, W., & Peterson, C. (1996). Some observations on a simple view of reading. In C.
- Cornoldi & J. Oakhill (Eds.), *Reading comprehension difficulties: Process and intervention* (p. 1-13). Mahwah, NJ: Lawrence Erlbaum.
- Goodman, R. (1997). The strengths and difficulties questionnaire: a research note. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, 38; 581-586.
- Graham, L., & Wong, B. (1993). Comparing two modes of teaching a question-answer strategy for enhancing reading comprehension: Didactic and self-instructional training. *Journal of Learning Disabilities*, 26; 270-279.
- Graham, S., & Harris, K. (2005). *Writing better: effective strategies for teaching students with learning difficulties*. Baltimore: Brookes
- Grandin, T. (1995). *Thinking In Picture*. New York: Doubleday.
- Griswold, D., Barnhill, G., Smith-Myles, B., Hageqaia, T. & Simpson, R. (2002). Asperger Syndrome and Academic Achievement. *Focus on Autism and Other Developmental Disabilities*, 94-102.
- Hammill, D. (1985). DTLA-2: Detroit Tests of Learning Aptitude. Author.
- Hammill D., & Larsen, D. (1996). *Test of Written Language-3rd Edition*. Austin, TX: Pro-Ed.

- Hansen, J. & Pearson, P.D. (1983). An instructional study: Improving the inferential comprehension of good and poor fourth-grade readers. *Journal of Educational Psychology*, 75; 821-829.
- Happe, F. (1994). An advanced test of theory of mind: Understanding of story characters thoughts and feelings by able autistic mentally handicapped and normal children and adults. *Journal of Autism and Developmental Disorders*, 24; 129-154.
- Harbinson, H. & Alexamder, J. (2009). Asperger syndrome and the English curriculum: addressing the challenges. *Support for Learning*, 24; 11-18.
- Hutchinson, N. (1993). Effects of cognitive strategy instruction on algebra problem solving of adolescents with learning disabilities. *Learning Disabilities Quarterly*, 16; 34-63.
- Johnson, B. & Portway S. (2005). Do you know I have Asperger's Syndrome? Risks of a non-obvious disability. *Health, Risk and Society*, 7; 73-83.
- Kamps, D., Leonard B., Potucek, J. & Garrison-Harrell, L. (1995). Cooperative learning groups in reading: An integration strategy for students with autism and general classroom peers. *Behavioral Disorders*, 21; 89-109.
- Kaufman, A. & Kaufman N. (1985), Kaufman Test of Educational Achievement. Circle Pines, MN: American guidance Service.
- Kaland, N., Smith, L. & Mortensen, E. (2007). Response times of children and adolescents with Asperger syndrome on an 'advanced' test of theory of mind. *Journal of Autism and Developmental Disorders*, 37; 197-209.
- Kaland, N., Callesen, K., Moller-Nielsen, A., Mortensen, E. & Smith, L. (2008). Performance of children and adolescents with Asperger syndrome or high-functioning autism on advanced theory of mind tasks. *Journal of Autism and Developmental Disorders*, 38; 1112-1123.
- Kern, J., Trivedi M., Garver, C., Grannemann, B, Adrews, A., Savla, J., Johnson, D. Mehta, J. & Schroeder, J. (2006). The pattern of sensory processing abnormalities in autism. *Autism: The International Journal of Research & Practice*, 10; p. 480-494.
- Klin, A., Danovitch J., Merz A., and Volkmar, F. (2007). Circumscribed intersts in higher functioning individuals with Autism spectrum disorders: an exploratory study. *Research and Practice for Person with Severe Disabilities* , 89-100.
- Klin, A. & Volkmar, F. (1996). *Asperger's syndrome; Handbook of Autism and Pervasive Developmental Disorders*. New York: Wiley.

- Klin, A., Jones, W., Schultz, R. & Volkmar, F. (2003). The enactive mind—from action to cognition: lessons from autism. *Philosophical Transactions of the Royal Society, Biological Sciences*, 358; 345-360.
- Klin, A., Volkmar, R., & Sparrow, S. (2000). *Asperger Syndrome*. New York: The Guilford Press.
- Koegel, A. (2008, October). Evidence Suggesting the Existence of Asperger Syndrome in the Mid-1800s. *Journal of Positive Behavior Interventions*, 270-272.
- Laine, M., Loivuselka-Sallinen, P., Hanninen, R., & Niemi, J. (1997). The Boston Naming Test. Helsinki, Finland: Psykologien Kustannus Oy.
- Levine, M. (1986). Manual of the Leiter international performance scale. Los Angeles: WPS.
- Lord, C., Rutter, M., Goode, S., Heemsbergen, J., Jordan, H., Manhood, L., & Schopler, E. (1999). Autism diagnostic observation schedule: A standardized observation of communicative and social behavior. *Journal of Autism and Developmental Disorders*, 19; 185-212.
- Lord, C., Rutter, M., & Le Couteur, A. (1994). Autism Diagnostic Interview-Revised. *Journal of Autism and Developmental Disorders*, 24, 659-685.
- Lord, C., Risi, S., Lambrecht, L. Cook, E., Levental, B., DiLavore, P., Pickels, A., & Rutter, M. (2000). The Autism diagnostic observation schedule-generic. *Journal of Autism and Developmental Disorders*, 30; 205-223.
- Loiaconno, V. & Allen, B. (2008). Are special education teachers prepared to teach the increasing number of students diagnosed with autism? *International Journal of Special Education*, 23; 120-12
- Louskusa, S., Leinonen, E., Kuusikko, S., Jussila, K., Mattila, M., Nuala, R., Ebeling, H., & Moilanen, I. (2007). Use of context in pragmatic language comprehension by children with Asperger syndrome or high-functioning Autism. *Journal of Autism Developmental Disorders*, 1049-1059.
- Lyncham, H., Albott, M. & Rapee, R. (2003). Life interference measure. Macquarie University, Sydney, Australia.
- Lyons, V. & Fitzgerald, M. (2007, October 6). Asperger (1906-1980) and Kanner (1894-1981), the two pioneers of autism. *J Autism Dev Disord*, pp. 2022-2023.
- MacWhinney, B. (1995). The CHILDES project: tools for analyzing talk (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates Inc.

- Manjiviona (2003). *Learning and Behavior Problems in Asperger syndrome*. New York:Guilford.
- Manzo, A. (1969). The request procedure. *Journal of Reading Education*, 13; 123-126.
- Mayes, S. & Calhoun, S. (2006) 'Frequency of reading, math, and writing disabilities in children with clinical disorders', *Learning and Individual Difference*, 16; 145-57.
- McCarthy, D. (1972). *Manual for the McCarthy Scales of Child's Ability*. New York: The Psychological Corporation.
- Minsheu, Goldstein, Taylor & Siegel (1994). Academic achievement in high functioning Austistic individuals. *Journal of Clinical and Experimental Neuropsychology*, 261-270.
- Montague, M. & Bos, C. (1986). The effect of cognitive strategy training on verbal math problem solving performance of learning disabled adolescents. *Journal of Learning Disabilities*, 19; 26-33.
- Montague, M. (1992). The effects of cognitive and metacognitive strategy instruction on the mathematical problem solving of middle school students with learning disabilities. *Journal of Learning Disabilities*, 25; 230-248.
- Myles, B., and Simpson, R. (1998). *Asperger Syndrome: A Guide for Educators and Practitioners*. Austin: PRO-ED.
- Myles, B., Hilgenfeld, T., Barnhill, G., Griswold, D., Hagiwara, T. & Simpson, R. (2002). Analysis of reading skills in individuals with Asperger syndrome. *Focus on Autism and Other Developmental Disabilities*, 44-47.
- Myles, B., Rome-Lake, M., Barnhill, G., Huggins, A., Hagiwara, T. & Griswold, D. (2003). Written language profile of children and youth with Asperger syndrome: from research to practice. *Education and Training in Developmental Disabilities*, 38; 362-369.
- Myles, B., Bock, S. & Simpson, R. (2001). *Asperger Syndrome Diagnostic Scale*. Austin, TX: Pro-Ed.
- Myles, B, Hagiwara, T., Dunn, W., Riunner, L., Reese, M., Huggins A. & Becher, S. (2004).Sensory issues in children with Asperger syndrome and autism. *Education an Training in Developmental Disabilities*, 39; 283-290.
- Nation, K., Clarke, P., Wright, B. & Williams, C. (2006). Patterns of reading ability in children with Autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 36: 911-919.

- Neale, M. (1997). Neale analysis of reading ability-revised (NARA-II). Windsor, UK: NFER.
- Newcomer, P., and Hammill, D. (1988). Test of language development-2. Toronto: Psycan.
- O'Connor, I. & Klein, P. (2004). Exploration of strategies for facilitating the reading comprehension of high-functioning students with Autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 115-127.
- OSPI (2009, July 10). Superintendent of Public Instruction. Olympia, Washington, USA.
- Ozonoff, S., Pennington, B., & Rogers, S. (1991). Executive function deficits in high-functioning autistic individuals: relationship to theory of mind. *Journal of Child Psychology and Psychiatry*, 32; 1081-1106.
- Palincsar, A. & Brown, A. (1984). Reciprocal teaching of comprehension-fostering and comprehension monitoring activities. *Journal of Cognitive Education*, 1; 117-175.
- Paris, S. & Oka, E. (1986). Children's reading strategies, metacognition, and motivation. *Developmental Review*, 6; 25-56.
- Portway, S. & Johnson, B. (2003). Asperger syndrome and the children who 'don't quite fit in'. *Early Child Development and Care*, 173; 435-443.
- Prior, M. (2003). Is there an increase in the prevalence of autism disorders? *Journal of Pediatrics and Child Health*, 39; 81-82.
- Quill, K. (2000). Do-Watch-Listen_Say. Baltimore: Paul H. Brookes Publishing Co
- Raphael, T. & Pearson, P. (1985). Increasing students' awareness of sources of information for answering questions. *American Educational Research Journal*, 22; 217-235.
- Rice CE, Baio J, Van Naarden Braun K, Doernberg N, Meaney F J, & Kirby RS for the ADDM Network. A public health collaboration for the surveillance of Autism spectrum disorders. *Paediatr Perinat Epidemiol*, 2007; 179-190.
- Ritvo, E. (2006). Understanding the nature of autism and Asperger's disorder. London: Jessica Kingsley Publishers.
- Rosenbaum, M. & Breiling, J. (1976). The development and functional control of reading comprehension behavior. *Journal of Applied Behavior Analysis*, 9; 323-333.
- Rutter, M., LeCouteur, A., & Lord, C. (2003). Autism diagnostic interview-revised. Los Angeles, CA: Western Psychological Services.

- Saalasti, S., Lepisto, T., Toppil E., Kujala, T., Laakso, M., Wendt, T., Wendt, L. & Jansson-Verkasalo, E. (2008). Language abilities of children with Asperger syndrome. *J Autism Dev Disord*, 1574-1580.
- Sansosti, F. & Powell-Smith, K. (2008). Using computer-presented social stories and video models to increase the social communication skills of children with high-functioning Autism spectrum disorders. *Journal of Postitive Behavior Interventions*, 162-178.
- Schniering, C. and Rapee, R. (2002). Development and validation of a measure of children's automatic thoughts: the children's automatic thoughts scale. *Behavior Research and Therapy*, 36; 545-66.
- Schreck, K. & Mazur, A. (2008). Behavior analyst use and beliefs in treatments for people with autism. *Behavior Interventions* , Volume 23: 201-212.
- Schunk, D. & Rice, J. (1986). Extended attributional feedback: sequence effects during remedial reading instruction. *Journal of Early Adolescence*, 6; 55-66.
- Siegel D., Goldstein, G. & Minshew, N. (1996). Designing Instruction for the High-Functioning Autistic Individual. *Journal of Developmental and Physical Disabilities*, 1-19.
- Silvaroli, N. (1993). Classroom reading inventory (8th ed.). Madison, WI: Brown and Benchmark.
- Skinner, C., Robinson, S., Johns, G., Logan, P., & Belfiore, P. (1996) Applying Herrnstein's matching law to influence students' choice to complete difficult academic tasks. *Journal of Experimental Education*, 65; 5-17.
- Sofronoff, K., Attwood, T., Hinton, S. & Levin, I. (2007). A randomized controlled trial of a cognitive behavioral intervention for anger management in children diagnosed with Asperger syndrome. *Journal of Autism and Developmental Disorders*, 37; 1203-1214.
- South, M., Ozonoff, S., & McMahon, W. (2005). Repetitive behavior profiles in Asperger syndrome and high-Functioning Autism. *Journal of Autism and Developmental Disorders* , 145-158.
- Snowling, M., Stothard, S. & McLean J. (1996). The graded non-word reading test. Read, UK: Thames Valley Test Company.
- Spence, S. (1998). A measure of anxiety symptoms among children. *Behavior Research and Therapy*, 35; 545-66.

- Spring, J. (2006). *The american school*. New York: McGraw Hill.
- Tyler, S.W., Delancy H. & Kinnucan M. (1983). Specifying the matter of reading ability differences and advance organizer effects. *Journal of Educational Psychology*, 75; 359-373.
- Thorndike, R., Hagen, E., & Sattler, J. (1986). Stanford-Binet intelligence scale (4th ed.). Chicago:Riverside.
- Vaughn, S., Bos, C., & Schumm, J. (2006). *Teaching Exceptional, Diverse, and At-Risk Students in the General Education Classroom (3rd ed.)*. Boston: Allyn and Bacon Publishers.
- Vaughn, S., Bos, C., & Schumm, J. (2007). *Teaching Students Who are Exceptional, Diverse, and at Risk in the General Education Classroom (4th ed.)*. New York: Pearson
- Villa, R. & Thoudand, J. (2000). Restructuring for caring and effective education: Piecing the puzzle together. Baltimore: Paul H. Brookes Publishing Co.
- Villiers, J., Fine, J., Ginsber, G., Vaccarella, L. & Szatmari, P. (2007). Brief report: a scale for rating conversational Impairment in Autism spectrum disorder. *J Autism Dev Discord* , 1375-1380.
- Volkmar, F. and Rutter, M (1994). Childhood disintegrative disorder: results of the DSM-IVautism field trial. *Journal of the American Acadamy of Child and Adolescent Psychiatry*, 34; 1092-1095.
- Wechsler, D. (1992). Wechsler intelligence scale for children (3rd ed). San Antonio, TX: Psychological Corp.
- Whalon, K., & Hanline, M. (2008). Effects of a reciprocal questioning intervention on the question generation and responding of children with autism spectrum disorder. *Education and Training in Developmental Disabilities*, 432; 367-387.
- Whalon, K., Otaiba, S., & Delano, M. (2009). Evidence-Based Reading Instruction for Individuals with Autism Spectrum Disorders. *Focus on Autism and Other Developmental Disabilities* , 3-16.
- Williams, A., Scott, F., Allison, C., Bolton, P., Baron-Cohen, S., and Brayne, C. (2005). The CAST (childhood Asperger syndrome test): test accuracy. *Autism*, p. 45-68.
- Wing, L. (1980). Childhood autism and social class: a question of selection? *British Journal of Psychiatry* , 410-417.

- Winter-Messiers, M. (2007). From tarantulas to toilet brushes: understanding the special interest areas of children and youth with Asperger syndrome. *Remedial and Special Education* , 140-152.
- Winter-Messiers, M., Herr, C., Wood, C., Brooks, A., Gates, M., Houston, T., & Tingstad, K.(2007). How far can Brian ride the daylight 4449 express? Strength-based model of Asperger syndrome based on special interest areas. *Focus on Autism and Other Developmental Disabilities* , 67-79.
- Woodward, H. (2006, April 25). Olympia school seek specialist for autism. *The Olympian*. Retrieved April 25, 2006, from <http://www.theolympian.com>.
- Woodcock, R.W. (1997). Woodcock Reading Mastery Test-Revised. Circle Pines, MN: American Guidance.
- World Health Organization (1993). International classification of diseases (ICD-10) (10th edition)Geneva: World Health Organization (WHO).
- Wright P. &. (2007). *Special Education Law*. Virginia: Harbor House Law Press, Inc.
- Zachman, L., Huisingh, R., Barrett, M., Orman, J. & LoGuidice, C. (1991). Test of problem solving-Elementary, revised: Examiner's manual. East Moline, IL: LinguSystems.
- Zachman, L., Barret, M., Huisingh, R., Orman, J. & Bageden C. (1994). Test of problem solving-ADO. East Moline, IL: LinguSystems.