

WHITE, MARY LOYD, Ph.D. *An Analysis of School District Demographic and Dispute Factors Affecting Services for Students with Autism Spectrum Disorder.* (2012)  
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The purpose of this study was to examine the educational services for students with autism in school districts ( $N = 115$ ) in North Carolina to identify the characteristics and variables that contribute to positive student outcomes. This study used a secondary analysis of data from various resources across the state. Variables included number of students with autism, prevalence, median personal income, student achievement composite scores, population demographics (urban versus rural), and rate of dispute (state complaints and mediations).

Between 2006 and 2010, the mean percentage of growth in North Carolina for students with autism ( $M = 82.23\%$ ) was greater than that of the total student population during the same time period ( $M = -1.55\%$ ). Multiple regressions were used to measure the effect of income on proficiency scores and prevalence; correlational analyses were used to examine the relationship between district variables. Although a district's median income was related to the percentage of students with a composite proficiency score on statewide testing in grades 3 through 8 for the total population it did not have the same effect on students with autism. A moderate association existed between the percentage of students identified with autism and the district's level of median personal income. For every thousand-dollar increase in median income, there was a .28 percent increase in the prevalence of autism. Only a mild relationship existed between the rate of dispute and median personal income for each district and little difference existed between dispute and other district-level variables.

The findings of this study provide direction for research and valuable insight for special education administrators at the state and district level as they face an increasing number of students with autism who have unique educational needs. Specifically, the results suggest that student proficiency scores for students with autism are not related to a district's median personal income, but income is related to the amount of dispute as well as a district's prevalence rate.

AN ANALYSIS OF SCHOOL DISTRICT DEMOGRAPHIC AND DISPUTE  
FACTORS AFFECTING SERVICES FOR STUDENTS WITH  
AUTISM SPECTRUM DISORDER

by

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APPROVAL PAGE

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## **CHAPTER I**

### **INTRODUCTION**

Although autism was identified more than 65 years ago, it has only received widespread recognition during the last decade as the number of children diagnosed with autism spectrum disorder (ASD) has steadily increased. The Centers for Disease Control and Prevention estimated that ASD now affects 1 in 110 children (CDC, 2010). The United States has more than 1.5 million individuals with autism and the prevalence rate continues to increase (White House, 2006). From the first mention of autism by a Swiss psychiatrist, Eugen Bleuler, in 1911, through relatively recent times, the etiology and treatment of autism have largely remained mysteries even to education professionals (Autism & PDD, 2010). As a result, children with autism in the 1950s and 1960s who received formal education worked with teachers who relied on their intuition to devise educational services. As educational services slowly evolved in the 1970s and 1980s, states began to create services and classrooms specific to students with ASD. This beginning of service delivery models specific to meeting the needs of students with ASD was followed by a time when the number of treatment interventions increased dramatically and school districts engaged in legal battles over what defined an appropriate level of services.

A wide range of opinions over treatments and educational services has evolved as, individuals, families, and professionals have benefited from increased awareness and

funding for research. Nevertheless, the prevalence and spectrum of autism is now so large that educational agencies face an increased need to find methods to provide evidence-based educational services.

Over the past decade, a considerable amount of federal research has been funded to support legislatures in their work on public policy as it relates to autism. The National Institute of Health and 26 universities, in collaboration with the National Institute on Child Health and Development, developed public policy regarding best practices for children with ASD (Feinberg & Vacca, 2000). The Combating Autism Act of 2006 authorized an expansion of actions for research, prevention and treatment through 2011. As a result, the Federal Interagency Autism Coordinating Committee (IACC) was established to advise the federal government on policy, but it has left the determination of appropriate methodologies for children with ASD to state and local agencies (U.S. Department of Health and Human Services, 2010).

Personal financial wealth has played a role in diagnosis and treatment over the years. Historically, children born to wealthier families have been more likely to receive a diagnosis of autism (Heasley, 2011). However, a recent study in California explored the role of the economically advantaged neighborhood and found that increasingly the socioeconomic level of the neighborhood played a greater role than the wealth of the individual family (King & Bearman, 2011). The median personal income of communities and school districts could be a factor in the district's prevalence rate and educational services, especially with the current financial strain on school districts across the nation.

Major advances in the understanding facets of autism and the focus on research provide some level of reassurance for the future, but, at present, special education administrators, as their budgets have fallen and accountability has increased, are faced with new challenges in effectively educating students with ASD. With a continued increase in accountability, schools struggle to meet the needs of students with disabilities, which can be an even greater hurdle for students with ASD (Olson, 2005; Walsh, 2005). The sheer number of methodologies and interventions is often overwhelming to parents and educators (Simpson, 2005). To meet the unique learning needs of students with ASD, some school districts have developed specific programs, although the quality of these programs varies widely because district staff members, who may not have the most recent information, provide much of the professional development (Lerman, Vorndran, Addison, & Kuhn, 2004).

In an effort to support families, service providers, and school districts, two publications have been produced that have national guidelines for supporting children with autism. The work of the National Research Council's (NRC) *Educating Students with Autism* (2001) outlined comprehensive and interdisciplinary practices that were proven to be most effective for children prior to age eight. In this publication, the first to provide a comprehensive evaluation of interventions, researchers analyzed approaches and identified best practices for educating children with ASD. Their findings established direction for providing professional development for teachers working with students with ASD. More recently, the National Autism Center (2009) released the *National Standards Project*, further addressed the need for evidence-based services for professionals and

families. Unlike the NRC document (2001) which limited its findings to young students, the *National Standard Project* evaluated research on evidenced-based interventions for students with ASD up to age 21.

Together the work of the National Research Council (NRC), National Professional Development Center (NPDC), and National Autism Center (NAC) have established systematic recommendations to guide districts in their programming decisions for individuals with autism in early childhood through young adulthood. The NRC publication has a school focus and provides clear recommendations for school districts (NRC, 2001). For this reason and because it has been available for just over ten years, it has served as a strong tool for evaluating school district responses to serving students with autism over the past decade. However, the role of the NPDC and NAC cannot be understated. Undoubtedly, each of these three national recommendations have impacted school district practices in North Carolina and thus serve as the evaluative framework used in this study.

Despite having national guidelines for best practices, the implementation of services likely varies from district to district. This is especially true in a time with educational services for many students are affected by the current economic state of the country. While a great deal of research has focused on different methodologies that directly influence the education of students with ASD, little research has focused on district level data and the implications for students with ASD.

This study examined several school district level variables to gain a better understanding of educational services for students with ASD. Specifically, data for

prevalence, dispute, median income, and student performance on the end of grade assessment in urban and rural schools within North Carolina were examined. Student achievement data, which tend to serve as a measure of a district's educational services, as students' test scores ultimately determine how schools are perceived by others in our data driven society, were included. The achievement data focused on composite performance scores for students in grades three through eight.

Using data starting at grade three was important for two reasons: first eligibility data is more representative at grade three and second most of the early intervention recommendations in the National Research Council publication focus on young students. The reason eligibility data is clear in third grade is because prior to turning eight or entering third grade, whichever comes first, children identified as developmentally delayed (DD) undergo a reevaluation, and if they continue to be eligible for special education their area of eligibility is changed from DD to another area (NCDPI, 2010b). As a result, the eligibility data for students at age eight provided a representative assessment of students in any of the possible areas of disability eligibility than data in previous age groups. The NRC recommendations focused on evidence-based practices that should be implemented in early childhood, up to age eight, and may affect subsequent educational services and thus student outcomes.

Additional district level variables in this study include: median income, dispute, prevalence, and urban/rural classification. Because the prevalence of autism is correlated with a higher level of parental age and education, median income data were used as a measure of district socioeconomic status. Another source of data that are discussed within

special education leadership but is rarely analyzed outside of individual cases is district level dispute data. For the purposes of this study, dispute includes formal state complaints and mediation cases. Prevalence data over a five year period are included as they vary from district to district and may show a relationship to other district variables. Finally, districts were categorized as either urban or rural based on census data. This variable was considered because of numerous studies exploring differences in urban and rural schools.

### **Statement of the Problem**

Historically, there was not reliable information about how to educate students with autism (Wing, 2007). The complexities of appropriate services and a lack of information have contributed to tensions between school districts and the families of students with ASD (Feinburg & Vacca, 2000; Weatherly, 2005). More recently, an abundance of contradictory information has become available to educators (Simpson, 2005). The NRC, NPDC, and NAC have provided recommendations for educational services as guidelines for school districts, but having established national recommendations does not necessarily change educational services or student outcomes. While understanding of autism has increased dramatically, along with the population itself, it is not known whether the recommendations have actually an impact on students with ASD and their families. The recommendations have the potential to provide a level of equality to educational services for students with autism, which could affect the level of conflicts and student outcomes. The present research focused on educational outcomes of students as well as evidence of legal conflict. School district variables within both

urban and rural areas of North Carolina were examined to gain an understanding of services for students with ASD.

### **Purpose**

The primary purpose of this study was to examine district level data in North Carolina as it related to students with autism to determine if a relationship exists among the following variables: prevalence of autism, per capita personal income, the number of dispute cases, and student outcomes in both urban and rural schools. This study examined a composite score for student achievement at grades 3 through 8 in districts with student subgroups large enough to report student achievement outcomes for students with ASD. With the exception of the districts that did not report student achievement data, all districts were included in the other analyses for urban and rural school districts with a population of students with autism ranging from 1,846 to 4, respectively.

Relevant district level variables were explored within the context of historical trends, current legal issues, National Research Council, National Professional Development Center, and National Autism Center recommendations. Due to the complexities regarding educational services for students with autism this study examined variables across school districts in North Carolina to gain a better understanding which factors could affect educational services and ultimately student outcomes. Further, the study provided important information to the field because no previous studies have examined the multitude of district level data included here. The findings provide informative data for state and district special education administrators, as well as school personnel and parents affected by autism.

## Research Questions

The following research questions guided this study to gain a better understanding of the educational services for students with ASD by LEAs in North Carolina.

1. What are the characteristics of school districts as they relate to students identified with autism in rural and urban North Carolina? Specifically,
  - a. What are the districts' autism data (number of students, percentage of growth, and prevalence)?
  - b. What is the median personal income for the districts?
  - c. What are the student achievement composite scores for the districts?
  - d. What are the population demographics of each district?
  - e. How many complaints and mediation requests were filed in each district with the North Carolina Department of Public Instruction between 2006 and 2011?
2. Does the EOG composite proficiency on statewide assessments in grades 3 through 8 differ with changes in median personal income and district level prevalence of students with autism?
3. Is there a relationship between median personal income and district level variables?
  - a. Is there a relationship between median personal income and autism prevalence in each district?
  - b. Is there a relationship between median personal income and the rate of dispute?

4. Is there a relationship between the level of dispute (defined by state complaint and mediations from 2006 to 2011) and district level variables? Specifically,
  - a. Is there a relationship between the rate of dispute and student proficiency on statewide assessments?
  - b. Is there a relationship between the rate of dispute and population demographics (urban or rural)?

### **Operational Definition of Key Terms**

In this section, the definitions associated with this study are presented in alphabetical order, and they relate to the full range of information taken into account during this research.

1. *Asperger's Disorder*: Asperger's disorder is included under the broad category of autism or Autism Spectrum Disorder. Asperger's disorder was added to the Diagnostic and Statistical Manual of Mental Disorders of the American Psychiatric Association with different criteria for diagnosis than that of autism. Individuals with Asperger's syndrome, in contrast to autism disorder, have no significant intellectual delays or delay in language development or skills necessary for self-help could be identified (APA, 2000).
2. *Autism*: IDEA defines autism as a developmental disability that significantly affects verbal and nonverbal communication and social interactions. It is usually evident before age 3 and it adversely impacts the child's educational performance. The North Carolina *Policies Governing Services for Children with Disabilities* (NCDPI, 2010b) includes the following disabilities under the autism eligibility area: Autistic Disorder, Pervasive Developmental Disorder-Not Otherwise Specified (Atypical Autism), Asperger's Disorder, Rett's

Disorder, Childhood Disintegrative Disorder or all Pervasive Developmental Disorders.

3. *Autistic Disorder*: The American Psychiatric Association's Diagnostic and Statistical Manual–IV, Text Revision (DSM-IV-TR) provides standardized criteria to help diagnose ASD (APA, 2000). The diagnostic criteria for 299.00 Autistic disorder defines delays or abnormal functioning in at least one of the following areas, with onset prior to age 3 years: (a) social interaction, (b) language as used in social communication, or (c) symbolic or imaginative play. The disturbance is not accounted for better by Rett's Disorder or Childhood Disintegrative Disorder.
4. *Autism Spectrum Disorder (ASD)*: ASD includes individuals identified with autistic disorder, Asperger Syndrome, and Pervasive Developmental Disorder Not Otherwise Specified.
5. *Blended approach*: A blended approach, sometimes referred to as an eclectic approach, refers to an intervention that uses a combination of evidence-based practices to meet the student's individual needs.
6. *Child count*: Child count data refers to the unduplicated count of all students with disabilities and children who are identified intellectually gifted. The student data are reported on December 1<sup>st</sup> and April 1<sup>st</sup> of each year by exceptionality, gender, age, and race/ethnicity.
7. *Dispute*: Dispute resolution data for children with autism were collected from the North Carolina Exceptional Children's Division. For the purposes of this study, cases of dispute included formal state complaints and requests for mediation. In North Carolina, state complaints are based on either IDEA or NC Policies violations and are investigated by NCDPI staff and resolved

within 60 days. For mediation requests, an impartial mediator contacts both the parent and school to hear their positions and then schedules a meeting to attempt a compromise (NCDPI, 2010b).

8. *Least Restrictive Environment (LRE)*: Students must be educated in the general education classroom with non-disabled peers to the maximum extent appropriate. When IEP teams determine a student's educational placement, participants must address whether the students' IEP can be implemented satisfactorily in the general education environment with supplementary aids and services.
9. *Local Educational Agency (LEA)*: The local education agency describes the government agency that is responsible for providing educational services with a defined community. It may also refer to a school district. In North Carolina most LEAs are defined by the county's jurisdiction, although some LEAs are divided into city and county systems. Charter schools serve as their own LEAs.
10. *North Carolina Extended Content Standards (NCECS)*: The North Carolina Extended Content Standards is a functional curriculum established for the students with the most severe disabilities. The curriculum provides statewide standards for each grade level or content area and is designed as an extension, or modified curriculum, based on the North Carolina Standard Course of Study. The standards establish a statewide curriculum for each grade level or content area. Students following this curriculum take an alternate assessment called the NCEXTEND 1.
11. *North Carolina Standard Course of Study (NCSCS)*: The North Carolina Standard Course of Study describes the curriculum that should be provided for

every child in North Carolina public schools. It provides grade level competencies for each curriculum area.

12. *Pervasive Developmental Disorder—Not Otherwise Specified (PDD-NOS):*

PDD-NOS is used to describe individuals who have some of the characteristics of autism, but not enough characteristics to meet the diagnostic criteria of autism (APA, 2000). Students with PDD-NOS in North Carolina can be identified as autistic (NCDPI, 2010b).

13. *Special Education Placement:* The student's placement on the continuum of alternative educational placements, as indicated by his/her IEP. For school age children, placement is defined as regular (more than 80% of the day with nondisabled peers), resource (40-79% of the day with nondisabled peers), separate (39% or less of the day with nondisabled peers), separate school, residential, or home/hospital (NCDPI, 2010b).

### **Overview of the Dissertation**

This research utilized a quantitative design to complete a postsecondary analysis of school district level demographic and autism level data. The majority of this data were maintained by the Exceptional Children's Division of the North Carolina Department of Public Instruction and the remaining demographic data were from the state of North Carolina. All districts were included in this study and thus analyzed population data for the state.

In Chapter II, the literature is reviewed to provide the framework for the study and the background as to why this research is important. Relevant socioeconomic factors and the role of disproportionate representation within the context of autism litigation will be discussed. Autism methodologies and interventions are discussed because the role complex educational services for students with autism cannot be discounted. Chapter III

provides a detailed explanation of the study design, methods, and variables in the study. The data from this study is presented in Chapter IV. Then, in Chapter V, the data are interpreted and discussed as well as conclusion and recommendations for future research.

### **Delimitations and Assumptions**

This study focused on services for students with ASD within in North Carolina. The researcher delimits this study because a few of the school districts had such small numbers of students with autism that they did not report student achievement data; thus, they were not included in all of the analyses. This study did not take into account possible reasons for the wide range of percentages of students with ASD among different LEAs. Further, specific information on many important aspects of educational services for students with autism is beyond the scope of this study. An assumption of the study is that the proximity of certain state and private services as well as university affiliated autism programs could influence the services provided by individual LEAs.

## **CHAPTER II**

### **REVIEW OF THE LITERATURE**

Research in the field of autism has focused largely on the etiology, prevalence, and specific methodologies or interventions. While funding for research in treatments and interventions has increased significantly since the new millennium, limited research exists on the state of educational services in public schools. This study provided an examination of district level variables within North Carolina. Specifically, this research examined data for student outcomes, prevalence, median personal income, and dispute cases in urban and rural school districts. The data were analyzed as a whole and individually at the urban and rural level. It has been well documented that disparity exists in schools and districts based on socioeconomic factors, which ultimately impacts the educational services all students receive.

By examining the prevalence, history, methodology, recommendations by the NRC, NPDC, and NAC, legal implications, and role of socioeconomic status in educational services for students with autism, a foundation was established to guide the reader in understanding the importance of understanding which variables influence services. The research focused on whether these factors have affected educational services for students with autism.

### **Conceptual Framework**

The conceptual framework developed for this study was based on social constructivism theory and an understanding of how social and historical norms have affected all students with disabilities. Social constructivism has been described as a worldview in which individuals seek an understanding of their life and work (Creswell, 2007). This worldview is affected by both historical and political norms, both of which have significantly mediated the education for students with disabilities.

For decades, researchers have explored how the variation from normalcy affects individuals with disabilities. Social constructivism explains how society views people in marginalized groups. The fundamental belief is that disabilities are attitudinal or environmental. Brantlinger (2001) discusses theory of disability from a social constructivism perspective that provides a perspective on poverty, class, and disability. She discusses how the systems of education and other social agencies intersect with the structure of social class as well as government. The structure and hierarchy is depersonalized and ultimately school staff merely follows the established mandates (Brantlinger, 2001).

The issues surrounding achieving equality for students with disabilities are long-standing. Social and political influences affect individuals in diverse social classes differently, especially those with disabilities. An equitable education for all students can be built through decisions founded in social justice, democratic school leadership, and teachers who utilize and share pedagogy and content area knowledge to improve student achievement (Starratt, 2003). Understanding history's influence on educational services

and how increased accountability mandated in the ESEA and IDEA 2004 have influenced educational services overall is critical background. By truly understanding the role of history for individuals with autism as well as the effects of accountability on students with disabilities, the perspective is provided for understanding the complexities of autism related research.

### **History's Influence on Services**

Autism was first identified in 1943 when Leo Kanner published an influential study of 11 children with severe language delays he studied at Johns Hopkins University. His paper, titled "Autistic Disturbances of Affective Contact" in the *Nervous Child* journal, described children with autism as mostly having normal intelligence, being devoid of neurological impairments, and having parents in higher social classes (Mesibov, Shea, & Adams, 2001). Kanner emphasized the role of biology in the cause of autism and was careful to differentiate between autism and schizophrenia, since the disorder was initially referred to as autism with schizophrenia. Kanner was responsible for coining the condition *early infantile autism* and described the inability to relate as a feature of the developmental sequence (Volkmar & Lord, 1998).

At approximately the same time, another researcher, Hans Asperger, was studying 200 German children who had similar characteristics to those Kanner studied, but without severe language delays. Asperger's 1944 doctoral thesis was later credited with identifying Asperger's syndrome, although the term was not used in a research paper until 1981 (Volkmar & Lord, 1998). He referred to the disorder as *autistic psychopathy of*

*childhood* in his work, which was originally published in a German article and was not translated into English until 1989 (Wolff, 2004).

Kanner and Asperger shared similarities in their lives and research. Even though the two never met, they were both born in Austria and received their training in Vienna. Kanner, who was 10 years older than Asperger, moved to the United States and became the head of the Child Psychiatric Clinic at John Hopkins University. Asperger stayed in Vienna and was hired as the Chair of Pediatrics at the University of Vienna (Mesibov et al., 2001). Both Kanner and Asperger noted symptoms and characteristics of the children they studied while distinguishing their characteristics from childhood schizophrenia. Common symptoms noted by both doctors were social difficulties, communication problems, and repetitive and restricted activities. Kanner and Asperger are so widely known as founders in the field of autism that one writer noted that they are the only two names in the field of autism recognized worldwide (Wing, 1997).

Another Austrian born doctor, Bruno Bettelheim, also heavily influenced awareness and understanding of autism in the early years. In numerous articles published throughout the 1950s and 1960s Bettelheim applied psychoanalytic principles to education, society and families. He focused on parenting and created the idea that children with autism were the victims of “refrigerator mothers” in several texts (e.g., *Marcia: An Autistic Girl*, *The Empty Fortress*). Bettelheim is perhaps best known for his work in *The Empty Fortress: Infantile Autism and the Birth of Self*, which was published in 1967. He compared children with autism to prisoners in concentration camps, while their parents were portrayed as the guards (Bettelheim, 1967). The Freudian influence

was clear in Bettelheim's work as he followed many beliefs of Sigmund Freud such as the focus on psychoanalytic principles.

During the 1950s and 1960s, schizophrenia was considered widespread, particularly in the United States, and children with autism included in the category often received expensive psychotherapy as a treatment (Wolff, 2004). The work that received credit for changing the view of autism from an emotional illness to a neurodevelopmental disorder was Bernard Rimland's 1964 book, *Infantile Autism: The Syndrome and its Implication for a Neural Theory of Behavior*. Rimland was a psychologist and a parent of a son with autism who was a vocal advocate of the theory that autism was biologically based in a time when many still believed it to be the result of bad parenting. Further, he believed that biomedical and behavioral therapies could be used for treatment (Rimland, 1964). Rimland's diagnostic checklist was of historical significance as one of the first attempts to provide a standardized method for diagnosis (Volkmar & Lord, 1998). He formed the Autism Research Institute (ARI) as a research center and biomedical clearinghouse. Then in 1965, Rimland founded the Autism Society of America (Maugh, 2006). Despite the fact that Rimland's work raised awareness that autism had a biological basis and was indeed a neurodevelopmental disorder, others continued to believe that autism was a variation of schizophrenia. In 1967, the International Statistical Classification of Disease and Related Health Problems listed *infantile autism* as a form of schizophrenia.

## **Systematic Support for Individuals**

The late 1960s was a time when researchers, teachers, and families began to establish organizations focused on supporting individuals with autism. Just before Rimland founded the ARI, a special education teacher, Sybil Elgar, was working to create a national society in Britain. Sybil Elgar was the United Kingdom's first autism specific teacher. She formed the Society for Autistic Children (now the National Autistic Society) in 1964 to meet the demand for her approach. Ten years later Elgar founded Britain's first residential community for adults with autism. She was widely recognized as a gifted teacher and pioneer for students with autism during a time when most children with autism were simply not recognized and certainly not diagnosed (Wing, 2007). Sybil relied heavily on her own teaching methodologies, many of which are incorporated in the approaches still utilized for students with ASD.

Virginia Walker Sperry, who wrote *Fragile Success: Ten Autistic Children, Childhood to Adulthood*, felt some of same challenges as Sybil Elgar. Sperry described her experiences as an early teacher in the field:

During the 1960s and 1970s, we teachers of youngsters with autism were in no-man's land, where information, resources, and guidance were largely unavailable and where intuition and innovation were required daily tools of the trade. (Sperry, 2001, p. XXIX)

It is clear that the early teachers for students with autism relied on intuition and personal innovation rather than standards when teaching students with a disability that was largely misunderstood.

In 1968, the first elected president of the organization called the Autism Society was the mother of a child with autism, Dr. Ruth Sullivan. Sullivan's fifth child, Joe, was seen by four psychiatrists who told her that she was a "refrigerator mother" before she sought another opinion from a psychiatrist familiar with Kanner's work. Finding a classroom to meet Joe's needs was a challenge during a time when only one in 2,500 children was diagnosed with autism. The family moved to Cabell County Schools in Huntington, West Virginia, so that Joe could attend a classroom for children with autism (Darst, 2007). Ruth founded the Autism Services Center in Huntington, and in November 2003, she was one of six experts for the initial Autism Summit Conference, supported by the U.S. Department of Education and the U.S. Department of Health and Human Services. Joe would eventually become the character most frequently associated with autism in popular media. His early portrayal in a documentary led him to serve as a model for Dustin Hoffman's character in the movie *Rain Man*.

### **History of ABA and TEACCH**

In 1965, Dr. Ivar Lovaas and researchers at the University of California in Los Angeles began using Skinner's experimental behavior analysis for older children with autism. The early results were mixed, and so he refocused his efforts on younger children during intensive sessions lasting 40 hours per week. Lovaas published a landmark study in the *Journal of Consulting and Clinical Psychology* in 1987. In this study, nearly half of the children who were provided intensive 40-hour week sessions in applied behavior analysis (ABA) showed few characteristics of autism after two years of treatment (Lovaas, 1987). The study assured a place for ABA as the first popular treatment for

autism. His treatment was based on the ideas of rewarding children when they were “good” and punishing behaviors that were “bad.” Lovaas’s treatment was considered shocking due to the rough nature of many of the punishments. His method evolved into Applied Behavior Analysis (ABA), and his work included over 70 publications (Metz, Mulick, & Butter, 2005; Tutt, Powell, & Thornton, 2006). This occurred despite the fact that his sample size was so small ( $N = 19$ ) that the results were statistically unreliable (Tutt et al., 2006). This study received attention from clinicians and families of students with ASD. Lovaas’s work contributed hope to many families and professionals that interventions could work.

On the other side of the United States, in 1968, Eric Shopler and Richard Reichler started the Child Research Program at the University of North Carolina School of Medicine. Shopler had been influenced by early experiences in pre-World War II Germany and his work with Bruno Bettelheim. He viewed parents differently from Bettelheim, and he rejected the idea that destructive parents caused autism. Another of his fundamental beliefs was that autism had a neurological origin and that it was not a mental illness. Initially the Child Research Program was supported by a five-year grant from the National Institute of Mental Health (NIMH). The initial program was later expanded and renamed the Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH). In 1972, TEACCH was endorsed by the North Carolina General Assembly as a statewide program to help people with autism across the life span. Shortly afterward, the first demonstration class opened, and by 1976 TEACCH supported ten demonstration classrooms. Reichler left TEACCH shortly after

the development of the statewide program, but Shopler remained as the director for 30 years and had published over 200 books and articles by his death in 2006 (Mesibov, 2006). Shopler's work and publications have been credited with using the parent's perspective as a fundamental piece in TEACCH's multidisciplinary approach to supporting children with ASD.

### **Two Decades of Drastic Change**

Although a handful of classrooms specific to students with autism existed before the 1970s, more districts began to establish classes during this decade, including the expansion of the TEACCH demonstration classrooms. The significance of Public Law 94-142, the Education of All Handicapped Children Act of 1975, cannot be understated. The law, now known as the Individuals with Disabilities Education Act (IDEA, 2004) has shaped how students with disabilities have been educated over the past 35 years. Although the original law did not include students with autism, it provided the foundation necessary for them to be included as a separate area in later revisions. Autism was added to the Diagnostic and Statistical Manual—3<sup>rd</sup> edition in 1980 and although it was still considered rare, its prevalence was increasing.

Sadly, just as autism research finally began to accumulate, Asperger passed away in 1980, followed closely by Kanner in 1981. Publications steadily increased during this time. Two of the most notable were Lovaas's *The Me Book*, a guide for parents, and Wing's (1981) seminal paper describing Asperger syndrome. New interest in this form of high-functioning autism also prompted the translation of Hans Asperger's study into

English (Wolff, 2004). Wing conceptualized the features of autism as follows: aloof, passive, active but odd, and overformal (Shopler, 2001).

Language skills are typically an area of relative strength for individuals with Asperger syndrome, although the differential in diagnosis was historically considered controversial until recent guidelines were established for clinicians (Volkmar & Lord, 1998). During the 1980s, Gillberg also made significant contributions to the field with publications in epidemiology, genetics, outcomes and clinical management of children on the autism spectrum (Wing, 1997; Wolff, 2004). His work also clarified the features of Asperger syndrome as part of a range of disorders that was later used for diagnosis. As other research continued to disprove Bettelheim's bad parenting theory with evidence of a neurological basis, the work of Susan Folstein provided a new theory. Folstein, a professor of psychiatry at Tufts University, co-authored a study showing evidence of genetic roots in the cause of autism. The *Journal of Child Psychology and Psychiatry* published the study, which presented data that chromosomes 7 and 13 were factors in the disorder (Szatmari & Jones, 1998).

Even with an increase in research publications, the popular perception of autism in the 1980s was established almost exclusively by the 1988 release of the movie *Rain Man*. For the public, Dustin Hoffman's portrayal of a man with autism in this film initiated a demand for more information about the condition (Mesibov et al., 2001). The public became fascinated with what was considered a rare disorder characterized by impairments in socialization and communication as well as restricted interests. This fascination provides a glimpse into how autism was viewed prior to the dramatic increase

in prevalence today. Autism was finally added as a separate reporting category under amendments to the Individuals with Disabilities Education Act in 1990 (IDEA, 1990).

### **Accountability in an Era of ESEA and IDEA 2004**

Learning in a socially just classroom is an area that may not be the focus of classrooms today, perhaps because of increasing accountability and reform efforts that focus on standardization and uniformity following curriculum-pacing guides. As accountability measures have increased, a new focus has been placed on the performance of individual students (Shapiro & Stefkovich, 2005; Simpson, LaCava, & Graner, 2004). Increasingly, students are identified at risk due to a host of variables, and they are deemed likely to not pass gateway tests.

The Elementary and Secondary Education Act (ESEA) and IDEA have forced school districts to consider the academic progress of individual students with disabilities with increased accountability measures. IDEA 2004 addressed the importance of academic progress and research-based methodologies, while taking steps in defining what is considered an appropriate education. The regulations for IDEA 2004 have affected programming decisions for students with ASD because of the reliance on peer-reviewed research (Walsh, 2005). This increase in expectations has required teachers to document educational interventions and utilize data to drive educational decisions. Ultimately, the focus on results has provided momentum for professionals working to find the balance among achieving academic progress, choosing research-based methodologies, and providing an appropriate education for all students in the general education classroom to the maximum extent possible. Equipping teachers with the specialized knowledge to

learn how to utilize a blended approach to accomplish these goals is left up to district level professional development and teacher preparation programs.

One of the major changes for students with autism in IDEA 2004 was support of the development and expansion of teacher preparation programs specific to educating students with ASD (Yell, 2006). This addition is significant because it is responsible for identifying national activities to improve the education of children with disabilities. The focus on national activities in conjunction with the increased accountability from ESEA has not only encouraged universities to assess their teacher preparation programs but has also affected professional development offered by state education agencies (Yell, 2006). Through the relatively new emphasis on research around teacher preparation for students with ASD, it is expected educators will become increasingly equipped to meet the needs of students who have struggled to progress in the general education classroom.

IDEA also requires that students receive a free appropriate public education (FAPE). The meaning of FAPE in public schools is sometimes considered obscure because “appropriate” may have a different connotation for educators and parents. FAPE has been elaborated upon further as a service that must provide some educational benefit (Skrtic, Harris, & Shriner, 2005). Since “appropriate” services and “some” educational benefit can both be interpreted differently depending on the situation, FAPE can become the central issue in a child’s services when parents and school districts disagree. This is especially true when the debate is around expensive services such as an ABA program, one-to-one paraprofessional, or placement in a residential center.

Access to general education is another requirement of IDEA, which focuses on education in the least restrictive environment (LRE). LRE has two major components; the first is that students must be educated as much as possible with non-disabled peers. The second states that the student may receive his/her education in a more restrictive setting if the general education classroom does not satisfactorily meet the student's needs (Skrtic et al., 2005). School districts must attempt to provide accommodations and appropriate services in the general education classroom before removing a child to a more restrictive setting. Yell (2006) emphasizes that for students to be educated in the LRE, districts must ensure that they offer the complete continuum of placements, including regular classes, resource rooms, special classes, special schools, homebound instruction, and instruction in hospitals and residential setting. The educational implications for students with ASD are affected by the underlying social deficits that inhibit some children from accessing the general education curriculum. Social skills are considered an important skill for students navigating through unstructured situations at school and can be developed through programs created specifically for students with ASD (Moore, 2002; Myles, 2005). Teachers and district officials have a responsibility to be knowledgeable of interventions and methodologies for students with ASD across the full continuum of placements.

While the revisions to IDEA 2004 focused on strengthening services for students with disabilities, the ESEA's programs (reauthorized in 2011) are designed to support all students by further advancing educational reform. The ESEA places emphasis on teacher training, academic accountability, and research-based teaching methodology for all

students (Simpson et al., 2004; Yell, Drasgow, & Lowrey, 2005). It mandates accountability for the academic growth of all students, and it is considered the most rigorous attempt to reform educational programs and enforced the use of standards-based practices (Yell, 2006). The interventions and methodologies used in the classroom are also held to a higher standard with the emphasis on utilizing scientifically-based research, which is characterized by methods that have consistent positive results (Simpson et al., 2004). Additionally, the increase in high-stakes testing holds both general education and special education teachers in inclusive classes accountable for student performance. Higher standards may encourage districts to reassess and strengthen the professional development they offer for groups not performing well. This is important for students with disabilities because as accountability has increased to unprecedented levels, previously accepted levels of student progress are continuously being monitored and increased. The effect of educational reform on students cannot be underestimated, especially for those served through special education.

Schools now are accountable for students who previously were left out of testing or whose scores were not included in statewide assessment data (e.g., students requiring certain alternative assessments). The increase in monitoring student achievement through reliance on testing has been difficult for students with ASD; they typically score poorly on standardized paper and pencil tests, which increasingly are used as gateway tests for placement and graduation (Olson, 2005). As a result, some believe that students served in special education may lower a school's test scores. Higher levels of accountability have

ultimately increased the level of progress monitoring for all students, especially those who are at risk of not performing well on accountability measures.

### **Understanding Students with ASD**

Since autism was first identified, educational services for students with autism spectrum disorder (ASD) have evolved from those based on the intuition of early teachers in the field to a quest for evidence-based practices based on the recommendations from the NRC and NAC. This journey overlaps with a dramatic increase in the prevalence of students identified with ASD over the past decade, which has resulted in a sense of urgency in school districts responsible for the implementation of their educational services (Iovannone, Dunlap, Huber, & Kincaid, 2003; Simpson, 2005; Simpson et al., 2005; Weatherly 2005). The implications of legal mandates and rulings, as well as the national recommendations, combined with socioeconomic factors all influence the educational services districts provide. The level of dispute around autism services indicates that the types of educational services vary among school districts.

Autism sometimes is considered a contentious area of special education because national publicity and parent networking have created awareness and, thus, an expectation for schools to provide comprehensive programs. Iovannone et al. (2003) identified six core elements of effective programs: (a) individualized supports and services for students and families, (b) systematic instruction, (c) comprehensible/structured learning environments, (d) specialized curriculum content, (e) functional approaches to problem behavior, and (f) family involvement. As the number of programs multiplies, the need to monitor program consistency with the corresponding alignment of

the best practices identified in professional literature is increasing (Downs & Downs, 2010). One of the educational system's responses to this demand has been to seek out qualified experts in the field, that is, autism specialists, who are expected to discover systems and approaches specific to the unique needs of the individual students.

School districts' constant struggle coupled with the unique learning needs of students with ASD has resulted in a marked increase in legal mandates and district policies regarding appropriate education. Further, the litigation over methodologies continues to intensify as the National Research Council evaluation criteria are established, IDEA is considered for reauthorization, ESEA changes are implemented, and school districts rush to accommodate the increase in students with ASD. Legislative mandates and legal rulings have increased the availability of interventions and treatments provided for students as school districts work to provide an appropriate education for students on the spectrum (Heflin & Simpson, 1998b). The fear of due process complaints and litigation is one reason why school districts have increasingly employed autism specialists. However, the demand for district level autism specialists has come at a time when many school districts are facing budget cuts.

### **Increasing Prevalence**

In the early 1980s, autism was still considered rare, with the Center for Disease Control reporting that autism affected 44 out of every 100,000 children (CDC, 2008). Currently, the Centers for Disease Control and Prevention (CDC) notes the prevalence of autism is approximately 1 in 110 (CDC, 2010). The prevalence of autism increased six-fold between 1994 and 2003. In 1994, autism was the 10<sup>th</sup> most common disability for

children in special education and now is the sixth most common disability classification in the United States (CDC, 2006). In 2000, the CDC reported higher prevalence in certain communities such as Brick Township, New Jersey, where 4 out of 1,000 children between the ages of 3 to 10 are diagnosed with autistic disorder and 6.7 per 1,000 people for ASD (for a total prevalence of 10.7 per 1,000 or 1 in 94). In comparison, the national rate was 6.7 cases of ASD per 1,000 people during the same time period. The Brick Township data are an example of just one of several communities the CDC has monitored because of an unexplained increase in prevalence from the national prevalence rate.

Although researchers disagree over the causes behind the increase, several factors are considered significant, including those that are genetic, infectious, immunologic, and environmental (CDC, 2006). In addition to the factors identified by the CDC, other reasons for the increase in prevalence include the broadening of diagnostic criteria and improved recognition of individuals who tend to fall on the “high” end of the spectrum. Counting students who were previously not identified on the autism spectrum as eligible for special education services under the autism label also may account for the growth in prevalence (Feinberg & Vacca, 2000). Individuals on the higher end of the autism spectrum often are diagnosed with Asperger’s disorder.

Asperger’s disorder was added to the Diagnostic and Statistical Manual of Mental Disorders of the American Psychiatric Association (APA) with different criteria for diagnosis than that of autism. According to the APA’s Diagnostic and Statistical Manual—Fourth Edition Text Revision (APA, 2000), autism spectrum disorder (ASD) includes autistic disorder, Asperger’s disorder, and pervasive developmental disorder –

not otherwise specified (PDD-NOS). Autism is a pervasive developmental disorder characterized by impairments in socialization and communication with restricted interests. Individuals with Asperger's disorder, in contrast to autism disorder, have no significant cognitive delays or delay in language development or skills necessary for self-help be identified (APA, 2000). The recognition of Asperger's disorder as a distinct syndrome was significant because individuals with no significant delays in intellectual ability, language development, or skills for self-help were now being identified. The expanding criteria of these individuals may account for a portion of the increase in diagnosis because normal intellectual functioning is now reported in approximately 20% of the individuals with ASD (Fombonne, 1999). Individuals who have characteristics on the autism spectrum are commonly referred to as having autism spectrum disorder because of their variability in abilities (Heflin & Simpson, 1998a).

### **Methodologies and Interventions for Students with Autism**

Numerous methodologies and interventions exist for students with autism, some of which are evidence-based and others have little research to support them or are not recommended. Within a one-hour Google search for autism and its treatment Metz et al. (2005) were able to identify 65 different interventions for individuals on the spectrum. The numbers of proposed interventions, most of which were promoted commercially, have ranged from biomedical to psychosocial to mechanical. Methodologies commonly used in the intervention and treatment of individuals with ASD include Lovaas, the Treatment and Education of Autistic and related Communication handicapped CHildren (TEACCH), discrete trial training (DTT), applied behavior analysis (ABA), picture

exchange communication system (PECS), pivotal response training, social stories, and floor time (Metz et al., 2005). Few of these interventions have been subjected to rigorous scientific study, and as Simpson pointed out in his review, many treatments that have been evaluated only have limited support or may not even be recommended. Yet parents and uninformed professionals continue to explore such interventions that promise to cure autism (Simpson, 2001).

A literature review by Simpson (2005) examined 33 research-based practices and evaluated these interventions as scientifically-based practices, practices that show potential, practices with limited support, and those not recommended for use (see Table 1). Scientifically-based practices were defined as those based on studies with documented empirical evidence and the practices considered promising show efficacy and effectiveness for students with ASD. Interventions identified as having limited supporting information demonstrated uncertain potential benefit and were deficient in supporting empirical research. Practices not recommended were those that had possible harmful effects. The 33 practices reviewed by Simpson's teams were categorized based on the scientific research and data used to support the claims of each efficacy.

### **Scientifically-based Practices**

Interventions that met the criteria of scientifically-based practices in the skill-based areas include: ABA, DTT, Pivotal Response Training (PRT), and Learning Experiences (Simpson, 2005; Simpson et al., 2005). Components of these interventions are utilized in many educational settings.

**Table 1****Evaluation of Interventions and Treatments for Students with ASD**

<b>Classification</b>	<b>Interpersonal relationship</b>	<b>Skill-based</b>	<b>Cognitive</b>	<b>Physiological/biological/neurological</b>	<b>Other</b>
Scientifically-based practice		Applied behavior analysis, Discrete trial teaching, Pivotal response training	Learning experiences: An alternative program for preschoolers and parents		
Promising practice	Play-oriented strategies	Picture exchange communication system, Incidental teaching, Structured teaching (e.g. TEACCH), Augmentative alternative communication, Assistive technology, Joint action routines	Cognitive behavioral modification, Cognitive learning strategies, Social stories, social decision making strategies	Sensory integration	
Limited supporting information for practice	Gentle touching, Option method, Floor time, Pet/animal therapy, Relationship development intervention	Van Dijk curricular approach, Fast ForWord	Cognitive scripts, Cartooning, Power cards	Scotopic sensitivity syndrome: Irlen lenses, Auditory integration training, Megavitamin therapy, Feingold diet, Herb, mineral, and other supplements	Music therapy, Art therapy
Not recommended	Holding therapy	Facilitated communication			

Adapted from Simpson, 2005; Simpson et al. (2005)

ABA has been proven effective for teaching adapted curriculum and the necessary academic skills for the increasing number of students with ASD participating in general education classrooms. ABA has a substantial amount of empirical evidence. One of the underlying ideas in ABA is that a behavior is related to the environmental circumstance (Heflin & Alberto, 2001). The significance of assessments and data collection are a contribution of ABA, because it offers a different way of assessing strengths and needs in addition to environmental factors, thus helping to which has the ability to identify underlying reasons for a behavior or skill deficit (Dunlap, Kern, & Worcester, 2001).

DTT is a specific ABA approach that uses short periods of instruction in a one-to-one setting. Each trial is divided up into five parts: the cue, prompt, response, consequence, and interval between the consequences and next trial (Smith, 2001). DTT teaches skills in an organized and systematic matter using repeated steps. Trials have a definite beginning and ending with crafted antecedents and consequences for each part (NRC, 2001). Data are typically collected on each trial and used to determine progress on learned skills or behaviors.

PRT is an approach that builds on children's initiatives and their specific interests (NRC, 2001). It teaches students based on naturally occurring learning experiences and has been found helpful in developing communication, language, play, and social behaviors. PRT provides an effective intervention by supporting four pivotal learning variables: motivation, responsivity to multiple cues, social initiations, and self-regulation (NRC, 2001).

Learning Experiences—An Alternative Program for Preschoolers and Parents (LEAP) is a comprehensive preschool service that is considered scientifically based. LEAP is a developmentally based approach that has components of an integrated preschool program with components of behavior training for parents. Classes usually have around 10 typically developing children and 3-4 children with autism. Speech, occupational, and physical therapies are incorporated into the class activities when necessary and independent play skills are facilitated through the use of peer models (Strain & Hoyson, 2000).

### **Practices with Potential**

According to Simpson, several practices have potential in three areas of development including: skill-based, cognition-based, and physiological/biological/neurological based. Practices that show potential for skills-based development include: the picture exchange communication system (PECS), incidental teaching, structured teaching or TEACCH, augmentative alternative communication, assistive technology, and joint action routines. Practices with potential for the development of cognition-based skills are: cognitive behavior therapy, cognitive learning strategies, social stories, and social decision-making strategies. Play-oriented strategies are identified under promising for interpersonal relationship building, and sensory integration is promising in the physiological/biological/neurological area (Simpson, 2005; Simpson et al., 2005).

PECS is an augmentative communication system used primarily with children and youth to assist in developing functional means of communication (NRC, 2001). It was developed by the Delaware Autistic Program and has been demonstrated to promote

speech development and production for individuals who do not use any speech or have very little functional communication. There are six phases in PECS instruction that are taught sequentially. The phases included (a) teaching the physically assisted exchange; (b) expanded spontaneity; (c) simultaneous discrimination of pictures; (d) building sentence structure; (e) responding to, ‘What do you want?’; and (f) commenting in response to a question (NRC, 2001). PECS is a behavioral program that provides a concrete and consistent visual to facilitate selection-based communication. This is different than many language based programs that focus on oral speech development (Lovaas, 1987).

Incidental teaching is a form of teaching that utilizes natural incidents or events to provide learning opportunities. This method is based on providing the student a systematic protocol to be used within their natural environment so that the teacher organizes the learning environment around planned objectives but takes the individual student’s interests into account. For example, a student may see an item of interest out of reach and is then prompted, if necessary, to ask for it. This approach has shown increases in varying degrees of communication skills for spoken and sign language (Simpson, 2005).

TEACCH or structured teaching is not a single approach or method. It is considered a comprehensive statewide program that utilizes structured teaching elements; it focuses on using individualized assessments to provide an individual ways to make the environment more predictable (NRC, 2001). Structure is provided in work areas, schedules, teaching methods, and directions. The teacher or adult creates an environment

such that the classroom is organized so that students understands as independently as possible where to work, what needs to be done, and how to do it (Mesibov et al., 2001).

To assist individuals with autism who have difficulty developing functional communication skills, augmentative and alternative communication and assistive technology devices can be utilized. Augmentative alternative communication systems include different devices that support communication, depending on the needs of the individual. The devices can be unaided such as signing and gestures. Aided tools can range from basic tools such as pictures to more advanced tools such as those that generate speech (NRC, 2001). Assistive technology includes any piece of equipment used to increase, maintain, or improve functional abilities of individuals with disabilities. The technology ranges from low to high tech devices (NRC, 2001). Since most children with autism process visual information better than auditory information, assistive technology typically provides information through visual methods.

Joint Action Routines (JARs) is a child-centered approach that uses routines designed to encourage communication for children with autism. In JARs, two or more people interact in a predictable and logical sequence, using the same words each time. The repetition provides a script for the child of what he can say and do at a given time. There are three primary situations where JARs are used: creating a specific product, teaching about a story or plot being read, or playing turn-taking during games (Simpson, 2001).

Cognitive Behavior Therapy (CBT) is sometimes referred to as Cognitive Behavioral Modification (CBM) or self-management. CBT is an intervention based on

the premise that our thoughts, feeling, and actions affect each other. It has been well documented that cognitive learning strategies help students with disabilities access the general education curriculum (Baker, Gersten, Dimino, & Griffiths, 2004). CBT has a strong evidence base for individuals with depression and anxiety with a growing body of research for ASD. Students are taught self-management skills to promote independence on a particular skill, such as managing anxiety, it is most appropriate for students with high functioning autism (Attwood, 2004; Myles & Simpson, 2003). The techniques in CBT focus on assisting people in their thoughts so that they can change how they think and behave to increase their level of independence (Simpson, 2001). Another technique used in cognitive behavior therapy is cognitive learning strategies. They provide a structure for learning how to complete a task that is complex. A cognitive strategy supports the learner as he develops the skills to enable him to perform complex tasks. Examples include strategies to assist in academic areas such as reading comprehension, writing, or the regulation of behaviors. For individuals with autism, cognitive learning strategies can be used to teach the ability to related social deficits to challenging social behaviors and the new skills necessary for social interactions.

Social stories are a tool for teaching social skills to individuals with higher functioning autism or Asperger syndrome (Gray, 2010). The stories provide an explanation about situations that the individual may not understand because the situations are difficult or confusing. They are individualized, but similar social stories can be used with a small group of students. Gray (2010) has identified several ways to use social stories, including describing situations, personalizing a social skills lesson, teaching

routines or teaching about a change to a routine, teaching social skills, or addressing behaviors.

Another cognitive intervention with potential for individuals with high functioning autism or Asperger syndrome is using social decision-making strategies. These strategies benefit students by helping them learn to use social problem-solving skills. Children or adults learn to identify the problem, develop an alternative, understand consequences, and figure out a way to correct the problem (Simpson, 2005; Myles & Simpson, 2003). Myles and Simpson (2003) specifically mention three problem-solving strategies: social autopsies, social stories, and Situation-Options-Consequences-Choices-Strategies-Simulation (SOCCSS). Each of these strategies could be used for teaching individuals with ASD how to interpret and respond to social situations.

Play-oriented strategies include a large group of treatment methods appropriate for all ages that teaches individuals how to participate in play and other social exchanges (Simpson, 2005). During play therapy, a therapist works with the child to help him address areas of concern in a safe and developmentally appropriate environment for the child to learn social exchanges. The skills addressed in play therapy include communication, behavior, problem-solving, and ways to related to others. According to the NRC (2001), most programs specifically target recreation and leisure skills.

Sensory integration therapy is an intervention used to assist individuals in adapting to certain sensory sensitivities and is usually offered by an occupational therapist. Individuals with autism sometimes have sensory processing difficulties that manifest in different ways in how they interpret these senses: smell, taste, touch, hearing,

and vision. For example, individuals with autism are often either hypersensitive or under-sensitive to light, noise or touch. Therapy utilizes different methods that focus on learning adaptive responses to these sensory sensations (Schaaf & Miller, 2005). The NRC (2001) explains that the goal of sensory integration therapy is to improve subcortical somatosensory and vestibular functions by providing sensory experiences that are controlled. Through these controlled sensory experiences the nervous system learns to better modulate and integrate the information it is receiving from the environment which provides a foundation for other responses. For example, specific sensory activities such as swinging, bouncing, or brushing may be utilized to help the child regulate his sensory response which in turn may improve behavior or reduce anxiety.

### **Practices with Limited Support**

Seventeen approaches are categorized as having limited support information for practice including the Son-Rise program, Floor time, Irlen Lenses, Power Cards, and the Feingold diet. Floor time is likely the most well-known of these approaches. It was developed by Stanley Greenspan as a prospective treatment in 1992 in his book *Infancy and Early Childhood: The Practice of Clinical Assessment*. This intervention also has been referred to as play therapy in some texts and is considered an interactive approach

Physiological focused strategies such as “brushing” and Auditory Integrating Training have limited support. Parents and professionals may support physiological techniques based on case studies or opinions from other professionals and parents, but they limited research to show efficacy. Other strategies with limited support in the research include: sensory diets, sensory integration, and floor time.

### **Practices Not Recommended**

The two practices that were not recommended included holding therapy and facilitated communication (Simpson, 2005; Simpson et al., 2005; Heflin & Simpson, 1998a). These two approaches have both received extensive coverage in popular media based on individual cases but are not recommended because of the risks of holding therapy and the limited empirical evidence for either approach.

Holding therapy is an intervention created for children birth to age 10. It was developed by Martha Welch and was based on the hypothesis that children with ASD have a troubled attachment to their caregivers and withdrawal has become the child's coping mechanism (Welch, 1988). Welch describes three phases to the holding time sequence: confrontation where the mother holds the child and insists on eye contact, rejection when the child rejects the attempts to make eye contact, and finally resolution where the child resists until the behavior gives way to closeness. The potential for serious risks of physically or psychologically harming the child because of the forced holding as well as the very limited research for the effectiveness of the approach is why this technique is not recommended.

Facilitated communication is a method of augmentative communication that was developed by Rosemary Crossley for persons with multiple disabilities. In facilitated communication, individuals are assisted hand-over-hand to type their thoughts (Crossley, 1994). The approach has been given credit in a few cases where individuals used facilitated communication to express their thoughts for the first time and some who

revealed they had been trapped in their bodies with no way to communicate prior to receiving support to type their thoughts.

Since both holding and facilitated communication have very limited data based primarily on anecdotal case studies to support their claims, they are not recommended and should not be utilized by school districts. These strategies as well as any interventions with limited research should be used with caution. Any approach that vows to benefit all students should be carefully regarded due to the range of skills characteristic of students with ASD (Heflin & Simpson, 1998a).

### **Importance to Educational Community**

An understanding of the methods in Simpson's (2005) review is important for the educational community as it has a responsibility to be knowledgeable of the positive and negative aspects of different interventions as well as an understanding the key pieces of effective inventions identified by the NRC. The characteristics of effective interventions identified by the National Research Council (2001) provided a foundation for educators because it developed the first national standards for states to utilize as guidelines for programs that the needs of children with autism. However, developing a wide knowledge based for autism related interventions and the national recommendations are only some of the components necessary for the educational community to make good educational decisions for students with ASD.

Ongoing assessment of the child's learning as well as evaluation of when and how to provide accommodations or modifications to the students learning environment are also crucial for the child's education. This assessment is not just necessary for academic

skills, but also for behavior. Myles and Adreon (2001) discuss the challenges to academics and behavior in the complex environment in secondary schools. School personnel need to be cognizant of environmental triggers in the school environment that may affect any of their students, but this is especially true for students with autism who may have atypical triggers to their behavior. Since the purpose of the functional behavior analysis is to examine the relationship between behaviors and the environment, it is an important piece of the intervention process because figuring out the antecedent to a given behavior is often crucial to changing that behavior. Antecedent variables such as environmental or curricular triggers provide information to change behaviors and change instructional programs (Myles & Simpson, 2003; Simpson, 2001).

Accommodations to the environment through the IEP such as schedules, frequent breaks, and extended time are antecedent modifications that can change a student's behavior (Myles, 2005). Mesibov et al. (2001) recognized the additional principles of interventions as the following: (a) utilizing interventions may be necessary long-term, (b) working with youngsters is labor-intensive, (c) helping families understand that autism is not a psychological problem, (d) coordinating intervention plans is critical, and (e) individualizing a child's plan in creative ways is essential. Knowledge of a wide range of interventions is also important as educators address the behaviors of students that need to be modified or learned, especially if those behaviors affect the student's access to the general education curriculum.

### **NRC, NPDC, and NAC Recommendations**

The U.S. Department of Education's Office of Special Education recognized a need for evaluating interventions and establishing guidelines for educators as new treatments emerged. The National Research Council, a sub-organization of the National Academy of Sciences, established The Committee on Educational Interventions for Children with Autism. This committee, through the sponsorship of the U.S. Department of Education's Office of Special Education Programs, developed a framework for evaluating the scientific evidence on both the effects and features of interventions. The result was *Educating Children with Autism* (2001) which was designed as a comprehensive assessment of science base of interventions for young children with autism.

The National Research Council findings were divided into six major areas: diagnosis, assessment, and prevalence; roles of families; goals for educational services; characteristics of effective interventions; public policies; personal preparation; and needed research. In the area of effective interventions six interventions were identified as a priority: functional spontaneous communication, social instruction delivered throughout the day in various settings, cognitive development and play skills, and proactive approaches to behavior problems. For the area of educational services, recommended goals by the NRC included: the immediate use of early interventions, instructional hours comparable to a school day throughout the year, parent involvement, utilization of deliberate teaching, small group or one-to-one instruction, and a communication-rich environment active engagement, planned learning opportunities, low student-teacher

ratio, monitoring, and adjustment of the program when necessary. Monitoring performance through on-going assessments is essential because of data and accountability of student growth behaviorally and academically (NRC, 2001). While the NRC discussed these recommended general strategies, they did not endorse a preference for specific methodologies (see Table 2).

**Table 2**

**National Research Council Recommendations**

Areas	NRC Recommendations
Diagnosis, Assessment, and Prevalence	<ul style="list-style-type: none"> <li>-Children with any ASD regardless of severity should be eligible for special education services under the category of autism.</li> <li>- Children identified with ASD should have a formal multidisciplinary evaluation, including a systematic gathering of information from their parents about their concerns and observations.</li> <li>-Younger children who receive a diagnosis of ASD should have a follow-up diagnostic and educational assessment 1-2 years after their initial evaluation.</li> <li>- Professionals having contact with young children should be aware of the patterns of behavior seen in very young child with ASD.</li> </ul>
Roles of Families	<ul style="list-style-type: none"> <li>- Parent perspectives and concerns should actively shape the educational planning.</li> <li>- Parents should have access to information about the nature of ASD, best practices in early education, supports and their child's rights.</li> <li>- Early intervention should include opportunities for families to learn specific techniques for teaching their child and reducing challenging behaviors.</li> <li>- Mental health support services should be provided to families experiencing stress until the child turns at least 8.</li> </ul>
Goals for Educational Services	<ul style="list-style-type: none"> <li>-Early intervention should begin as soon as an ASD diagnosis is considered.</li> <li>-Active engagement in intensive instructional programming for a minimum of a full school day, 5 days a week with a full year of programming.</li> <li>-Teaching opportunities should be 15-20 minute intervals for young children with one to one adult time and small group instruction.</li> <li>-A family component such as parent training should be included.</li> <li>-Low student/teacher ratio should be used (2 young children per adult).</li> <li>-Program evaluation and assessment to be certain the child is responding positively to the intervention.</li> </ul>

**Table 2 (cont.)**

<b>Areas</b>	<b>NRC Recommendations</b>
Characteristics of Effective Interventions	<ul style="list-style-type: none"> <li>-Educational services should be a minimum of 25 hours a week, 12 months a year for the child to be engaged in a systematic educational activity based on specific goals.</li> <li>-Individualized attention for therapy, small group or one to one each day</li> <li>-IEP goal assessment should be ongoing and further steps should be taken when the student does not progress over a 3-month period.</li> <li>-Six kinds of interventions should be a priority: functional and spontaneous communication, social skills instruction throughout the day, play skills, cognitive development, interventions to address behavior, and functional academic skills when appropriate.</li> </ul>
Public Policies	<ul style="list-style-type: none"> <li>-National Institute of Health’s Autism Coordinating Committee and the Federal Interagency Coordinating Council should create a task force of autism experts to monitor and report on programs to both parent and state agencies</li> <li>-States should provide regional centers for resources, professional development, and technical support to school districts</li> <li>-Someone who is knowledgeable of ASD, the law, and/or court cases should provide consultation and legal knowledge to families.</li> <li>-State and federal agencies should explore methods for supporting professional and advocacy groups by providing new information to parents and providers.</li> <li>- States should establish minimum standards for educators working with students with ASD</li> <li>- States should create a systematic plan to fund the interventions for students with ASD in local schools</li> <li>-OSEP should make accessible a current summary of case law, consultation services, and mediation, mechanisms specific to ASD</li> <li>- Professionals knowledgeable of the needs and interventions for persons with ASD should be included in decision-making activities.</li> </ul>
Personal Preparation	<ul style="list-style-type: none"> <li>-OSEP should establish a 5-year plan to provide priority funds.</li> <li>-Personnel preparation and practicum work should address the needs for a team approach when addressing needs.</li> <li>-A special emphasis should be placed on using a train the trainer model to increase the expertise and experience in the field of autism.</li> <li>-Existing support systems that provide short-term training should include individuals with expertise in autism on their staff.</li> <li>-Curriculum content for children should be based on sound research.</li> </ul>

**Table 2 (cont.)**

Areas	NRC Recommendations
Needed Research	<ul style="list-style-type: none"> <li>-Funding agencies and professional journals should use minimum standards in research design and the plan for intervention projects.</li> <li>-Both funders and researchers should recognize the value of a variety of approaches to research design.</li> <li>-Federal agencies involved in ASD initiatives and nonprofit agencies with similar national missions should form a research task force and allocate federal responsibilities for recurring and funding a comprehensive plan for intervention and treatment.</li> <li>-A federal initiative should solicit and fund studies to make educational services outcome oriented.</li> <li>-Competitively funded early education initiatives for students with ASD should require plans, and be supported with sufficient funding for assessments of child outcomes and measures on efficacy.</li> </ul>

Adapted from the National Research Council (2001)

Although the NRC publication was groundbreaking work, it had two limitations: First, it focused solely on young children to age 8, and second, it evaluated research that was conducted prior to 2000. There was a need for the evaluation of current research with a wider focus that included older school-aged children and adolescents. Another comprehensive program began as parents, experts in the field, and advocates continued to search for research that supports specific interventions.

The National Professional Development Center (NPDC) was founded at the University of North Carolina at Chapel Hill, the M.I.N.D. Institute at the University of California at Davis Medical School, and the Waisman Center at the University of Wisconsin at Madison in 2008. The intention was to promote the use of evidence-based practices for children and adolescents with autism spectrum disorders. The NPDC identified 24 practices that met the criteria for evidence-based practices and were the

foundation for on-line modules and implementation checklists for practitioners (NPDC, 2012). The internet modules were developed to help parents and professionals have current information to support individuals with ASD.

The National Autism Center is a nonprofit organization focused on identifying evidence-based practice for the treatment and care of individuals with autism. The center connected 45 professionals from across the country to establish the National Standards Project, which produced a set of standards for research based educational and behavioral interventions specific to children and young adults with ASD. School districts need to become knowledgeable about research on methodologies and use quality indicators of research to determine the data for effective practices (Odom et al., 2005). The goal is to use these standards for evidence-based interventions in education and behavior. Over time, the interventions that have empirical evidence to support their claims appear to be at the center of methodology debates.

As its first major initiative for the National Autism Center, the National Standards Project Expert Panel worked to develop evaluation criteria for interventions. The National Standards Project was completed in 2009 when the panel established a set of standards for effective, research-validated interventions for children with ASD to provide guidance for parents, caregivers, educators, and service providers. The panel identified 11 established treatments, those interventions with sufficient research to establish their effectiveness, for children with ASD. The findings based on the evaluations are considered the most in-depth assessment of treatments currently available for children with autism. The project served three primary purposes:

1. To identify the level of research support currently available for education and behavioral interventions for individuals (below 22 years of age) with ASD. These interventions address the core characteristics of these neurological disorders. Knowing levels of research support is an important component in selecting treatments that are appropriate for individuals on the autism spectrum. We also seek to identify whether or not the favorable outcomes reported are extended to all treatment targets, age groups, and diagnostic groups.
2. To help parents, caregivers, educators, and service providers understand how to integrate critical information in making treatment decisions. Specifically, evidence-based practice involves the integration of research finding with (a) professional judgment and data-based clinical decision making, (b) values and preferences of families, and (c) assessing and improving the capacity of the system to implement the intervention with a high degree of accuracy.
3. To identify the limitations of the existing treatment research involving individuals with ASD. Even when a treatment has been established as effective, it may require more investigation in order to extend favorable outcomes to all age groups, diagnostic groups, or skills/behaviors that may be targeted for improvement. (NAC, 2009, p. 20)

It was anticipated that district special education administrators, educators, parents, and service providers would review the project recommendations and evaluate the current status of services they provide. These recommendations provided specific recommendations for interventions specific to individuals with autism, but little has been done thus far to evaluate them.

The NRC, NAC, and NPDC recommendations each have a role in the professional development provided to educators in North Carolina. The National Research Council recommendations provided the first standards of evidence-based practices for children with autism and served as the first meaningful guide for state and local districts. It was the work of the NRC that first emphasized the similarities in characteristics of effective programs rather than recommending specific interventions and

treatments. The NRC work was followed by the National Autism Center recommendations and the National Professional Development Center.

In North Carolina, the Exceptional Children's Division has committed resources to assisting local districts in training and ongoing support for personnel who are responsible for educating students with ASD (NCDPI, 2011c). Statewide professional development based on the NRC, NAC, and NPDC recommendations of evidence-based practices are in place. Educators and supporting students with ASDs are expected to be knowledgeable of the evidence-based practices identified in these recommendations.

### **Litigation around Services for Students with ASD**

A recent study by Zirkel (2011) discussed the overrepresentation of autism in FAPE and LRE litigation, children with autism account for almost one third of published court decisions over FAPE and LRE. When comparing the litigation percentage with the autism percentage over a span from 1993 to 2006, the ratio was almost 10:1 (Zirkel, 2011). Zirkel explained the reasons behind the disproportionate level of autism litigation involve several significant factors, which include the cost of educating a child with autism, the relatively new recognition of autism in comparison to other disability areas under IDEA, and the combination of uncertainty of science with diversity of the disorder. Research regarding methodology often has contradictory findings, and interventions largely have been left up to state and local agencies.

The Zirkel study, although the most current review of autism litigation, further illustrates how autism services have been highly litigated for years. In 2005, Weatherly stated that the most common reason for litigation during the past 10 years under the

IDEA were concerns around providing an appropriate education to students with autism. And as far back as 1999, Baird found that ASD was also the area of special education considered the most expensive for school districts to defend in due process cases. This is likely because litigation involving students with ASD differs from the typical procedural cases in special education.

A higher number of methodology cases exist, in which parents and school districts have different opinions of what methodology and placement should be used to teach a child with ASD, and as a result, experts from the school district and families represent opposing sides. This strong belief around appropriate services should be led to frequent conflicts among families and professionals over both the data used to support methodologies considered effective and predictions of how a specific methodology could meet individual needs (Feinberg & Vacca, 2000). The provision of related services was such a common complaint among parents that the Autism Society of America's (2006) National Conference promoted sessions on empowering parents and advocacy skills from presenters who advertised how to fight legal battles. The concerns of families understandably intensified when, even with intensive services, students with ASD experience academic or behavioral difficulty and due process cases are the unfortunate result of competing points of view on methodology and a lack of evidence for interventions and treatments.

In addition to methodology debates, however, due process proceedings also challenge support services, placement, and the amount of time allotted for intervention (Heflin & Simpson, 1998b). Some parents request a more intensive service such as the

provision for a one-to-one paraprofessional or in-home instruction, but these services may be considered overly restrictive. The debates surrounding options are sending some IEP team meetings into multiple days and ultimately leading a level of conflict that requires formal dispute resolution procedures (Heflin & Simpson, 1998b). The number of challenged cases serves as a reminder of the tension that may exist between schools and parents over the implementation of treatment programs in schools. Sadly, some IEP teams replace open discussion regarding the needs of the child with a win-lose mentality.

The decisions regarding provisions for an appropriate level of educational services in special education have been greatly influenced by the 1982 outcome of *Hendrick Hudson Central School District Board of Education vs. Rowley*. Rowley's impact was to mandate that schools provide some educational benefit while determining that programming decisions should be left up to educators (Walsh, 2005; Yell, 2006). Furthermore, this decision stated courts do not have the "specialized knowledge and experience" for "persistent and difficult questions of educational policy" (Weatherly, 2005, p. 7). This standard has been referenced in cases where methodology debates have occurred.

In addition to the Rowley case, Yell (2006) reviewed three other cases that provided a foundation for subsequent cases involving methodology. The plaintiffs each of these cases brought action against school districts because the school district had chosen a particular methodology that the parents opposed. These include *Lachman v. Illinois State Board of Education*, *Peterson v. Hastings Public Schools*, and *Bougham v. Town of Yarmouth*. In *Lachman v. Illinois State Board of Education* (1988), it was decided that

under IDEA parents do not have the right to require a school district to provide a specific program or methodology to provide the education of a child with a disability. In *Peterson v. Hastings Public Schools* (1993), the court stated that as long as the IEP was reasonably calculated to provide educational benefit the court would not intervene. A subsequent case, *Boughham v. Town of Yarmouth* (1993), held that according to Rowley courts should not in making decisions regarding methodology and should avoid imposing their views over any preferred methodology. The outcomes of these cases have provided guidance to school districts as they evaluate the services they provide for students. Past decisions from case law consistently have shown that when a student is making educational progress, the courts leave methodology decisions to the district (Yell, 2006).

However, because of the increase in standards and accountability for all students, some have speculated that as a result of IDEA 2004, post-Rowley cases could be interpreted differently. The difference would be that educational services would be held to a standard higher than the previous one to provide *some educational benefit* (Baird, 2005; Weatherly, 2005; Yell, 2006). Although most court decisions about methodology are left up to educational professionals, a few court decisions have maintained a level of caution among districts. State Education Agencies (SEAs) have ruled in Maryland, Connecticut, and North Carolina in favor of parents for reimbursement of Lovaas programming, which tends to range between \$12,000 and \$20,000 per year (Womack, 2002).

In a number of cases over a student's LRE, the courts have recognized that although IDEA clearly has a preference for full inclusion, the general education

classroom may not be an appropriate placement for some students (Osborne & Russo, 2007). Educational services for students with ASD continue to be influenced by educators' differing perspectives on methodologies and interventions, most agree that the social benefits of inclusion for a child with ASD are not sufficient to justify it when academic progress is not being made (Heflin & Simpson, 1998b). These decisions confirm the importance of using data collection methods that provide information concerning the child's progress to determine the appropriate level of service. Evaluation of data is a critical component when assessing the educational benefits of time in the general and special education settings. Osborne and Russo (2007) add that courts have acknowledged that smaller districts without specialized programs may need to seek other placements to meet the needs of some students. These cases and other source of potential conflict around educational services for students with ASD, such as those around FAPE or appropriate related service, set the groundwork for how school districts make programming decisions and ultimately have a direct implication on the services that are provided for students with ASD.

### **Methodology Litigation**

The publicity around autism has resulted in the support of well-known methodologies such as Applied Behavior Analysis (ABA) programs, the UCLA Young Autism Project (YAP), Learning Experiences on Alternate Program (LEAP), The Denver Health Science Program (DHSCP), and the Treatment and Education of Autistic and related Communication Handicapped Children (TEACCH). These methods are considered to be research-based methods for children with ASD (Gresham, Beebe-

Franenberger, & MacMillan, 1999), although they do not all meet the scientifically based criteria in Simpson's review. It is important to note that even programs without extensive research have proven successful in single subject research designs. Few data demonstrate that one method of treatment is preferable to another because much of the research relies on single-case design and usually lacks random assignment (Siegel, 2003). The unique learning styles of students with ASD have an impact on specific strategies and make data collection critical for measuring progress which wide variability of learning characteristics and spikes in development typical of students with ASD create a heterogeneous group (Heflin & Simpson, 1998a; Myles & Simpson, 2003).

There is conflict among families and professionals over the data used to support effectiveness of any single methodology and how to make reasonable predictions among a specific methodology and a child's individual needs (Feinberg & Vacca, 2000). Certain methodologies also foster long-standing controversy about their effectiveness, including ABA, Lovaas, and TEACCH. One of the major debates concerns the decision when to use DTT, a component of ABA, and TEACCH (Heflin & Simpson, 1998a). Both methods utilize different interventions that have been successful with individual students, although neither one used alone has been proven to work effectively for all children. In fact some feel that ABA and TEACCH share many of the same fundamental beliefs and that TEACCH, although frequently referred to as a methodology, is a philosophy of using student characteristics to drive intervention decisions (Thomas, 2006). Strategies such as DTT and components of structured teaching supported through TEACCH both provide measurable student outcome data, but ABA, with 40 years of single-subject research, has

significantly more data that supports its efficacy. Despite the debate and a lack of empirical research, the structured teaching components of TEACCH are considered instrumental for many students with ASD (Heflin & Simpson, 1998a; Mesibov & Howley, 2003). Different philosophies over methodology have the potential to cause conflict over services.

The cases that involve litigation usually revolve around appropriate educational services (Weatherly, 2005) as parents and uninformed professionals explore interventions promising to “cure” autism (Simpson, 2001). Lovaas and TEACCH are two methodologies commonly debated by parents and educators. Lovaas has clear evidence to support educational benefit because of intense data collection, and as a result his approach tends to be preferred by judges (Yell, 2006). Wright and Wright (2006) are well known attorneys and advocates representing children with disabilities, including methodology based cases. One of the arguments that Wright uses in the methodology debate is that TEACCH seems to be at a standstill in terms of research. They also argue that although some children make progress through TEACCH approaches, experts in the field have limited data to support such claims, and TEACCH may be more appropriate for older children. School districts are encouraged to use eclectic approaches in order to have programs that meet the needs of individual students and are legally defensible. Although it has been noted that little empirical data exists to support the efficacy of eclectic programs in general, many leaders in the field, including the nationally known researchers behind the NRC (2001) recommendations, have created an eclectic list of evidence-based practices.

### **Eclectic Approach to Services as a Safeguard**

Without scientific evidence that supports the exclusive use of any one intervention in isolation, it is important to individualize methods of intervention based on student needs (Simpson, 2001). Educators should have an understanding of competing methodologies and consider factors such as the child's age, skill set, and range of functioning on the autism spectrum to choose the right method to meet the needs of the child at each developmental level. As interest continues to grow in the combination of various components found in effective methodologies as well as the national recommendations established by NRC, educators have more possible interventions that can be used to create an eclectic approach for services.

An eclectic approach, sometimes referred to as a blended approach, is simply an approach that combines components of different strategies and interventions together to meet the needs of an individual student. Evidence consistently suggests that a structured approach that uses intensive systematic instruction will include some principles of ABA, parental involvement, and social and communication instruction as foundations of best practices (Heflin & Simpson, 1998a; Iovannone et al., 2003; Thomas, 2006). The research on components of effective methodologies and the use of eclectic approaches provides implications for school district implementation, especially since the research is not conclusive with regard to effectiveness of the blended approach that many districts are utilizing (Downs & Downs, 2010). It is important to note that although Downs and Downs express a need for additional research into the effects of eclectic approaches in schools districts, many of the recommendations from the NRC (2001) and well-

recognized best practices in several studies are eclectic in nature (i.e., the NRC outlines recommendations utilized in more than one intervention).

Another explanation for the popularity of using blended approaches for students with ASD is that, historically, the school system endorsement of a specific methodology has landed districts in undesirable situations during litigation. For every student who has made significant progress using a single methodology, another student has made comparable gains with a different methodology (Siegel, 2003). The emphasis must be on providing an appropriate approach, and combining methodologies in some situations. School districts also consider cost factors for the use of some single methodologies. For example, the exclusive use of ABA for students with ASD is costly because parents or professionals often expect treatment sessions to be administered individually or in small groups (Simpson, 2001; Weatherly, 2005). The funding needed for highly individual programs is rising just as some school districts are struggling in the current difficult economic times.

Ultimately, school districts may feel that an eclectic approach is necessary when determining an appropriate methodology, that by combining elements of different approaches and individualizing them to each child's needs some students have made more progress. For example, children receiving a combination of Lovaas and TEACCH interventions demonstrated progress three to four times greater than those receiving a single approach (Feinberg & Vacca, 2000). This indicates that educators could be most effective when they are knowledgeable of more than one approach and have the ability to

combine the best practices from the approaches to meet the needs of each individual with ASD.

Dealing with complicated problem behaviors is an example of when components of ABA are likely to be implemented because ABA's function over form has increased the ability to create interventions that work for problem behaviors (Dunlap et al., 2001). The addition of functional behavior assessments to IDEA in 1997 indicates recognition of how important understanding antecedents to behavior can be when determining methods to reduce the identified behavior and teaching students appropriate replacement behaviors and social skills that can be generalized across educational settings. Social skills instruction that teaching self-management and, when necessary, replacement behaviors can be necessary interventions for students to make progress academically. Teaching students self-management reduces behavior problems and increases overall academic engagement (Harrower & Dunlap, 2001; Koegel, Harrower, & Koegel, 1999). The generalization of social skills is a daunting task for students with ASD, and its significance is critical to successful inclusion (Harrower & Dunlap, 2001; Myles, 2005). School districts are encouraged to use eclectic approaches in order to have programs that meet the needs of individual students and are legally defensible. Although it has been noted that little empirical data exists to support the efficacy of eclectic programs in general, many leaders in the field, including the nationally known researchers behind the NRC's (2001) recommendations, have created an eclectic list of evidence-based practices.

Educators maintain a responsibility to continuously evaluate the services provided for students with ASD as well as evaluate the services provided in students' IEPs (Heflin & Simpson, 1998b), and the identification of research-based curricula and methodologies remains a challenge (Simpson, 2005). The factors that make this task difficult include the range of skills, unique behavioral characteristics, variety of interventions, and the publicity surrounding treatment options for students on the autism spectrum. The contradictory findings of research among interventions and treatments have resulted in state and local educational agencies with taking the responsibility of determining an appropriate level of services. For students who are not making progress, district personnel are responsible for providing appropriate services, which may include a combination of interventions. Services may be characterized by the basic elements of effective interventions provided through a synthesis of methodologies. For example, a study focused on practices in early intervention for children with ASD found that over half of the programs (54%) were using a blended approach (Downs & Downs, 2010).

While school professionals have some flexibility in choosing the appropriate methodology for instructing students with ASD, or other disabilities, they must be able to demonstrate that the student is provided FAPE in the LRE. Educational services are affected by the increasing requirements set forth in IDEA and ESEA requiring measurable results that demonstrate an increased student performance (Skrtic et al., 2005). It stands to reason that the emphasis on the use of evidence-based interventions mandated in the ESEA affects school district decisions around the methodology debate.

### **Autism and Socioeconomic Status**

During the last few years, the nation's current economic status has strained school district budgets across the country and educational services for students with autism are no exception. It has been well documented in research and shared with the public through social media that children in wealthier families are more likely to be diagnosed with autism. Historically, children born in poor families are less likely to be diagnosed with autism than those from wealthier families, but new research indicates that autism is now more evenly spread across different communities (Heasley, 2011).

A recent study examined in more detail how socioeconomic factors influence diagnosis. A study released by King and Bearman (2011) showed that although wealthier children born between 1992 and 1995 were 20 to 40 percent more likely to be diagnosed with autism, this did not hold true for children in the area born between 1992 and 2000. When the researchers looked at diagnostic records for children born in California between 1992 and 2000 and variables such as property values in a child's neighborhood, parents' wealth and educational attainment, they found that the neighborhood where a child lived played a larger role in a child being diagnosed than the family's wealth. According to the study, children from poor families living in economically advantaged neighborhoods were 250 percent more likely to be diagnosed with autism than individuals in poorer neighborhoods with similar means (King & Bearman, 2011).

While two individual factors, the child's birth weight and parent's level of education, have consistently had a relationship to diagnosis over time, King and Bearman found that community factors appear to drive an increasing prevalence in California.

Children born to wealthy and educated parents were most likely to be diagnosed with autism. However, the rate of diagnosis in this group was stagnant after 1994, when wealthier neighborhoods appeared to hit a ceiling of around 40 per 10,000 diagnoses of autism. For children in the poorest neighborhoods, the probability of an autism diagnosis continued to increase slowly but steadily (King & Bearman, 2011). Ultimately, it appears that the socioeconomic gradient for autism diagnosis has stabilized in wealthy neighborhoods within California but not in poor areas. Therefore, another socioeconomic factor, district revenue, has also been associated with an increase in diagnosis of autism.

An earlier study in Texas found that educational spending, as measured by district revenue, was associated with an increase in identification of children with autistic disorder (Palmer, Blanchard, Jean, & Mandell, 2005). Education-related spending varies widely among school districts, and those communities with higher spending are likely to have highly trained staff and specialized programs to support students with autism. School districts with higher revenues are associated with an increased rate of identification for students with autistic disorder and districts who spent the least amount served lower percentages of children with autistic disorder (Palmer et al., 2005).

There is little research on the characteristics of school districts and the provision of services for students with ASD. Furthermore, what, if any, role socioeconomic factors play in the identification of children with ASD or the level of educational dispute cases among rural and urban districts. While some of these questions are beyond the scope of this study, we will examine the relationship for each district's median personal income and other district variables.

### **Implications for Research**

As a number of changes to educational services for students with ASD over the past decade have been implemented, educators have learned about their impact on educational services. From the first national recommendations, millions of dollars spent on research, the history of conflict over methodologies, or the shift towards using research-based teaching methodologies, educators are faced with a multitude of information for students with ASD. During this time educators also have faced a paradigm shift that focuses on accountability as increases in state, district, and school accountability have placed greater weight on evaluating student performance and has ultimately been an impetus for revisions to state curriculum standards for all students. Teachers must be prepared to evaluate effective practices and create a curriculum standard (Lerman et al., 2004). Students served in the general education classroom need teachers who can deliver the curriculum so that students with ASD have appropriate access to it (Hurth, Shaw, Izeman, Whaley, & Rogers, 1999).

Much is left to learn about effective methods and treatments to ensure appropriate programming for students with ASD. As the controversy continues over instructional strategies, variations in services will continue to exist. Reports issued by The National Research Council (2002) and the Coalition for Evidence-Based Policy (2002) emphasized the use of practices that have been proven effective. Reviews of effective educational practices such as the work by Simpson (2005) and Iovannone et al. (2003) must be considered when developing a program to meet the individual needs of the student. Following NRC guidelines, it is recommended that teachers be aware of (a) ABA

techniques, (b) use of incidental teaching, (c) assistive technology, (d) structured teaching, (e) data collection, (f) social skills, and (g) communication (Thomas, 2006).

The challenge of educators and school leaders in determining effective programming for students with ASD is an understanding of methodologies and the legal requirements that must be fulfilled. Educators must be accountable for the implementation of research-based instructional strategies in the classroom. School districts must allocate the resources to provide professional development opportunities that prepare teachers to use an eclectic approach of research-based methodologies, while recognizing that some students will require highly individualized instruction to make progress.

This literature review has examined the history of services and its impact on educational services for students with autism. The recommendations from the National Research Council, National Autism Center, and the National Professional Development Center have established standards for effective educational practices. Evaluating the implications for educational services for students with ASD can be daunting due to the number of variables, such as the wide range of relatively new interventions and various ways that autism can impact an individual, which also provide challenges to research in the area as well as ample opportunities for future study. An understanding of these factors and how they can work together to impact students with autism provides the foundation for this study; and is necessary to understand how parents and professionals continue to disagree over approaches for children with ASD at an alarming rate.

The emphasis on evidence-based instruction has established clear standards for students, yet the wide range of possible interventions muddies the waters for parents and many educators. As school districts work with a wider range in ability levels and increasing numbers of students with ASD, they are charged with being knowledgeable of national recommendations and interventions to support students. Thus the variability of theories and the high rate of litigation for educational services specific to persons with autism continues to grow. Numerous studies have researched interventions and prevalence in given areas and a few have started to explore why litigation rates are so high for students with autism, but no study as of yet has examined district level variables including student achievement, dispute, and income in a given state.

A gap clearly exists in exploring district level data that is routinely collected and maintained at varying levels by the local and state educational agencies in each state. The researcher examined district level data from school districts across the state of North Carolina to gain a better understanding of the variables that influence services for students with ASD. Specifically, this study focused on the relationship between socioeconomic status, district and family conflict, and performance for students with ASD as measured by the percent of students scoring proficient on states achievement tests. This research has contributed to the field by analyzing data to provide insight into the variables that could impact student achievement for students on the autism spectrum as well as a studying the variables related to conflict between families and school districts.

## **CHAPTER III**

### **METHOD**

Educational services for students with autism have been influenced over the years by a number of factors, including historical trends, current legal issues, National Research Council (2001), the National Professional Development Center on ASD (2008), and the National Autism Center (2009) recommendations. Concurrently, the prevalence of children with autism spectrum disorder (ASD) has continued to increase while district administrators have also faced increased accountability for student outcomes in a time of economic uncertainty. Numerous studies on students with ASD focus on causation, prevalence, and methodologies and interventions, but only a small amount of research has focused on the relationship among rates of dispute, services, and student achievement. Further, limited research has examined how the characteristics of school districts are associated with the identification of students or services for students with ASD or the district- level resources affect student outcomes (Palmer et al., 2005).

The literature outlined in Chapter II provides the background for the complexities involved in services for students with autism. This study examined the effects of some of the factors that may influence educational services and, ultimately, achievement outcomes for students with autism in public school districts. Because the prevalence rate continues to rise and litigation for individuals with ASD has maintained a disproportionately high rate compared to other areas of special education litigation, it was

important to examine socioeconomic, dispute, and outcome data at the district level (Zirkel, 2011).

The conceptual framework for this study is based on social constructivism theory that seeks to understand how social and historical norms have affected individuals with disabilities, and, for this study in particular, students with autism. It is this framework that explains the importance of understanding the perspective within poverty, class, and disability (Brantlinger, 2001), and it was one reason why the median personal income and urban versus rural status were included in this study.

### **Design of the Study**

This study began with a collection and review of existing data specific to students with autism in North Carolina, and the research questions were answered through a quantitative study of secondary data. Most research using secondary sources focuses on administrative records or prior studies. Mertens and McLaughlin (2004) noted that a considerable information base already exists for special education research. For example, the federal government requires that school districts maintain data on students with disabilities who receive special education. Administrative records held at the district, state, or federal level provide a vast amount of data that are often collected but not utilized. This research utilized secondary data sources from the North Carolina Department of Public Instruction's Divisions of Accountability and Exceptional Children, the North Carolina Department of Commerce Division of Employment Security, and the United States Census.

Studies using secondary analysis of data allow researchers to gain an understanding of programs and how they operate without interrupting the program services. Advantages for using this type of data collection include (a) gaining comprehensive historical information, (b) minimizing interruptions to programs, (c) utilizing information that already exists, and (d) having few biases around data collection. The challenges for this type of study include (a) significant time required to sort through vast amounts of data, (b) potentially incomplete information, (c) lack of clarity in what the researcher is looking for, and (d) data being restricted to what already exists (Mertens & McLaughlin, 2004).

Maruyama and Deno (1992) noted that using secondary data sources does have drawbacks. For example, data are frequently collected to inform policy instead of theory development. They also noted that secondary sources of data are sometimes collected at a level that does not allow researchers to disaggregate them and some databases exclude certain areas of eligibility. The researchers specifically mention two areas that are challenges when using existing databases for special education research because of the difficulty interpreting data across groups. These problematic areas are (a) the criteria for inclusion and (b) the implementation of modifications for testing procedures (Maruyama & Deno, 1992). Since one of the questions in this study called for an analysis of achievement scores, it should be noted that acceptable testing modifications vary from student to student based on their individual needs, which provided a challenge for interpreting some of the testing data.

The research design for this study is a quasi-experimental design because it uses both multiple levels of data (data across school districts) as well as multiples waves of data (district dispute data over a five year period). In quasi-experimental designs random assignment to comparison groups is not feasible. However, a quasi-experimental design can be strengthened by matching comparison groups on characteristics as they are related to the dependent variable (Howell, 2007).

The initial phase of data collection focused on child count data over a five-year period. Then student outcome, median income, dispute data, population data, and urban or rural classification data were collected. This type of study allowed the researcher to examine the numerous and complex relationships among student achievement, district dispute data, and socioeconomic factors for children with ASD.

The initial study proposal was designed to analyze differences in districts with the smallest and largest numbers of students with autism. However, obtaining student outcome data for districts with a very small number of students with autism was not possible because the data could be considered personally identifiable. This was particularly true for outcome data at specific grade levels or for specific areas such as reading or math. To address this limitation, two changes were made to the design of the study. First, the sample size was expanded to include all LEAS in North Carolina, with the exception of charter schools. Second, for the student achievement index, composite scores for grades three through eight were used. As a result, the number of districts included in the study was 115 for measures other than student outcome data, which were 101.

## Sample

The study's sample was based school district data for individual students identified as a student receiving special education with a current IEP with a primary area of eligibility as autistic as defined by IDEA. Child count data for each LEA within the state of North Carolina over a five-year period from 2006 to 2010 were extracted for each school district (NCDPI, 2010a). The districts were ranked based on the number of students with autism ( $N = 4$  to 1,846) based on their April 1, 2010 child count data (see Appendix A). Because 14 districts still had so few students with autism that composite scores were not released, an SPSS option to exclude cases list-wise was implemented. Excluding cases list-wise allows only the cases in the analysis that have full data on all the variables listed in the variable list box (Pallant, 2010).

## Data Sources

### Prevalence Data

Child count data for students identified with autism and for all students with disabilities from 2006 to 2010 were obtained from the Department of Public Instruction's Exceptional Children's Division and used as a starting point for this study (NCDPI, 2010a). These data were reported by school districts based on the number of students with disabilities who were also in need of special education and who had IEPs at the time. The districts were ranked based on the numbers of students with autism on April 1, 2010, and the samples were taken from two groups, those with the highest and lowest numbers of students with autism. In North Carolina, nearly all the school districts represent the county, and comprised the population. Since many of the variables were

selected at the county levels, and due to the small student population, charter schools were excluded from this study. To gain a better perspective on each district's prevalence of students receiving special education services for ASD in the student population, the Average Daily Membership (ADM) during the same time was also included for each district (see Appendix B). The ADM for each district was collected from NCDPI's student accounting section under data and reports (NCDPI, 2011b).

### **Dispute Resolution Data**

Dispute resolution data were defined as the number of individual cases of mediations and state complaints. To be counted as a state complaint, a formal complaint form was submitted based on specific concerns regarding educational services. Both mediation and state complaint were collected for each LEA and maintained at the Department of Public Instruction's Exceptional Children's Division.

### **Median Income Data**

The North Carolina Department of Commerce, Division of Employment Security (2011) maintains a large database containing labor market information. The database has a workforce in-depth section that has the ability to provide customized reports for each county in North Carolina. The division maintains data concerning the labor force, per capita income, average weekly wage, commuting patterns, Census population, and other categories of economic data (NCDC, 2011). Each district's median personal income was used as a socioeconomic variable in this study (see Appendix C).

**Census Data**

Census data from the 2010 census were gathered and cross-checked by the U. S. Census Bureau's urban-rural classification system. The system identifies urban and rural areas based on a delineation of geographical areas and their density. Urban areas are further identified as either urbanized areas or urban clusters. Urbanized areas (UAs) have 50,000 or more people and urban clusters (UCs) have at least 2,500 and less than 50,000 people. Rural areas include all population and territories with a population of less than 2,500. For the purpose of this study, districts were defined as either urban or rural based on these criteria (see Appendix C).

**Student Outcome Data**

At the school level, each student's IEP team is responsible for making decisions regarding the instructional process, annual goals, and any required accommodations or alternate assessments. Table 3 outlines the statewide tests used in North Carolina (NCDPI, 2011a). District level scores are reported for students in special education and for each subgroup unless the number of students in each subgroup is so small that it would be considered personally identifiable. Therefore some small districts did not report subgroup data for students with autism and those districts were excluded from this part of the study. The assessment data included in this study were composite scores for the North Carolina End-of-Grade (NCEOG), North Carolina End-of-Grade Reading Comprehension Test (NCEXTEND 1) and the North Carolina Extend 2 (NCEXTEND 2) for grades three through eight (see Appendix D). Each of these assessments is designed to

measure proficiency on content standards, but the NCEXTEND 2 is an alternate assessment designed to measure performance on the extended content standards.

**North Carolina End-of-Grade Mathematics Test (NCEOG- Math).** The NCEOG in Mathematics has been used since the 2005-2006 school year to measure proficiency with the goals and objectives specified in the mathematics standard course of study content standards in grades 3-8. The competency goals were established by the NC State Board of Education in 2003 and cover five strands: number and operations, measurement, geometry, data analysis and probability, and algebra (NCDPI, 2011a).

**Table 3**

**North Carolina Testing Program Assessment Options for Grades 3-8**

Grades 3-8	General Assessment Options		Alternate Assessment Options	
	General Test Administration	General Test Administration with Accommodations	NCEXTEND2 EOG	NCEXTEND1
Measured North Carolina Standard Course of Study (NCSCS) Content	Grade level	Grade level	Grade level	Extended content standards
Academic Achievement Standards (Cut scores)	Grade-level academic achievement standards	Grade-level academic achievement standards	Grade-level modified academic achievement standards	Alternative academic achievement standards
Test Format Reading and Math Grades 3-8 Science Grades 5 and 8	Multiple-choice	Multiple-choice	Modified multiple-choice	Performance tasks
Eligible Students	All students	Students who are Limited English Proficient, students with disabilities who have an IEP or a Section 504 Plan, and students with a transitory impairment	Students with disabilities (who have a current IEP) and meet specific criteria	Students with disabilities (who have a current IEP) and meet specific criteria

Adapted from NCDPI, 2011a

**North Carolina End-of-Grade Reading Comprehension Test (NCEOG – Reading).** The NCEOG in Reading has been used since the 2007-2008 school year to measure proficiency with the goals and objectives specified in the language arts standard course of study content standards in grades 3-8. The competency goals were established by the NC State Board of Education in 2004 and assess reading comprehension and knowledge vocabulary. The reading passages are chosen a variety of purposes, including literary experience, gaining information, and performing a task (NCDPI, 2011a).

**North Carolina Extend 2 (NCEXTEND 2).** The NCEXTEND 2 has been in use since the 2005-2006 school years for grades 3-8 in Mathematics and Reading (an NCEXTEND 2 and EOG for science are also given at grades 5 and 8, but they are not referenced in this study). It is based on grade level standard course of study standards but has adapted grade level standards and an accommodated test format. The test format includes shorter reading passages, simplified vocabulary, fewer multiple-choice test items (three answer choices rather than four), and a different page layout (only one or two items per page). Students taking the NCEXTEND 2 participate in the standard course of study and may take the NCEXTEND 2 in one or more subject areas (math, reading, and/or science). NCEXTEND 2 testing criteria state that students should not have a significant cognitive disability but must have a disability that prevents them from attaining grade level proficiency in a given subject area (NCDPI, 2011a).

**North Carolina Extend 1 (NCEXTEND 1).** The NCEXTEND 1 is an alternate assessment that has been in use since the 2006-2007 school years and was used to replace the alternate assessment portfolio. This assessment is used for students in grades 3-8 and

grade 10. It differs in complexity from regular grade-level standards and is utilized to assess students in the North Carolina extended content standards. Students taking the NCEXTEND 1 must have a significant intellectual disability that requires extensive and explicit instruction to acquire, maintain, and generalize new skills in the tested areas (NCDPI, 2011a). The assessment is in a multiple-choice format and requires that two independent assessors each evaluate a student's performance and independently enter their results online.

**North Carolina Checklist of Academic Standards (NCCLAS).** The NCCLAS was an alternative assessment used primarily for students with limited English proficiency and students with significant disabilities. It was discontinued in 2009 due to a variety of issues with its technical quality, and students who took this assessment now take either the NCEXTEND 1 EOG or the NCEXTEND 2 EOC described above. Until 2009, results from the NCCLAS alternate assessment were included in each school's annual performance composite and the federal measures of adequate yearly progress under the ESEA.

### **Data Collection Procedures**

The Institutional Review Board judged this study to be exempt in regard to the protection of human subjects. The initial stage of data collection involved reviewing five years of child count data for students with autism. Data for students with disabilities are submitted by each LEA and reported to the state of North Carolina under guidelines from the Individuals with Disabilities Education Act. Each December 1<sup>st</sup> and April 1<sup>st</sup>, individual LEAs, charter schools, and state operated programs are responsible for

submitting child count verification reports (NCDPI, 2010a). Additionally, each year these data are forwarded to the U.S. Department of Education, Office of Special Education Programs. For the purpose of this study, data from the April 1<sup>st</sup> child count were utilized.

The student performance data were reported per school and local education agency through the Accountability Division of the North Carolina Public Schools Website. The achievement data was organized according the school system, school, subject, grade, and type of assessment. The data were not disaggregated with the specific test scores for students or for subgroups too small to report a value. For each assessment, the disability subgroups data provided scores for all students with disabilities as well as for students identified by each individual area of disability. These data sets provide the number and percent of students at or above a proficiency score of level 3. The student outcome score used in this study was a composite score for grades three through eight composed of the NCEOG, NCEXTEND 1, and NCEXTEND 2 data.

As a specialist for my LEA, I had previously worked with the current assistant director for the North Carolina's Exceptional Children Division as well as several of the consultants for dispute resolution. As a result, both the assistant director and the consultants for dispute resolution agreed to work with me and share their dispute data for this study. The dispute data had been collected and maintained by the consultants for dispute resolution by district, but it had not been analyzed with the variables identified in this study. Email was used as the primary method of contact for the assistant director, dispute resolution consultant, and the investigator. Data were submitted to the researcher via several emails between summer and fall 2011.

## Data Analysis

Data were collected and entered into SPSS version 19.0. Descriptive statistics were computed on specific LEA prevalence data, dispute data, median personal income, density rating, and proficiency on statewide assessments. Specific data analyses for each research question is as follows:

Research Question 1: *What are the characteristics of the school districts as they relate to students identified with autism in North Carolina?*

Descriptive statistics were calculated for each of the district level data in the study. They included autism data, median personal income, student achievement composite scores (NCEOG, NCEXTEND 1, and NCEXTEND 2), population demographics, and dispute data. The nominal data were analyzed with frequency and percentages, and the continuous data were analyzed with means and standard deviations.

Research Question 2: *Does the EOG composite proficiency on statewide assessments in grades 3 through 8 differ with changes in median personal income and district level prevalence of students with autism?*

To answer Question Two, a regression analysis using the general linear model was completed. A multiple regression was completed using the EOG proficiency composite score as the dependent variable. The median personal income, percent of SWDs with autism, and an interaction effect of median income and percentage of SWDs with autism were also included.

Research Question 3: *Is there a relationship between median personal income and district level variables?*

To answer Question Three, a Pearson product correlation was used as a measure of the strength as well as direction of a relationship. A simple regression was used to predict whether personal income affects autism prevalence within a school district. A Spearman rank order, or Spearman rho, correlation was used to determine if a relationship existed between personal median income and the rate of dispute. The Spearman rho is used to identify the level of monotonic relationships between two variables (Howell, 2007).

Research Question 4: *Is there a relationship between the level of dispute (defined by state complaint and mediations from 2006 to 2011) and district level variables?*

For Question Four, a Spearman rho was used to determine if there was a relationship between the rate of dispute and population demographics.

In summary, this study was designed to examine district data for students with ASD in North Carolina public school districts. A quasi-experimental design was used to explore district level data to examine factors that affect children with autism. Previous studies have explored specific methodologies and evidence-based practices, but none to date that the researcher has found analyzed the prevalence of ASD with student achievement, dispute data, and socioeconomic factors.

Research including these variables has the potential for contributions to the field of educational research as well as district and state special education administrators. For example, the majority of this information, with exception the dispute data, was accessible to the general public yet it was never studied in detail. This analysis provided insight into the factors that influence educational service for students with autism in North Carolina.

## **CHAPTER IV**

### **RESULTS**

The purpose of this study was to conduct an analysis of school district demographic and dispute factors that could affect educational services for students with ASD. Few studies have examined district level data as they relate to outcomes for students with autism. This study identified and analyzed data for variables that are discussed in the literature as the factors perceived to have an effect or relationship on educational services. The information gained from this study provides insight for special education administrators at the state and district level that enhances the understanding of the complexities in the field of autism. The data also provide a meaningful foundation for future areas of much needed research for students with autism.

Of the 115 North Carolina school districts, data were included for each of the variables. The student performance EOG composite score was not available for 14 of the districts because the student population in those districts was so small that it could yield personally identifiable information. Thus, eighty-eight percent (88%) of districts were included in the student outcome analyses and the other districts were excluded using a list-wise comparison.

#### **Quantitative Analysis**

Research Question One asked, “What are the characteristics of school districts as they relate to students identified with autism in rural and urban North Carolina?”

Specifically, what are the districts' autism data (number of students, percentage of growth in students with autism, and prevalence)? To examine this question, descriptive statistics including frequencies, percentages, means, and standard deviations were computed for each of the sub-questions. The individual districts' 2010 child count data ranged from 2 to 1,844 students being served in the autism category across North Carolina with a total of 11,259 students receiving services. The average number of students with autism per the average daily membership (ADM) for each district was similar between urban ( $\bar{X} = .76$ ;  $SD = .28$ ) and rural districts ( $\bar{X} = .74$ ;  $SD = .3$ ). Perhaps most interesting is the percentage of change in the number of students with autism over a four-year period between 2006 and 2010. The percentage of students with autism increased substantially 83.29% ( $SD = 80.22$ ) across the state while the total ADM during the same time period decreased (-1.55%;  $SD = 6.58$ ).

Descriptive data were used to review the median personal income for each of the districts. In 2009, the median personal income for each district ranged from a minimum of 24,807 to a maximum income of 47,925. Overall, the average median personal income was 31,727, with a median of 30,508 ( $SD = 4,562$ ). Urban districts had a higher mean ( $\bar{X} = 32,522$ ;  $SD = 4,722$ ) than rural districts ( $\bar{X} = 30,233$ ;  $SD = 4387$ ).

The next question specifically looked at the NCEOG achievement composite scores students in each district from 2010. Achievement scores for grades 3 through 8 showed differences in scores among all students (all student scores included scores for students with disabilities), students with SWD (SWD scores included scores for students with autism), and students with autism. Overall, students with autism had higher mean

scores ( $\bar{X} = 49.12\%$ ;  $SD = 13.57$ ) than students with disabilities ( $\bar{X} = 34.50\%$ ;  $SD = 11.22$ ) and lower mean scores than all students ( $\bar{X} = 64.78\%$ ;  $SD = 10.43$ ). Students with autism in urban districts scored slightly lower ( $\bar{X} = 48.7\%$ ;  $SD = 12.57$ ) than those in rural districts ( $\bar{X} = 50.6\%$ ;  $SD = 16.94$ ). Similar findings for SWDs showed they scored higher in rural districts ( $\bar{X} = 37.39\%$ ;  $SD = 13.29$ ) than in urban districts ( $\bar{X} = 34.29\%$ ;  $SD = 10.6$ ). The mean composite scores for all students were also higher in rural areas ( $\bar{X} = 67.39\%$ ;  $SD = 11.44$ ) than urban districts ( $\bar{X} = 65.31\%$ ;  $SD = 8.64$ ).

The population for the county seat of each district (or city population if it was a city/county district) ranged from 143 to 731,424. County seats with a population under 2,500 were defined as rural. Out of 115 districts in North Carolina, 26% of districts ( $N = 30$ ) were identified as urban and 74% of districts ( $N = 85$ ) were identified as rural.

The dispute data (state complaints and mediations) filed in each district within North Carolina Department of Public Instruction between 2006 and 2011 showed a total of 128 cases of dispute with a range from 0 to 28 per district. Districts with the highest numbers of dispute were urban with the greatest population. The districts in urban areas had an average of 1.52 disputes ( $\bar{X} = 4.1$ ) and rural areas had an average of .32 ( $\bar{X} = .57$ ). However, when looking at the dispute data by population numbers, urban ( $\bar{X} = .01$ ;  $SD = .199$ ) and rural areas ( $\bar{X} = .011$ ;  $SD = .299$ ) were similar.

Question Two analyzed whether the EOG composite proficiency percentage on statewide assessments in grades 3 through 8 differed with changes in median personal income and district prevalence of students with autism. In order to estimate the effect of median personal income and district prevalence of students with autism, a regression

utilizing the general linear model was conducted. A multiple regression with EOG proficiency as the dependent variable and median income, the percent of SWDs with autism, and an interaction effect of median income and percent of SWDs with autism were included in the model. Multiple regression analysis assumes that (a) the variables are normally distributed, (b) variables are measured without error, (c) the error distribution is homoscedastic or that the error variance in each level of the independent variable is equal, and (d) a linear relationship between the independent variables and the dependent variables (Howell, 2007).

An analysis of an interaction effect is a way to examine if there is a non-linear relationship between the independent variables. The interaction effect was calculated by centering (or subtracting the mean off of the independent variables) and then multiplying the centered variables together. The reason the variables are centered is because not centering them can lead to the issue of multicollinearity, is that, the variables explain the same variance in the dependent variable. The multiple regression analysis is assumed to be robust to minor violations such as slight problems with skew.

In Table 4, the model-based parameters are displayed. The analysis indicates that overall, for each thousand dollars in median income, a .560 increase in the percentage of all students scoring proficient on the EOGs in grades 3 through 8. For each percentage of students with autism that comprise the students with disabilities, there is a 10.725 percentage increase in EOG proficiency for all students; however, there is only about a 1% difference in the minimum and maximum prevalence. The two independent variables explain about 18% of the variance found in EOG proficiency ( $r^2 = 0.178$ ). This suggests a

low to moderate effect size; in addition, the variance explained by each of the predictors as measured by  $r^2$  also indicates a low overall effect size.

**Table 4**  
**All Students' EOG Multiple Regression**

<b>Parameter</b>	<b>Unstandardized Beta</b>	<b>Std. Error</b>	<b>Standardized Beta</b>	<b><i>t</i></b>	<b><i>Sig.</i></b>	<b><math>r^2</math></b>
Median Income	.560	.232	.217	2.417	.017	.050
Autism Prevalence	10.725	3.446	.305	3.112	.002	.080
Interaction between Median Income and Prevalence of Autism	-.772	.651	-.117	-1.186	.238	—

In addition, an analysis was run on the composite percentage proficient on just the students with autism to see if the covariates held in the subpopulation. The same multiple regression was conducted with EOG percent proficient for students with ASD as the dependent variable and both median income and autism prevalence as the independent variables. An interaction effect of median income and prevalence of autism were included in the model. In Table 5, the model-based parameters are displayed for this analysis. The analysis showed that none of the variables were significant for students with autism. The same independent variables in this analysis explain .03% of the variance found in EOG proficiency for students with autism. This suggests that the variables that work for the total population do not have the same effect for the subpopulation.

**Table 5**  
**Students with Autism EOG Multiple Regression**

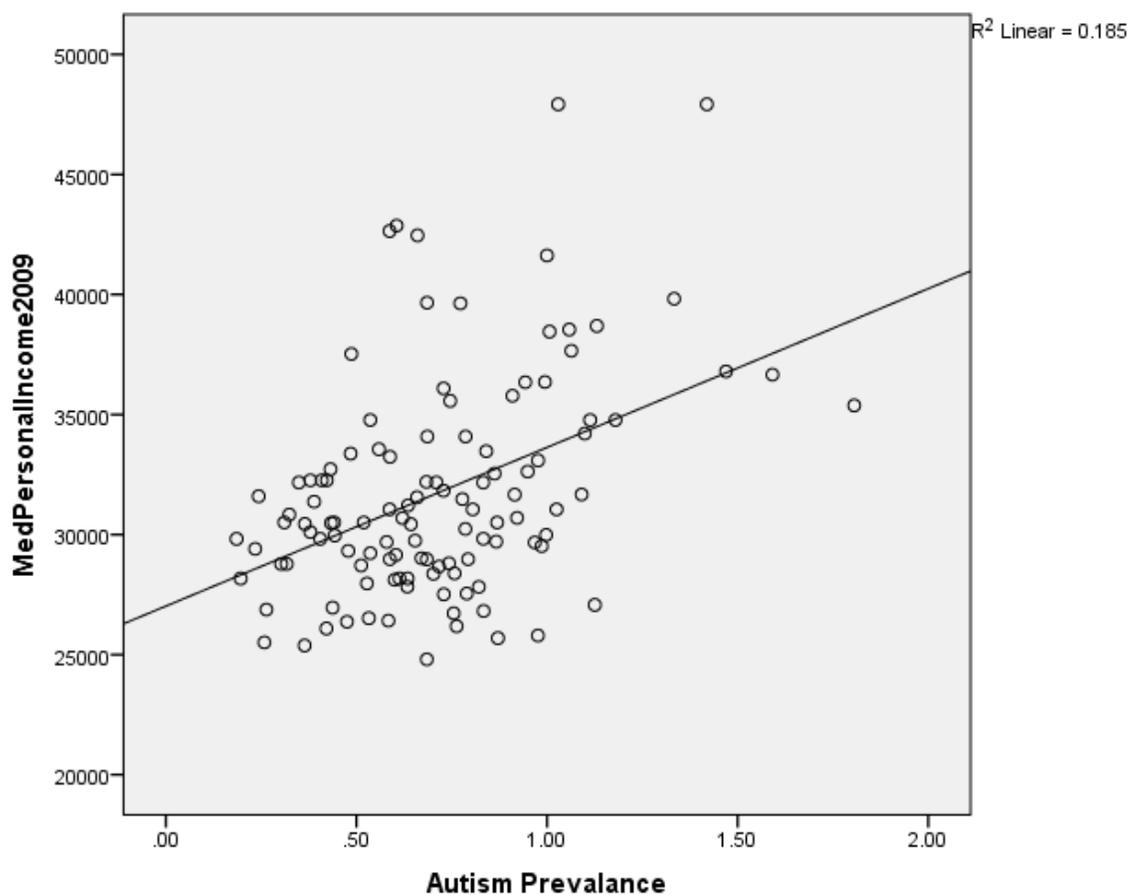
<b>Parameter</b>	<b>Unstandardized Beta</b>	<b>Std. Error</b>	<b>Standardized Beta</b>	<b><i>t</i></b>	<b><i>Sig.</i></b>	<b><i>r</i><sup>2</sup></b>
Median Income	.148	.340	—	.435	.665	—
Autism Prevalence	5.873	5.266	—	1.115	.268	—
Interaction between Median Income and Prevalence of Autism	.241	.950	—	.254	.800	—

In Table 6, an analysis was conducted to examine whether the effect held in the subpopulations of students with disabilities. In the students with disabilities subpopulation, the analysis revealed that none of the variables were significant for SWDs. Whereas the  $r^2$  for the full population was 18%, for the SWD population the  $r^2$  drops to 8%. This suggests that the variables that work for the total population do not have the same effect in either the (students with autism or SWD) subpopulations.

**Table 6**  
**Students with Disabilities EOG Multiple Regression**

<b>Parameter</b>	<b>Unstandardized Beta</b>	<b>Std. Error</b>	<b>Standardized Beta</b>	<b><i>t</i></b>	<b><i>Sig.</i></b>	<b><i>r</i><sup>2</sup></b>
Median Income	.384	.263	—	1.458	.148	—
Prevalence of Autism	7.794	3.918	.206	1.989	.049	.034
Interaction between Median Income and Prevalence of Autism	-.305	.740	—	-.412	.681	—

Question Three looked at the whether there was a relationship between median personal income and district level variables. First, the relationship between median personal income and autism prevalence in each district was analyzed. The scatterplot (see Figure 1) shows that there is a moderate association between the percentage of the students with disabilities that are affected with autism and the median personal income. The Pearson product correlation is .43. This indicates that the two variables have a moderate association.



**Figure 1. Scatterplot of Median Personal Income with Autism Prevalence**

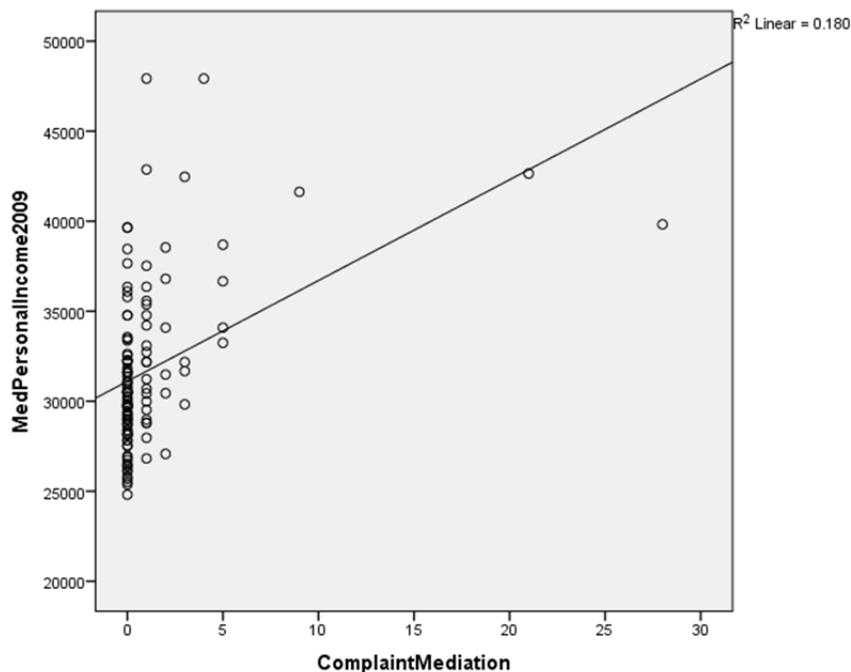
In addition, a simple regression was conducted to predict how personal income affects autism prevalence within a county. The regression found that for every thousand-dollar increase in the county's median income, there was a .028 increase in the percentage of autism prevalence in the district. The median income in this study ranged from 24,000 to 45,000. The predicted difference between the two would be over 5% more students identified in the wealthiest county as opposed to the poorest county. Table 7 shows the results from the linear regression.

**Table 7**

**Linear Regression for Median Income onto Autism Prevalence**

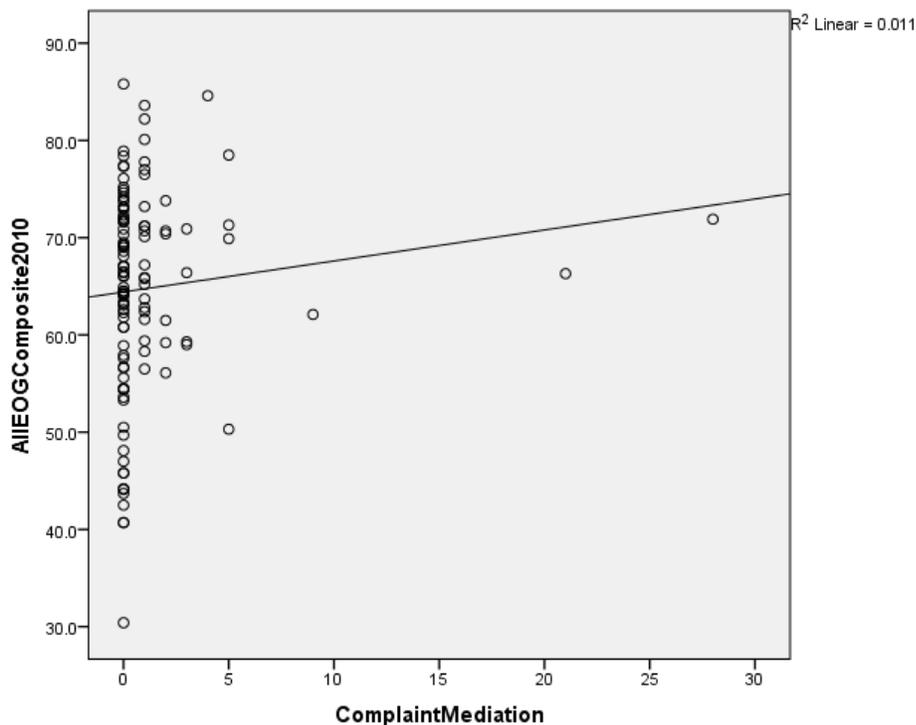
<b>Parameter</b>	<b>Unstandardized Beta</b>	<b>Std. Error</b>	<b>Standardized Beta</b>	<b><i>t</i></b>	<b><i>Sig.</i></b>	<b><i>r</i><sup>2</sup></b>
Median Income	.028	0.006	0.43	5.066	0.000	0.185

The second sub-question looked at the relationship between median personal income and the rate of dispute. While there is very little overall variation in the number of state complaints and disputes mediated, there is a moderate association between that and personal income. That is, the higher the median level of personal income, the more state complaints and mediations there are. The Spearman rank order correlation between median personal income and the rate of dispute is .44. See Figure 2 for a scatterplot of median personal income with complaints mediated.



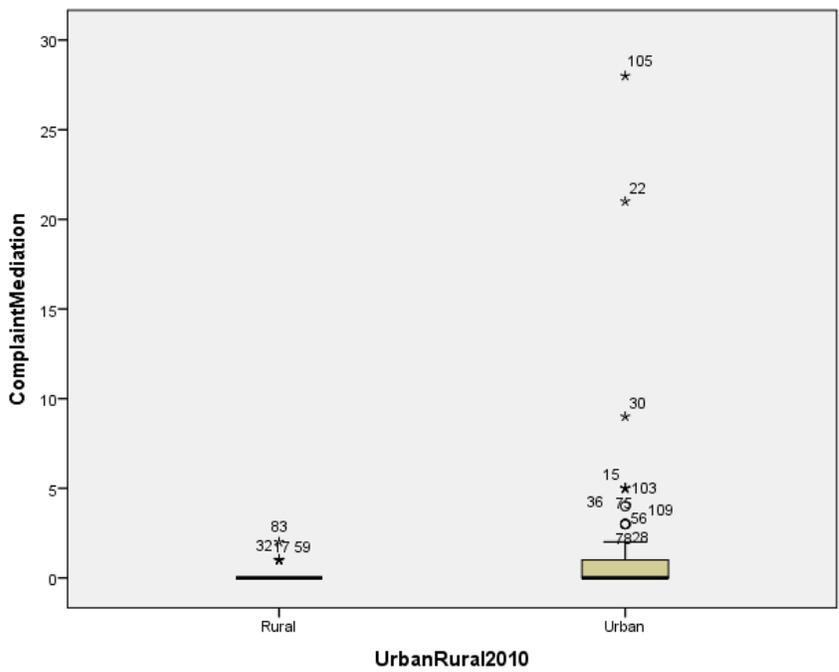
**Figure 2. Scatterplot of Median Personal Income with Complaints Mediated**

Question Four was intended to examine any relationship between the rate of dispute (defined by state complaint and mediations from 2006 to 2011) and district level variables. The first sub-question looked at whether a relationship between existed between the rate of dispute and student proficiency on statewide assessments. The Spearman rank order correlation between the rate of dispute and student proficiency on the EOG was .170. This suggests that virtually no relationship was found between the rate of disputes as measured by state complaints and mediations from 2006 to 2011 and achievement as measured by the composite percent proficiency scores from 2010. See Figure 3 for the scatterplot of the composite percent proficiency scores with complaints mediated.



**Figure 3. Scatterplot of Proficiency Composite Scores with Complaints Mediated**

The second sub-question considered whether a relationship existed between the rate of disputes and population demographics (urban or rural). It appears that although there is little variance overall in the number of state complaints or mediations, the urban areas are far more variable than the rural areas. This could be because there are simply more state complaints in urban areas because there are more people in the district and thus more possible situations where a complaint would arise. In fact, a Pearson product-moment correlation between state complaints and mediations and the population for a city is .79. See Figure 4 for the boxplot of the number of complaints mediated in urban versus rural areas.



**Figure 4. Boxplot of the Number of Complaints Mediated in Urban versus Rural**

This data analysis provided a deeper understanding of students with autism in North Carolina’s public school districts by analyzing demographic data as well as factors identified in the research that have the potential to affect educational services. The study identified that although a district’s level of median income is related to student achievement for all students it does not relate to on the achievement scores for students with autism. Further, it is telling that a moderate association exists between prevalence of students with autism in the ADM and the district’s median personal income. In the next chapter, the results are discussed in great detail to provide conclusions about critical factors and educational services as well as recommendations for future research.

## **CHAPTER V**

### **DISCUSSION**

The number of students diagnosed with ASD continues to grow steadily across the nation. In the past 4 years alone, this study shows that the prevalence of students identified with autism and in need of special education across North Carolina increased 83.23% between 2006 and 2010. This sharp increase in students with autism occurred at the same time that the total number of students (or ADM) during the same time period decreased 1.55%. If you look specifically at 2010, 5.27% of students with disabilities were identified with autism and the districts prevalence rates averaged .71% for a total of 11,259. As these numbers indicate, school districts are identifying more students with autism who need individualized education plans. So how are these students doing in school?

There are many measures of student outcomes, such as achievement scores, graduation indexes, post-school outcomes, etc. Because this research focused on student performance, achievement data were measured based on the percent of students scoring proficient on statewide achievement scores for grades 3 through 8. Overall students with autism demonstrated scored higher levels of proficiency (49.1% proficient) than the composite for all students with disabilities (34.5% proficient); however, both groups scored lower than the all students composite (64.8% proficient). These data indicates that although students with autism scored higher than many students with disabilities, they are

still falling behind other North Carolina students on accountability measures. Students with ASD have diverse learning patterns and thus unique educational needs that can be challenging for educators.

The findings from this study showed that proficiency scores for all students and both subgroups in North Carolina are higher in rural areas than in urban areas. Students with ASD performed at a slightly higher level in rural areas (50.6% proficient) than in urban areas (48.7% proficient). Additional studies would need to be completed to investigate possible reasons as to why it appears students in North Carolina scored higher in rural areas than urban areas. It is important to note that the criteria for how urban and rural schools are defined varies; therefore, it can be difficult to make generalizations between studies.

Although widespread research specific to student outcomes for children with autism in urban and rural areas have not been conducted, studies of student outcomes for the total population have been variable. For example, some national research on student performance between urban and rural areas show similar student outcomes, and others show students in rural areas not scoring as well as their urban peers. One factor complicating the urban and rural research is that different criteria exist for how rural is defined. According to the National Center for Education Statistics (2007), approximately 33% of students attend rural schools. On the 2005 National Assessment of Educational Progress, fourth- and eighth-grade students performed at similar levels in reading, science, and mathematics (National Center for Education Statistics, 2007). However, a

closer look shows that student performance in math varies significantly between urban and rural students in some states but not others (Lee & McIntire, 2000).

Another indicator of student achievement different between groups was the level of median personal income. Studies have long indicated that family income and school districts' resources are indicators of student performance. The findings in this study indicate that for every additional thousand dollars in median income we would expect to see a .560 increase in percentage of all students scoring proficient in grades 3 through 8. However, median income was not a significant factor in proficiency scores for students with autism. In an effort to better understand this outcome, additional analyses were conducted to look at the interaction effect between median income and the percentages of SWDs with autism (as possible indicators of prevalence or diagnostic discrepancies between districts). This analysis also indicated that the variables were not significant for students with autism.

This study found that a moderate relationship existed between the district's median personal income and district level autism prevalence. In fact, for every thousand-dollar increase in the county's median income, there was a .028 increase in the percentage of autism prevalence for the district. Ultimately 5% more students would be identified in the wealthiest county versus the poorest county in North Carolina. These data supports an earlier study by Durkin and his colleagues (2010) showing that, in U.S. cross sectional study, the overall prevalence of autism is higher in areas where census based measures of socioeconomic status were higher. But they contradict a recent study in California that showed that socioeconomic factors were no longer a factor in

diagnosing autism. In that study, King and Bearman (2011) examined both individual and community resources identified with an increase in autism prevalence between 1992 and 2000. They found that community resources in California drove prevalence. The authors suggested that by treating communities as dynamic we could better understand both the socioeconomic gradient of autism and increases in prevalence. Additionally, Mandell and Palmer (2005) found that interstate variability in the identification of children with ASD is associated with both education-related spending and the availability of healthcare resources.

Although understanding why district level prevalence is related to income in North Carolina is beyond the scope of this study it does warrant discussion as the findings could affect student outcomes. Prevalence and diagnostic discrepancies between districts are factors that need to be considered when examining district level data. Glascoe (2000) found that the school system, not the medical system, identified 70% of children with developmental delays. Another study found that 75% of children with autism spectrum disorder were identified through the school system (Yeargin-Allsopp et al., 2003). One of the reasons income is believed to play a role in diagnosis is the access to qualified diagnosticians and community supports such as screening services, school-based mental health centers, and pediatricians in the community (Mandell & Palmer, 2005; Palmer et al., 2005). Those studies also suggested that school districts with higher levels of economically disadvantaged communities could need support in identifying children with ASD (Palmer et al., 2005).

Next, this study looked at the relationship between the rate of dispute and student proficiency. This question was intended to see if there would be a relationship between districts with a higher level of dispute and students scoring either lower or higher on statewide assessments. The correlation between the two variables was extremely weak and thus the rate of dispute does not appear to have any relationship to student achievement. Thus, districts with the lowest student proficiency outcomes did not have a greater chance of a formal state complaint or mediation request than district's that had the highest student proficiency outcomes.

Finally, this study looked at the relationship between the rate of dispute and demographic variables. When compared to other litigation studies about all students with disabilities, autism cases are litigated at a disproportionate rate for a number of complex reasons (Feinberg & Vacca, 2000; Heflin & Simpson, 1998b; Zirkel, 2011). Overall the level of state complaints and disputes mediated across North Carolina showed very little variation. A district's median level of personal income had a moderate association with the level of dispute. The data showed that the greater the median personal income, the greater the level of dispute.

Overall there is little variance between the level of dispute between urban and rural areas. However, urban areas of North Carolina have a far more variable rate of dispute than rural areas. This could also be associated with the level of median income, which is typically lower in rural areas. Without reviewing data from other areas of disability, it is not possible to determine whether the level of state complaints or disputes was disproportionate in this study. However, this study did indicate a moderate

association between median personal income and the rate of dispute. When looking at the relationship between the rate of dispute and population demographics (urban or rural) the data showed more disputes in urban areas. This could potentially be explained by a number of factors specific to urban areas in North Carolina, including more students with autism, a higher prevalence rate, or higher personal median income levels. Or something else might explain this correlation, such as the population's access to parent support organizations or advocacy groups.

### **Limitations**

Limitations to this study involved the use of district level data sets as aggregate units to investigate differential rates student proficiency scores at the district level. Since individual student data were not used, this study did not examine how differences in services or prevalence rates affect individual outcomes. Regression artifacts are another possible limitation with quasi-experimental designs using matched data sets, such as urban and rural districts. Regression artifacts are produced when matched group come from nonequivalent populations and can be complex to control for without a strong understanding of regression techniques and grounding theory (Maruyama & Deno, 1992).

Another limitation for this study was the difficulty encountered obtaining student achievement data for students in districts with the fewest numbers of students with autism. Subgroups are groups of students with certain characteristics, such as those with disabilities, whose data reported and monitored by local, state, and federal officials. This is because any school or school district that has a group of students so small that the students could be personally identifiable does not have to publicly report data for that

particular subgroup. Thus any subgroup of students that is small is not required to report results for adequate yearly progress (AYP) accountability purposes. Therefore, composite student achievement data for students in third through eighth grade was available for the most of the urban districts ( $N = 79$ ; 92.9%), but was not available for many of the small, rural districts ( $N = 22$ , 73.3%).

A limitation to the prevalence data has to do with utilizing administrative level data from each district. The true prevalence of students with autism in each community is likely higher than the numbers reported on each district's child count report. This is most likely because of three reasons: (a) students with autism may be identified as students receiving special education under another area of eligibility such as other health impaired, (b) students may not meet the criteria for special education services according to state policy, or (c) parents of students with autism may not have given permission for the student to receive special education services. A small amount of variation in district level data for these reasons would probably affect the proportion of children with autism in each district. As a result, the prevalence rate discussed in this study could actually be higher if all children with autism received special education services with a primary eligibility area of autism (and thus were identified as a child with autism on child count).

No researcher is completely free of bias and my experiences working with students on the autism spectrum has provided me with thoughts and beliefs regarding autism supports from early intervention through young adulthood. The ideals that I bring to this research include: (a) more must be done to prepare general education teachers to support students with autism, (b) schools need to set high expectations for all teachers to

understand and apply evidence-based practices, (c) programs serving young children should follow guidelines established by the National Research Council, and (d) all districts should be equipped to evaluate and diagnose autism. Without these high expectations, inequities in both diagnosis and educational services for students with autism can exist among individual schools and school districts. The findings from this study support a relationship between median personal income and a district's autism prevalence in North Carolina. I believe that socioeconomic variables do play role in diagnoses and services in North Carolina as I continue to see students who move into the district where I work from other areas of the state who were not evaluated or diagnosed as part of early intervention services. However, without further study, is impossible to rule out possible causes behind the discrepancies in prevalence across the state (i.e., parental education level, parental age, school district resources, or another unknown variable).

It is expected that educators supporting students with autism in North Carolina are utilizing evidence-based practices based on the national recommendations from the NRC, NDPC, and NAC. Overall, these data show that there is only a slight variation in achievement for students with autism in urban and rural areas of the state and there is no relationship between the proficiency outcomes and level of dispute for a district. However, the standard deviation between the groups provides some insight. The standard deviation for the percent proficiency was higher ( $SD = 13.57$ ) for students with autism, than SWDs ( $SD = 11.22$ ), and all students ( $SD = 10.43$ ). Achievement for students with autism in rural districts showed the greatest level of variability ( $SD = 16.94$ ) out of all

subgroups. For comparison, the standard deviation for percent proficient in rural areas was less for both SWDs ( $SD = 13.29$ ) and all students ( $SD = 11.44$ ) than students with autism. The variation in the percentage of students scoring proficient could indicate a lack of fidelity in the implementation of the national recommendations between urban and rural areas. A limitation of this study is that it cannot measure the fidelity to which the national recommendations are used between individual districts.

These results examine data from one state with a long history of providing statewide programs for students with ASD, and thus the results may not be generalizable to other states. This is true not only because North Carolina has an affiliation with specific intervention programs for students with ASD through the TEACCH program but also because regulations regarding funding for some early intervention services, including insurance coverage mandates, vary from state to state.

Additionally, in 2013, it is expected that a revised definition for autism will appear in the new fifth edition of the Diagnostic and Statistical Manual. The proposed revisions would tighten the criteria for autism and would ultimately decrease the number of individuals identified. If these revisions are accepted in the new DSM-V, the district prevalence data in this study would likely change dramatically as some students would no longer meet the criteria to be diagnosed with an Autism Spectrum Disorder.

### **Recommendations**

As the prevalence of autism continues to rise, much research is needed to continue to improve supports to individuals and increase student outcomes. The recommendations

from this study are divided into two sections, future research and practices for the field of special education.

### **Future Research**

The results of this study have raised additional questions and pinpointed several areas of future research regarding student outcomes. Specifically, research on achievement for students with disabilities can be difficult challenging, especially when the focus of research is on a relatively small subgroup of students. Several reasons explain this challenge, including the availability of achievement scores for small subgroups of students as well as small variations between districts on how many students may actually be taking one of the two alternative assessments designed for students with disabilities. Further, states revise their achievement tests and proficiency standards from year to year, which can make it difficult to compare student achievement over multiple years and nearly impossible to compare achievement scores among states. Despite the difficulties in research involving student outcomes, this is needed area of study as student proficiency on statewide assessments is one important measure of accountability for the educational services provided.

Future quantitative research on student outcomes should examine Reading and Math scores individually to determine differences exist between the two areas. Additionally, student performance at the secondary level should also be examined. This study used a composite score as the measure of student achievement for grades three through eight. Composite scores in this study used a combination of both Reading and Math scores from the EOG, NCEXTEND 1, and NCEXEND 2. Investigating Reading

and Math composite scores separately or even achievement scores at third, fourth, and eighth grades individually could have yielded specific findings and is thus another recommendation for future research. However, a study of this nature would have its own limitations because the number of students in each subgroup would be so low in many districts that the achievement data would not be reported at all. The large number of missing cases would make it more likely that achievement data could only be analyzed in urban districts with larger numbers of students identified with autism.

Finally, as the prevalence rate continues to increase at an alarming rate across the state, the challenge is for local and state administrators to monitor student outcomes specific to autism. This is especially true since some of the variables how students with autism may be impacted by some variables differently from other groups. Specifically, research needs to be completed to gain a better understanding of why variables that affect student achievement in the total student population do not appear to have the same effect on students with autism. Overall little research has been directed toward which factors are predictive of positive student outcomes as measured by statewide proficiency on achievement measures. This is a complex area that could yield insight into which district level factors do have the greatest effect on student proficiency.

### **Practices for the Field**

In 2010, over 11,000 students in North Carolina were found eligible for special education services as having an autism spectrum disorder. Each of these students received supports through their individualized education programs, which also determined the appropriate state achievement test for them (NCEOG, NCEXTEND 1, or

NCEXTEND 2). These data show that 49% of students with autism scored proficient on the composite scores yielded from their achievement in grades 3 through 8. While this composite proficiency score was 14.6% points higher than the composite proficiency score for SWDs, it was still 15.7% lower than the composite score for all students. Often special education proficiency scores are viewed for SWDs as a whole, but more attention should be paid to the differences in proficiency scores among subgroups of SWDs and what these differences mean. This is particularly true if demographic predictors of proficiency vary across subgroups. State and district staff members are tasked with digging deeper into the data to discover why students with autism have better student outcomes in some districts.

In order to make sure that all students who need an individualized educational program have the same opportunity to be evaluated, diagnosed, and provided with the appropriate educational services, the differences between prevalence in wealthier and poorer districts must be examined closely. These data show that the overall prevalence of students with autism receiving special education in public schools across North Carolina is .71% with a range of .19% to 1.81%. While it is possible that there are differences in the general population are responsible for true differences in the prevalence for a particular area, it is important to consider the evaluation and diagnostic capabilities of the school districts with the lowest prevalence. If it is a matter of diagnosis, these students could potentially suffer as they would not be afforded early intervention or other evidence based services for students with autism.

Although dispute resolution for students with autism is a concern for many district staff, this study did not yield great insight into variables that affect the number of disputes that districts face. The data were simply variable across the state, with the highest levels of dispute in areas with the largest populations and highest median personal income. There was not even a relationship between student outcomes and the rate of dispute.

### **Conclusion**

Educational services for students with autism will continue to evolve as local and state leaders work to incorporate evidence-based practices for a growing number of students with autism. This data in this study showed that overall students with autism are performing slightly higher on student outcome measures in grades 3 through 8 than all students with disabilities, but their proficiency scores are still lagging scores for all students. The data in this study provided two findings of particular interest. Although a district's level of median income has an effect on the total population of students, it does not hold true for the subpopulations of students with autism or students with disabilities. Second, prevalence is moderately associated with median personal income with a 5% difference in identification between the wealthiest and poorest counties. Thus an area of focus for future research is the evaluation and diagnostic availabilities and procedures in those districts with the lowest median income.

North Carolina showed little variability in their rate of dispute across districts, but the level of dispute was higher in urban areas and areas with a higher median income. Local factors such as the socioeconomic status, prevalence of students with disabilities, and the inclusive mindset of school and district administrators can have an effect on

students' educational experiences. Overall the data from this study provide a foundation for more research that is needed to understand school district and demographic variables that affect student outcomes as well as what can be done better to improve individual student outcomes.

## REFERENCES

- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- Attwood, T. (2004). Cognitive behavior therapy for children and adults with Asperger's Syndrome. *Behavior Change*, 21, 147–161.
- Autism and PDD Support Network. (2010). What is autism? Retrieved on May 23, 2010 from <http://www.autism-pdd.net/autism-history.html>
- Autism Society of America. (2006). *Autism Society of America's 37<sup>th</sup> National Conference on Autism Disorders*. Retrieved on June 30, 2006 from <http://asa.confex.com/asa/2006/techprogram/s1970.HTM>
- Baker, S., Gersten, R., Dimino, J. A., & Griffiths, R. (2004). The sustained use of research-based instructional practice. *Remedial & Special Education*, 25, 5–25.
- Baird, M. M. (2005, May). *The year in review: 2004-2005*. Handout presented at the 26<sup>th</sup> Annual LRP's National Institute on Legal Issues of Educating Individuals with Disabilities, Las Vegas, NV.
- Baird, M. M. (1999). Legal issues in autism. *Proceedings of the 20<sup>th</sup> National Institute on Legal Issues of Educating Individuals with Disabilities*. Alexandria, VA: LRP.
- Bettelheim, B. (1967). *The empty fortress: Infantile autism and the birth of the self*. New York: The Free Press.

- Brantlinger, E. (2001). Poverty, class, and disability: A historical, social, and political perspective. *Focus on Exceptional Children*, 33, 1–19.
- Centers for Disease Control and Prevention. (2000). *Prevalence of autism in Brick Township, New Jersey, 1998: Community Report*. Atlanta, GA: Author.
- Centers for Disease Control and Prevention (2006). *Prevalence of autism spectrum disorders – Autism and developmental disabilities monitoring network, United States*. Retrieved on March 9, 2011, from <http://www.cdc.gov/mmwr/preview/mmwrhtml/ss5810a1.htm>
- Centers for Disease Control and Prevention. (2007). *Frequently asked questions—Prevalence*. Retrieved March 16, 2010, from [http://www.cdc.gov/ncbddd/autism/faq\\_prevalence.htm#whatisprevalence](http://www.cdc.gov/ncbddd/autism/faq_prevalence.htm#whatisprevalence)
- Centers for Disease Control and Prevention. (2008). *MMR vaccine and autism fact sheet*. Retrieved on April 20, 2008 from [http://www.cdc.gov/vaccinesafety/concerns/mmr\\_autism\\_factsheet.htm](http://www.cdc.gov/vaccinesafety/concerns/mmr_autism_factsheet.htm)
- Centers for Disease Control and Prevention. (2010). *Autism spectrum disorders: What should you know?* Retrieved on May 23, 2010 from <http://www.cdc.gov/ncbddd/autism/index.html>
- Coalition for Evidence-Based Policy. (2002). *Bringing evidence based policy to education: A recommended strategy for the U.S. Department of Education*. Washington, DC: Author. Retrieved on November 28, 2005 from <http://www.excelgov.org/usermedia/images/uploads/PDFs/CoalitioFinRpt.pdf>
- Creswell J. (2007). *Qualitative inquiry and research design*. Thousand Oaks, CA: Sage.

- Crossley, R. (1994). *Facilitated communication training*. New York: Teachers College Press.
- Darst, P. (2007, November 1). Autism center founder hands over reigns. *The State Journal—News for West Virginia's Leaders*. Retrieved February 18, 2008, from [http://www.statejournal.com/story.cfm?func=viewstoryid=30916&](http://www.statejournal.com/story.cfm?func=viewstoryid=30916)
- Downs, R. C., & Downs, A. (2010). Practices in early intervention for children with autism: A comparison with the National Research Council recommended practices. *Education and Training in Autism and Developmental Disabilities, 45*, 150–159.
- Durkin, M. S., Maenner, M. J., Meaney, F. J., Levy, S. E., DiGuseppi, C., Nicholas, J. S., Kirby, R. S., Pinto-Martin, J. A., & Schieve, L. A. (2010). Socioeconomic inequality in the prevalence of autism spectrum disorder: Evidence from a U.S. cross-sectional study. *PLoS ONE, 5*(7), e11551. doi:10.1371/journal.pone.0011551
- Feinberg, E., & Vacca, J. (2000). The drama and trauma of creating policies on autism: Critical issues to consider in the new millennium. *Focus on Autism and Other Developmental Disabilities, 15*, 130–137.
- Feinstein, A. (2007, February 8). Sybil Elgar, British pioneer in autism education, dies at 92. *Autism Connect*. Retrieved on February 18, 2008, from [http://www.autismconnect.org/news.asp?section=00010001&itemtype=news&search=sybil+elgar&x=O&y=\)&id=6065](http://www.autismconnect.org/news.asp?section=00010001&itemtype=news&search=sybil+elgar&x=O&y=)&id=6065)
- Fombonne, E. (1999). The epidemiology of autism: A review. *Psychological Medicine, 29*, 769–786.

- Garson, G. D. (2011). *Logistic regression*. Retrieved April 22, 2011, from <http://faculty.chass.ncsu.edu/garson/PA765/logistic.htm>
- Glascoe, F. (2000). Evidence-based approach to developmental and behavioural surveillance using parents' concerns. *Child Care Health Development*, 26, 137–149.
- Gray, C. (2010). *The new social story book*. Arlington, TX: Future Horizons.
- Greenspan, S. I. (1992). *Infancy and Early Childhood: The Practice of Clinical Assessment*. Madison, CT: International Universities Press.
- Gresham, F. M., Beebe-Frankenberger, M. E., & MacMillan, D. L. (1999). A selective review of treatments for children with autism: Description and methodological considerations. *School Psychology Review*, 28, 559–575.
- Harrower, J. K., & Dunlap, G. (2001). Including children with autism in general education classrooms: A review of effective strategies. *Behavior Modification*, 25, 762–784.
- Heasley, S. (2011). *Socioeconomic factor less in diagnosing autism, study finds*. Retrieved on April 4, 2011 from <http://disabilitycoop.com/2011/04/06/socioeconomics-autism/12842>
- Heflin, L. J., & Alberto, P. A. (2001). Establishing a behavioral context for learning for students with autism. *Focus on Autism and Other Developmental Disabilities*, 16, 93–101.
- Heflin, L. J., & Simpson, R. L. (1998a). Interventions for children and youth with autism: Prudent choices in a world of exaggerated claims and empty promises. Part I:

- Intervention and treatment option review. *Focus on Autism and Other Developmental Disabilities*, 13, 194–211.
- Heflin, L. J., & Simpson, R. L. (1998b). Interventions for children and youth with autism: Prudent choices in a world of exaggerated claims and empty promises. Part II: Legal/policy analysis and recommendations for selecting interventions and treatments. *Focus on Autism and Other Developmental Disabilities*, 13, 212–220.
- House Committee on Education and the Workforce. (2004). *IDEA reauthorization conference report summary*. Renewing and Strengthening Education: The Individuals Education Improvement Act.
- Howell, D. C. (2007). *Statistical methods for psychology*. Belmont, CA: Thomson Wadsworth.
- Hurth, J., Shaw, E., Izeman, S. G., Whaley, K., & Rogers, S. J. (1999). Areas of agreement about effective practices among programs serving young children with autism spectrum disorders. *Infants and Young Children*, 12(2), 17–26.
- Individuals with Disabilities Education Act Amendments of 1997, 11 Stat 37 20 U.S.C. §1401 *et seq.* (1997).
- Individuals with Disabilities Education Act of 1990, 20 U.S.C. § 1400 *et seq.* (1990).
- Individuals with Disabilities Education Improvement Act of 2004, 20 U.S.C. § 1400 *et seq.* (2004).
- Iovannone, R., Dunlap, G., Huber, H., & Kincaid, D. (2003). Effective educational practices for students with autism spectrum disorder. *Focus on Autism and Other Developmental Disabilities*, 18, 150–165.

- King, M. D., & Bearman, P. S. (2011). Socioeconomic status and the increased prevalence of autism in California. *American Sociological Review*, 76(2), 320–346.
- Koegel, L. K., Harrower, J., & Koegel, R. L. (1999). Support for children with developmental disabilities participating in full-inclusion classrooms through self-management. *Journal of Positive Behavior Interventions*, 1, 26–34.
- Lee, J. and McIntire, W. G., (2000). Interstate variation in the mathematics achievement of rural and nonrural students. *Journal of Research in Rural Education*, 16(3), 168–181.
- Lerman, D. C., Vorndran, C. M., Addison, L., & Kuhn, S. C. (2004). Preparing teachers in evidence-based practices for young children with autism. *School Psychology Review*, 33, 510–526.
- Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting and Clinical Psychology*, 55(1), 3–9.
- Mandell, D. S., & Palmer, R. (2005). Differences among states in the identification of autistic spectrum disorders. *Archives of Pediatric and Adolescent Medicine*, 159, 266–269.
- Maruyama, G., & Deno, S. (1992). *Research in educational settings*. Newbury Park, CA: Sage.

- Maugh, R. H. (2006, November 26). Bernard Rimland, 78: Author was the father of modern autism research. *LA Times*. Retrieved on April 25, 2008 from <http://www.autism.com/ari/rimland/rimlandlatimesobit.htm>
- Mertens, D. M., & McLaughlin, J. A. (2004). *Research and evaluation methods in special education*. Thousand Oaks, CA: Corwin.
- Mesibov, G. (2006). A tribute to Eric Shopler. *Journal of Autism and Developmental Disorders, 36*, 967–970.
- Mesibov, G., & Howley, M. (2003). *Assessing the curriculum for pupils with autistic spectrum disorders: Using the TEACCH programme to help inclusion*. London: David Fulton.
- Mesibov, G., Shea, V., & Adams, L. (2001). *Understanding Asperger syndrome and high functioning autism*. New York: Kluwer.
- Metz, B., Mulick, J. A., & Butter, E. M. (2005). *Controversial therapies for developmental disabilities: Fad, fashion, and science in professional practice*. Mahwah, NJ: Lawrence Erlbaum.
- Moore, S. T. (2002). *Asperger syndrome and the elementary school experience*. Shawnee Mission, KA: Autism Asperger.
- Myles, B. S. (2005). *Children and youth with Asperger syndrome: Strategies for success in inclusive settings*. Thousand Oaks, CA: Corwin.
- Myles, B. S., & Adreon, D. (2001). *Asperger syndrome and adolescence: Practical solutions for school success*. Shawnee Mission, KA: Autism Asperger Publishing Co.

- Myles, B. S., & Simpson, R. (2003). *Asperger syndrome: A guide for educators and parents*. Austin, TX: Pro-ed.
- National Autism Center. (2009, September). *The National Autism Center's national standards report*. Retrieved on May 23, 2010 from <http://nationalautismcenter.org>
- National Center for Education Statistics. (2007). *Status of education in rural America*. Retrieved February 14, 2012, from <http://nces.ed.gov/pubs2007/ruraled/index.asp>
- National Professional Development Center on Autism Spectrum Disorders (2012). *A multi-university center to promote the use of evidence-based practice for children and adolescents with autism spectrum disorder*. Retrieved on March 9, 2012, from <http://autismpdc.fpg.unc.edu/>
- National Research Council. (2001). *Educating children with autism*. Washington, DC: National Academy Press.
- National Research Council. (2002). *Strategic education research partnerships*. Washington, DC: National Academy Press.
- Network of Training and Technical Assistance Programs. (2007, September). *National teacher standards*. Retrieved February 20, 2008 from [http://www.autismsociety-nc.org/html/for\\_teachers\\_.html](http://www.autismsociety-nc.org/html/for_teachers_.html)
- North Carolina Department of Commerce Division of Employment Security. (2011). *Workforce in-depth*. Retrieved November 10, 2011, from <http://www.ncesc1.com/imi/infotools/infotoolsmain-new.asp>

- North Carolina Department of Public Instruction. (2010a). *Data & reports*. Retrieved November 14, 2010, from <http://www.ncpublicschools.org/ec/data/childcount/reports/april1>
- North Carolina Department of Public Instruction. (2010b). *Policies governing services for children with disabilities*. Retrieved on November 14, 2010, from <http://www.ncpublicschools.org/ec/policy>
- North Carolina Department of Public Instruction. (2011a). *State/LEA and school test performance*. Retrieved December 3, 2011, from <http://www.ncpublicschools.org/accountabililty/reporting/leaperformancearchive/>
- North Carolina Department of Public Instruction. (2011b). *Data & reports*. Retrieved December 3, 2011, from <http://www.ncpublicschools.org/fbs/accounting/data>
- North Carolina Department of Public Instruction. (2011c). *Evidence-based practices in educating children with autism*. Retrieved March 9, 2012, from <http://www.ncpublicschools.org/ec/instructional/autism/>
- No Child Left Behind Act of 2001. 20 U.S.C. 70 § 6301 *et seq.* (2002).
- Odom, S. Brantinger, E., Gersten, R., Horner, R., Thompson, B., Harris, K. (2005). Research in special education: Scientific methods and evidence-based practices. *Exceptional Children, 71*, 137–148.
- Osborne, A., & Russo, C. (2007). *Special education and the law: A guide for practitioners*. Thousand Oaks, CA: Corwin.
- Olson, L. (2005). AYP rules miss many in special education: More students left out of accountability ratings. *Education Week, 25*(4), 24–25.

- Pallant, J. (2010). *SPSS survival manual*. New York: McGraw-Hill.
- Palmer, R. F., Blanchard, S., Jean, D. R., & Mandell, D. S. (2005). School district resources and identification of children with autistic disorder. *American Journal of Public Health, 95*, 125–130.
- Rimland, B. (1964). *Infantile Autism*. New York: Appleton-Century-Crofts.
- Schaaf, R. C., & Miller, L. J. (2005). Occupational therapy using sensory integration approach for children with developmental disabilities. *Mental Retardation and Developmental Disabilities Research Reviews, 11*, 143–148.
- Shapiro, J. P., & Stefkovich, J. A. (2005). *Ethical leadership and decision making in education: Applying theoretical perspectives to complex dilemmas*. Mahwah, NJ: Lawrence Erlbaum.
- Shopler, E. (2001). Treatment for autism. In E. Shopler, N. Yirmiya, C. Shulman, & L. Marcus (Eds.), *The research basis for autism intervention* (pp. 9–24). New York: Kluwer Academic/Plenum.
- Siegel, B. (2003). *Helping children with autism learn: Treatment approaches for parents and professionals*. New York: Oxford University Press.
- Simpson, R. L. (2001). ABA and students with autism spectrum disorders: Issues and considerations for effective practice. *Focus on Autism and Other Developmental Disabilities, 1*, 68–71.
- Simpson, R. L. (2004). Finding effective intervention and personnel preparation practices for students with autism spectrum disorders. *Exceptional Children, 70*, 135–144.

- Simpson, R. L. (2005). Evidence-based practices and students with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 20*, 140–149.
- Simpson, R. L., de Boer-Ott, S. R., Griswald, D. E., Myles, B. S., Byrd, S. E., Ganz, J. B., . . . Adams, L. G. (2005). *Autism spectrum disorders: Interventions and treatments for children and youth*. Thousand Oaks, CA: Corwin.
- Simpson, R., LaCava, P. G., & Graner, P. S. (2004). The No Child Left Behind Act (NCLB): Challenges and implications for educators. *Intervention in School and Clinic, 40* (2), 67–75.
- Skrtic, T. M., Harris, K. R., & Shriner, J. G. (2005). *Special education: Policy and practice*. Denver, CO: Love.
- Smith, T. (2001). Discrete trial training in the treatment of autism. *Focus on Autism and Other Developmental Disabilities, 16*, 86–92.
- Sperry, V. W. (2001). *Fragile success: Ten autistic children, childhood to adulthood*. Baltimore, MD: Brookes.
- Starratt, R. J. (2003). *Centering educational administration: Cultivating meaning, community, responsibility*. Mahwah, NJ: Lawrence Erlbaum.
- Strain, P. S., & Hoyson, M. (2000). The need for longitudinal intensive social skill intervention, leap follow-up outcomes for children with autism. *Topics in Early Childhood Special Education, 20*(2), 116–122.
- Szatmari, P., & Jones, M. B. (1998). Genetic epidemiology of autism and other developmental disorders. In F. Volkmar (Ed.), *Autism and pervasive*

*developmental disorders* (pp. 109–129). Cambridge, England: Cambridge University Press.

Thomas, J. (2006, March). *Best practices in autism: What works in the classroom?*

Raleigh: North Carolina Department of Public Instruction, Exceptional Children Division.

Tutt, R., Powell, S., & Thornton, M. (2006). Educational approaches in autism: What we know about what we do. *Educational Psychology in Practice*, 22, 69–81.

U.S. Census Bureau. (2010). *Census urban and rural classification and urban area criteria*. Retrieved on December 28, 2011, from <http://www.census.gov/geo/www/ua/2010urbanruralclass.html>

U.S. Department of Health and Human Services. (2010). *About interagency autism coordinating committee*. Retrieved on January 15, 2011, from <http://iacc.hhs.gov/about/>

U.S. Department of Education. (2003). *Identifying and implementing educational practices supported by rigorous evidence: A user-friendly guide*. Washington, DC: Author.

U.S. Department of Education. (2006). *Special education and rehabilitation services regulations*. Retrieved on March 24, 2010 from <http://idea.ed.gov/explore/view/p/%2Croot%2Cregs%2c>

Volkmar, F. R., & Lord, C. (1998). Diagnosis and definition of autism and other pervasive developmental disorders. In F. Volkmar (Ed.), *Autism and pervasive developmental disorders* (pp. 1–25). Cambridge: Cambridge University Press.

- Walsh, J. (2005, May). *Legal issues in the autism methodologies debate*. Handout presented at the 6<sup>th</sup> Annual LRP's National Institute on Legal Issues of Educating Individuals with Disabilities, Las Vegas, NV.
- Weatherly, J. (2005). *Autism programs and services: Lessons from the law*. Mobile, AL: LRP.
- Welch, M. (1988). *Holding time*. New York: Fireside.
- White House. (2006, December 19). *Fact sheet: Combating autism 2006*. Retrieved on April 20, 2008 from <http://www.whitehouse.gov/news/releases/2006/12/20061219-3.html>
- Wing, L. (1981). Asperger's syndrome: A clinical account. *Psychological Medicine, 11*, 115–130.
- Wing, L. (1997). *The history of ideas on autism: Legends, myths and reality*. London: The National Autistic Society.
- Wing, L. (2007, January 24). Sybil Elgar: Pioneer in teaching and care of autistic people. *The Guardian*. Retrieved on April 27, 2008, from <http://www.guardian.co.uk/news/2007/jan/24/guardianobituaries.obituaries2>
- Wolf, S. (2004). The history of autism. *European Child & Adolescent Psychiatry, 13*(4), 201–208.
- Womack, R. R. (2002). Autism and the Individuals with Disabilities Education Act: Are autistic children receiving appropriate treatment in our schools? *Texas Tech Law Review, 34*, 189–191.

- Wright, P., & Wright, P. (2006). *TEACCH v. Lovaas*. Retrieved on July 20, 2006 from [http://www.wrightslaw.com/advoc/ltrs/debate\\_teach\\_lovaas.htm](http://www.wrightslaw.com/advoc/ltrs/debate_teach_lovaas.htm)
- Yeargin-Allsopp, M., Rice, C., Karapurkar, T., Doernberg, N., Boyle, C., & Murphy, C. (2003). Prevalence of autism in a US metropolitan area. *Journal of the American Medical Association, 289*(1), 49–55.
- Yell, M. L. (2006). *The law and special education*. Columbus, OH: Merrill.
- Yell, M. L., Drasgow, E., & Lowrey K. A. (2005). No Child Left Behind and students with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 20*, 130–140.
- Zirkel, P. A. (2011). Autism litigation under the IDEA: A new meaning of “disproportionality.” *Journal of Special Education Leadership 24*(2), 92–103.

**APPENDIX A**

**NORTH CAROLINA CHILD COUNT DATA FOR STUDENTS WITH AUTISM 2006-2010**

<b>LEA</b>	<b>Apr-06 AU</b>	<b>Apr-07 AU</b>	<b>Apr-08 AU</b>	<b>Apr-09 AU</b>	<b>Apr-10 AU</b>	<b>Apr-10 Total</b>	<b>Apr-10 AU %</b>	<b>% Change in AU 2006 to 2010</b>
Alamance-Burlington	130	136	151	159	169	2,824	5.98%	30.00%
Alexander County	11	17	26	26	32	816	3.92%	190.91%
Alleghany County	3	3	2	2	7	220	3.18%	133.33%
Anson County	6	6	8	8	10	618	1.62%	66.67%
Ashe County	10	12	13	21	21	535	3.93%	110.00%
Asheboro City	9	13	18	23	24	502	4.78%	166.67%
Asheville City	50	44	37	42	43	514	8.37%	-14.00%
Avery County	20	19	20	17	16	286	5.59%	-20.00%
Beaufort County	21	23	36	45	60	1,046	5.74%	185.71%
Bertie County	8	8	8	6	9	420	2.14%	12.50%
Bladen County	8	11	12	10	12	595	2.02%	50.00%
Brunswick County	60	62	63	69	74	1,317	5.62%	23.33%
Buncombe County	197	217	237	239	278	3,380	8.22%	41.12%
Burke County	48	58	78	92	116	2,278	5.09%	141.67%
Cabarrus County	80	105	120	163	189	3,787	4.99%	136.25%
Caldwell County	23	42	48	54	66	1,448	4.56%	186.96%
Camden County	15	25	30	35	34	264	12.88%	126.67%
Carteret County	49	60	75	76	82	1,208	6.79%	67.35%
Caswell County	19	18	20	22	25	420	5.95%	31.58%
Catawba County	80	83	94	94	100	2,241	4.46%	25.00%
Chapel Hill-Carrboro	129	134	152	157	163	1,060	15.38%	26.36%
Charlotte-Mecklenburg	414	497	573	684	773	14,193	5.45%	86.71%

LEA	Apr-06 AU	Apr-07 AU	Apr-08 AU	Apr-09 AU	Apr-10 AU	Apr-10 Total	Apr-10 AU %	% Change in AU 2006 to 2010
Chatham County	22	28	35	35	46	1,161	3.96%	109.09%
Cherokee County	9	10	9	11	26	490	5.31%	188.89%
Clay County	2	2	4	4	8	201	3.98%	300.00%
Cleveland County	40	51	53	76	92	2,129	4.32%	130.00%
Clinton City	5	6	6	7	9	269	3.35%	80.00%
Columbus County	24	18	16	15	12	754	1.59%	-50.00%
Craven County	98	120	141	179	212	1,645	12.89%	116.33%
Cumberland County	372	400	432	489	510	7,279	7.01%	37.10%
Currituck County	20	27	30	30	29	360	8.06%	45.00%
Dare County	10	9	12	16	23	551	4.17%	130.00%
Davidson County	51	59	66	70	85	2,509	3.39%	66.67%
Davie County	32	41	46	58	59	797	7.40%	84.38%
Duplin County	21	27	35	43	53	892	5.94%	152.38%
Durham Public	267	285	312	338	355	4,409	8.05%	32.96%
Edenton/Chowan	14	15	17	19	21	317	6.62%	50.00%
Edgecombe County	28	30	35	40	49	837	5.85%	75.00%
Elkin City	4	4	4	5	6	127	4.72%	50.00%
Forsyth County	184	206	254	289	372	6,515	5.71%	102.17%
Franklin County	36	39	46	42	45	875	5.14%	25.00%
Gaston County	125	155	171	196	220	3,776	5.83%	76.00%
Gates County	9	11	9	11	14	356	3.93%	55.56%
Graham County	7	6	8	6	5	146	3.42%	-28.57%
Granville County	34	43	49	50	54	895	6.03%	58.82%
Greene County	12	14	15	16	17	429	3.96%	41.67%
Guilford County	433	518	595	685	749	10,244	7.31%	72.98%
Halifax County	16	18	22	25	24	536	4.48%	50.00%
Harnett County	77	95	118	135	137	2,505	5.47%	77.92%

LEA	Apr-06 AU	Apr-07 AU	Apr-08 AU	Apr-09 AU	Apr-10 AU	Apr-10 Total	Apr-10 AU %	% Change in AU 2006 to 2010
Haywood County	33	44	42	50	50	1,221	4.10%	51.52%
Henderson County	85	91	99	111	129	1,661	7.77%	51.76%
Hertford County	12	18	17	19	22	502	4.38%	83.33%
Hickory City	17	26	29	34	44	467	9.42%	158.82%
Hoke County	26	29	30	42	60	1,049	5.72%	130.77%
Hyde County	2	2	2	3	4	103	3.88%	100.00%
Iredell-Statesville	32	37	47	65	73	2,524	2.89%	128.13%
Jackson County	31	32	40	43	34	581	5.85%	9.68%
Johnston County	133	167	200	234	243	4,643	5.23%	82.71%
Jones County	6	9	9	9	5	209	2.39%	-16.67%
Kannapolis City	15	17	26	36	39	815	4.79%	160.00%
Lee County	61	67	72	78	82	1,064	7.71%	34.43%
Lenoir County	42	52	59	72	76	1,298	5.86%	80.95%
Lexington City	7	4	6	7	11	349	3.15%	57.14%
Lincoln County	26	29	37	50	57	1,643	3.47%	119.23%
Macon County	20	26	34	37	39	775	5.03%	95.00%
Madison County	20	16	19	19	21	347	6.05%	5.00%
Martin County	23	23	21	24	28	567	4.94%	21.74%
McDowell County	37	46	47	51	61	952	6.41%	64.86%
Mitchell County	3	7	9	10	12	367	3.27%	300.00%
Montgomery County	9	12	18	21	20	581	3.44%	122.22%
Moore County	72	82	94	110	129	1,435	8.99%	79.17%
Mooreville City	18	24	35	40	45	685	6.57%	150.00%
Mount Airy City	1	3	2	5	7	298	2.35%	600.00%
Nash-Rocky Mount	62	73	81	84	94	2,135	4.40%	51.61%
New Hanover County	239	283	318	354	375	2,900	12.93%	56.90%
Newton Conover City	14	12	15	19	23	357	6.44%	64.29%

LEA	Apr-06 AU	Apr-07 AU	Apr-08 AU	Apr-09 AU	Apr-10 AU	Apr-10 Total	Apr-10 AU %	% Change in AU 2006 to 2010
Northampton County	6	6	5	7	6	314	1.91%	0.00%
Onslow County	81	107	127	142	153	2,627	5.82%	88.89%
Orange County	41	54	58	62	72	1,017	7.08%	75.61%
Pamlico County	11	11	11	10	13	250	5.20%	18.18%
Pasquotank County	47	52	55	61	66	928	7.11%	40.43%
Pender County	53	64	67	67	79	975	8.10%	49.06%
Perquimans County	7	9	13	17	17	249	6.83%	142.86%
Person County	38	40	35	32	31	902	3.44%	-18.42%
Pitt County	123	149	176	203	218	2,773	7.86%	77.24%
Polk County	11	10	12	11	16	393	4.07%	45.45%
Randolph County	45	58	73	76	94	2,112	4.45%	108.89%
Richmond County	25	28	28	35	33	839	3.93%	32.00%
Roanoke Rapids City	4	9	11	13	18	351	5.13%	350.00%
Robeson County	39	46	48	56	59	3,942	1.50%	51.28%
Rockingham County	47	48	55	69	87	3,942	2.21%	85.11%
Rowan-Salisbury	46	58	66	71	73	2,544	2.87%	58.70%
Rutherford County	41	50	57	70	74	1,308	5.66%	80.49%
Sampson County	15	17	18	24	26	974	2.67%	73.33%
Scotland County	30	31	34	41	49	963	5.09%	63.33%
Stanly County	17	25	30	34	40	1,611	2.48%	135.29%
Stokes County	21	28	35	41	45	1,218	3.69%	114.29%
Surry County	13	13	17	20	26	1,188	2.19%	100.00%
Swain County	6	5	9	11	14	333	4.20%	133.33%
Thomasville City	5	6	6	9	10	234	4.27%	100.00%
Transylvania County	23	21	29	37	39	474	8.23%	69.57%
Tyrrell County	3	2	2	4	5	94	5.32%	66.67%
Union County	110	134	158	190	224	3,773	5.94%	103.64%

<b>LEA</b>	<b>Apr-06 AU</b>	<b>Apr-07 AU</b>	<b>Apr-08 AU</b>	<b>Apr-09 AU</b>	<b>Apr-10 AU</b>	<b>Apr-10 Total</b>	<b>Apr-10 AU %</b>	<b>% Change in AU 2006 to 2010</b>
Vance County	36	41	48	53	55	1,006	5.47%	52.78%
Wake County	1,053	1,213	1,481	1,698	1,846	18,976	9.73%	75.31%
Warren County	10	7	8	8	9	377	2.39%	-10.00%
Washington County	8	9	8	8	8	285	2.81%	0.00%
Watauga County	21	23	25	26	29	710	4.08%	38.10%
Wayne County	130	145	162	182	205	2,744	7.47%	57.69%
Weldon City	2	3	4	2	2	123	1.63%	0.00%
Whiteville City	8	11	11	11	9	259	3.47%	12.50%
Wilkes County	20	24	28	28	38	1,216	3.13%	90.00%
Wilson County	71	74	90	112	115	1,132	10.16%	61.97%
Yadkin County	9	11	11	20	22	878	2.51%	144.44%
Yancey County	12	13	14	15	16	363	4.41%	33.33%
<b>Total</b>	<b>6,676</b>	<b>7,716</b>	<b>8,894</b>	<b>10,137</b>	<b>11,259</b>	<b>187,291</b>	<b>6.01%</b>	<b>68.65%</b>

**APPENDIX B**  
**STUDENT POPULATION DATA 2010**

<b>LEA</b>	<b>AU 2010</b>	<b>Percent Change in AU 2006 to 2010</b>	<b>ADM 2010</b>	<b>Percent Change in ADM 2006 to 2010</b>	<b>AU Students as Percentage of Total ADM Apr 2010</b>
Alamance-Burlington	169	30.00%	21,872	0.76%	0.77%
Alexander County	32	190.91%	5,446	-3.37%	0.59%
Alleghany County	7	133.33%	1,463	-3.30%	0.48%
Anson County	10	66.67%	3,792	-8.12%	0.26%
Ashe County	21	110.00%	3,133	-2.70%	0.67%
Asheboro City	24	166.67%	4,475	0.45%	0.54%
Asheville City	43	-14.00%	3,646	-1.09%	1.18%
Avery County	16	-20.00%	2,154	-5.82%	0.74%
Beaufort County	60	185.71%	6,959	-0.67%	0.86%
Bertie County	9	12.50%	2,779	-12.72%	0.32%
Bladen County	12	50.00%	5,119	-5.15%	0.23%
Brunswick County	74	23.33%	11,642	5.72%	0.64%
Buncombe County	278	41.12%	24,974	-0.03%	1.11%
Burke County	116	141.67%	13,383	-4.93%	0.87%
Cabarrus County	189	136.25%	27,551	15.94%	0.69%
Caldwell County	66	186.96%	12,513	-2.30%	0.53%
Camden County	34	126.67%	1,883	4.38%	1.81%
Carteret County	82	67.35%	8,148	1.05%	1.01%
Caswell County	25	31.58%	3,002	-6.51%	0.83%
Catawba County	100	25.00%	17,040	0.80%	0.59%
Chapel Hill-Carrboro	163	26.36%	11,485	4.69%	1.42%
Charlotte-Mecklenburg	773	86.71%	131,722	8.08%	0.59%
Chatham County	46	109.09%	7,599	2.44%	0.61%
Cherokee County	26	188.89%	3,409	-4.78%	0.76%
Clay County	8	300.00%	1,333	2.07%	0.60%
Cleveland County	92	130.00%	15,885	-4.53%	0.58%
Clinton City	9	80.00%	2,975	-1.13%	0.30%
Columbus County	12	-50.00%	6,474	-5.13%	0.19%
Craven County	212	116.33%	14,427	0.59%	1.47%
Cumberland County	510	37.10%	51,015	-0.74%	1.00%
Currituck County	29	45.00%	3,887	-2.41%	0.75%

<b>LEA</b>	<b>AU 2010</b>	<b>Percent Change in AU 2006 to 2010</b>	<b>ADM 2010</b>	<b>Percent Change in ADM 2006 to 2010</b>	<b>AU Students as Percentage of Total ADM Apr 2010</b>
Dare County	23	130.00%	4,727	-1.91%	0.49%
Davidson County	85	66.67%	20,134	1.96%	0.42%
Davie County	59	84.38%	6,490	2.90%	0.91%
Duplin County	53	152.38%	8,781	0.08%	0.60%
Durham County	355	32.96%	31,401	2.49%	1.13%
Edenton/Chowan	21	50.00%	2,295	-5.79%	0.92%
Edgecombe County	49	75.00%	7,158	-2.40%	0.68%
Elkin City	6	50.00%	1,156	-4.62%	0.52%
Forsyth County	372	102.17%	51,075	4.40%	0.73%
Franklin County	45	25.00%	8,392	6.70%	0.54%
Gaston County	220	76.00%	31,002	-1.68%	0.71%
Gates County	14	55.56%	1,854	-6.36%	0.76%
Graham County	5	-28.57%	1,187	-2.06%	0.42%
Granville County	54	58.82%	8,523	-0.86%	0.63%
Greene County	17	41.67%	3,193	1.92%	0.53%
Guilford County	749	72.98%	70,412	3.79%	1.06%
Halifax County	24	50.00%	3,917	-20.18%	0.61%
Harnett County	137	77.92%	18,792	10.05%	0.73%
Haywood County	50	51.52%	7,589	-1.61%	0.66%
Henderson County	129	51.76%	12,973	4.01%	0.99%
Hertford County	22	83.33%	3,070	-9.79%	0.72%
Hickory City	44	158.82%	4,293	-3.53%	1.02%
Hoke County	60	130.77%	7,569	9.35%	0.79%
Hyde County	4	100.00%	570	-9.38%	0.70%
Iredell-Statesville	73	128.13%	20,917	3.99%	0.35%
Jackson County	34	9.68%	3,514	-1.98%	0.97%
Johnston County	243	82.71%	31,237	14.11%	0.78%
Jones County	5	-16.67%	1,158	-9.88%	0.43%
Kannapolis City	39	160.00%	4,962	6.09%	0.79%
Lee County	82	34.43%	9,438	4.43%	0.87%
Lenoir County	76	80.95%	9,043	-6.78%	0.84%
Lexington City	11	57.14%	2,902	-1.96%	0.38%
Lincoln County	57	119.23%	11,763	0.09%	0.48%
Macon County	39	95.00%	4,233	2.59%	0.92%
Madison County	21	5.00%	2,558	-0.78%	0.82%
Martin County	28	21.74%	3,845	-8.52%	0.73%

<b>LEA</b>	<b>AU 2010</b>	<b>Percent Change in AU 2006 to 2010</b>	<b>ADM 2010</b>	<b>Percent Change in ADM 2006 to 2010</b>	<b>AU Students as Percentage of Total ADM Apr 2010</b>
McDowell County	61	64.86%	6,250	-1.23%	0.98%
Mitchell County	12	300.00%	2,056	-7.60%	0.58%
Montgomery County	20	122.22%	4,209	-5.16%	0.48%
Moore County	129	79.17%	12,191	2.16%	1.06%
Mooresville City	45	150.00%	5,405	11.72%	0.83%
Mount Airy City	7	600.00%	1,587	-8.42%	0.44%
Nash-Rocky Mount	94	51.61%	16,820	-5.43%	0.56%
New Hanover County	375	56.90%	23,565	-0.30%	1.59%
Newton Conover City	23	64.29%	2,857	-2.49%	0.81%
Northampton County	6	0.00%	2,464	-17.70%	0.24%
Onslow County	153	88.89%	23,178	3.63%	0.66%
Orange County	72	75.61%	6,997	5.46%	1.03%
Pamlico County	13	18.18%	1,379	-10.51%	0.94%
Pasquotank County	66	40.43%	5,866	-1.54%	1.13%
Pender County	79	49.06%	8,014	9.57%	0.99%
Perquimans County	17	142.86%	1,704	-2.80%	1.00%
Person County	31	-18.42%	4,994	-12.19%	0.62%
Pitt County	218	77.24%	22,332	2.78%	0.98%
Polk County	16	45.45%	2,335	-3.67%	0.69%
Randolph County	94	108.89%	18,350	1.30%	0.51%
Richmond County	33	32.00%	7,545	-6.17%	0.44%
Roanoke Rapids City	18	350.00%	2,838	-2.41%	0.63%
Robeson County	59	51.28%	22,824	-3.21%	0.26%
Rockingham County	87	85.11%	13,534	-3.81%	0.64%
Rowan-Salisbury	73	58.70%	20,023	-2.70%	0.36%
Rutherford Cty.	74	80.49%	8,879	-9.27%	0.83%
Sampson County	26	73.33%	8,204	2.37%	0.32%
Scotland County	49	63.33%	6,209	-6.79%	0.79%
Stanly County	40	135.29%	9,031	-5.49%	0.44%
Stokes County	45	114.29%	6,883	-4.65%	0.65%
Surry County	26	100.00%	8,369	-2.23%	0.31%
Swain County	14	133.33%	1,849	3.12%	0.76%
Thomasville City	10	100.00%	2,446	-4.71%	0.41%
Transylvania County	39	69.57%	3,549	-3.82%	1.10%
Tyrrell County	5	66.67%	574	-6.51%	0.87%
Union County	224	103.64%	38,097	21.64%	0.59%

<b>LEA</b>	<b>AU 2010</b>	<b>Percent Change in AU 2006 to 2010</b>	<b>ADM 2010</b>	<b>Percent Change in ADM 2006 to 2010</b>	<b>AU Students as Percentage of Total ADM Apr 2010</b>
Vance County	55	52.78%	7,001	-10.85%	0.79%
Wake County	1,846	75.31%	138,458	15.14%	1.33%
Warren County	9	-10.00%	2,473	-13.17%	0.36%
Washington County	8	0.00%	1,846	-12.68%	0.43%
Watauga County	29	38.10%	4,243	-4.54%	0.68%
Wayne County	205	57.69%	18,799	-0.07%	1.09%
Weldon City	2	0.00%	1,019	0.10%	0.20%
Whiteville City	9	12.50%	2,224	-12.03%	0.40%
Wilkes County	38	90.00%	9,772	-1.00%	0.39%
Wilson County	115	61.97%	12,115	-0.96%	0.95%
Yadkin County	22	144.44%	5,803	-4.81%	0.38%
Yancey County	16	33.33%	2,337	-6.30%	0.68%

**APPENDIX C**  
**DISTRICT DEMOGRAPHIC DATA**

<b>LEA</b>	<b>Median Income 2009</b>	<b>Population 2010</b>	<b>Rural (1) or Urban 2</b>
Alamance-Burlington	39,635	49,963	2
Alexander County	28,976	2,098	1
Alleghany County	29,325	1,770	1
Anson County	26,879	5,813	2
Ashe County	29,019	1,611	1
Asheboro City	34,774	25,012	2
Asheville City	34,774	83,393	2
Avery County	28,806	698	1
Beaufort County	32,542	9,744	2
Bertie County	30,835	3,630	2
Bladen County	29,407	3,583	2
Brunswick County	31,222	143	1
Buncombe County	34,774	154,925	2
Burke County	29,710	16,918	2
Cabarrus County	34,083	135,386	2
Caldwell County	27,969	18,228	2
Camden County	35,379	599	1
Carteret County	38,455	4,039	2
Caswell County	29,830	2,039	1
Catawba County	31,052	93,215	2
Chapel Hill-Carrboro	47,925	76,815	2
Charlotte-Mecklenburg	42,644	731,424	2

<b>LEA</b>	<b>Median Income 2009</b>	<b>Population 2010</b>	<b>Rural (1) or Urban 2</b>
Chatham County	42,870	3,743	2
Cherokee County	26,185	1,627	1
Clay County	28,119	311	1
Cleveland County	29,692	20,323	2
Clinton City	28,778	8,639	2
Columbus County	29,822	52,704	2
Craven County	36,798	29,524	2
Cumberland County	41,627	200,564	2
Currituck County	35,569	3,759	2
Dare County	37,526	1,434	1
Davidson County	32,263	117,190	2
Davie County	35,784	5,051	2
Duplin County	29,155	855	1
Durham County	38,692	228,330	2
Edenton/Chowan	31,666	5,004	2
Edgecombe County	28,973	11,415	2
Elkin City	30,508	4,001	2
Forsyth County	36,091	229,617	2
Franklin County	29,228	3,359	2
Gaston County	32,171	71,741	2
Gates County	26,724	321	1
Graham County	26,089	620	1
Granville County	27,831	8,461	2
Greene County	26,520	1,595	1
Guilford County	37,658	269,666	2

<b>LEA</b>	<b>Median Income 2009</b>	<b>Population 2010</b>	<b>Rural (1) or Urban 2</b>
Halifax County	28,173	37,282	2
Harnett County	27,514	3,194	2
Haywood County	31,552	9,869	2
Henderson County	36,355	13,137	2
Hertford County	28,673	769	1
Hickory City	31,052	40,010	2
Hoke County	28,977	4,611	2
Hyde County	28,370	324	1
Iredell-Statesville	32,171	126,726	2
Jackson County	29,674	2,588	2
Johnston County	31,480	10,966	2
Jones County	32,724	287	1
Kannapolis City	34,083	42,625	2
Lee County	30,505	28,094	2
Lenoir County	33,476	21,677	2
Lexington City	32,263	18,931	2
Lincoln County	33,375	10,486	2
Macon County	30,699	3,845	2
Madison County	27,823	872	1
Martin County	31,833	5,511	2
McDowell County	25,797	7,838	2
Mitchell County	26,418	464	1
Montgomery County	26,375	3,189	2
Moore County	38,539	2,205	1
Mooresville City	32,171	32,711	2

<b>LEA</b>	<b>Median Income 2009</b>	<b>Population 2010</b>	<b>Rural (1) or Urban 2</b>
Mount Airy City	30,508	10,388	2
Nash-Rocky Mount	33,557	57,477	2
New Hanover County	36,662	106,476	2
Newton Conover City	31,052	21,133	2
Northampton County	31,598	513	1
Onslow County	42,463	70,145	2
Orange County	47,925	56,986	2
Pamlico County	36,348	1,263	1
Pasquotank County	27,075	18,683	2
Pender County	29,520	3,872	2
Perquimans County	29,990	2,143	1
Person County	30,688	8,362	2
Pitt County	33,089	84,554	2
Polk County	39,659	999	1
Randolph County	28,717	116,740	2
Richmond County	26,959	9,558	2
Roanoke Rapids City	28,173	15,754	2
Robeson County	25,511	21,542	2
Rockingham County	30,435	2,807	2
Rowan-Salisbury	30,444	33,662	2
Rutherford County	26,820	4,213	2
Sampson County	28,778	54,792	2
Scotland County	27,544	15,962	2
Stanly County	29,965	15,903	2
Stokes County	29,751	189	1

<b>LEA</b>	<b>Median Income 2009</b>	<b>Population 2010</b>	<b>Rural (1) or Urban 2</b>
Surry County	30,508	59,284	2
Swain County	28,386	1,424	1
Thomasville City	32,263	26,757	2
Transylvania County	34,207	7,609	2
Tyrrell County	25,688	891	1
Union County	33,240	32,797	2
Vance County	30,236	15,368	2
Wake County	39,821	403,892	2
Warren County	25,383	862	1
Washington County	30,483	3,878	2
Watauga County	32,193	17,122	2
Wayne County	31,673	36,437	2
Weldon City	28,173	1,655	1
Whiteville City	29,822	5,394	2
Wilkes County	31,374	3,413	2
Wilson County	32,628	49,167	2
Yadkin County	30,107	2,959	2
Yancey County	24,807	1,693	1

**APPENDIX D**

**PERCENT OF STUDENTS SCORING PROFICIENT FOR GRADES 3-8 IN 2010**

<b>LEA</b>	<b>All Students EOG Composite</b>	<b>SWD EOG Composite</b>	<b>AU EOG Composite</b>
Alamance-Burlington	62.3	21.5	36.7
Alexander County	69.2	38.1	50.0
Alleghany County	74.9	34.1	-
Anson County	45.8	26.0	25.0
Ashe County	73.9	50.8	60.0
Asheboro City	55.6	18.2	33.3
Asheville City	72.3	55.9	58.6
Avery County	73.2	55.0	75.0
Beaufort County	60.8	23.1	36.8
Bertie County	49.7	28.0	60.0
Bladen County	54.5	22.1	20.0
Brunswick County	67.2	29.8	34.9
Buncombe County	71.2	30.0	47.8
Burke County	74.2	45.5	49.0
Cabarrus County	69.9	31.6	34.5
Caldwell County	71.2	43.7	39.4
Camden County	83.6	53.7	35.0
Carteret County	78.9	46.5	53.7
Caswell County	60.8	26.0	50.0
Catawba County	72.0	51.5	72.1
Chapel Hill-Carrboro	84.6	57.4	71.8
Charlotte-Mecklenburg	66.3	32.0	41.7
Chatham County	65.8	37.7	53.8

<b>LEA</b>	<b>All Students EOG Composite</b>	<b>SWD EOG Composite</b>	<b>AU EOG Composite</b>
Cherokee County	70.9	28.6	35.7
Clay County	69.2	24.7	-
Cleveland County	71.7	36.7	42.6
Clinton City	63.2	35.8	60.0
Columbus County	59.0	23.8	40.0
Craven County	70.4	35.6	46.6
Cumberland County	62.1	30.5	54.5
Currituck County	80.1	39.9	27.3
Dare County	77.0	51.1	50.0
Davidson County	73.1	35.3	42.9
Davie County	77.3	37.1	48.5
Duplin County	57.6	37.1	47.4
Durham County	50.3	21.7	39.9
Edenton/Chowan	61.8	32.0	54.5
Edgecombe County	43.7	16.2	25.0
Elkin City	76.1	38.9	-
Forsyth County	64.9	32.1	43.8
Franklin County	64.0	26.5	50.0
Gaston County	63.7	23.7	35.1
Gates County	66.1	31.5	14.3
Graham County	67.1	42.7	-
Granville County	57.9	28.9	42.9
Greene County	40.7	21.9	45.5
Guilford County	64.3	35.2	55.8
Halifax County	30.4	10.3	-
Harnett County	54.4	17.4	34.8

<b>LEA</b>	<b>All Students EOG Composite</b>	<b>SWD EOG Composite</b>	<b>AU EOG Composite</b>
Haywood County	75.2	35.4	61.9
Henderson County	76.5	57.0	66.1
Hertford County	45.8	19.7	22.2
Hickory City	64.2	37.4	57.9
Hoke County	56.5	28.9	45.5
Hyde County	56.7	31.6	-
Iredell-Statesville	70.9	30.3	41.0
Jackson County	69.0	52.5	59.1
Johnston County	73.8	42.0	61.7
Jones County	65.2	40.0	-
Kannapolis City	61.5	43.6	75.0
Lee County	64.5	32.6	40.0
Lenoir County	58.9	25.1	39.6
Lexington City	53.6	32.6	-
Lincoln County	72.9	39.0	45.8
Macon County	67.0	34.2	61.9
Madison County	71.8	31.0	40.0
Martin County	63.4	31.5	46.7
McDowell County	70.3	39.5	40.9
Mitchell County	71.6	38.7	50.0
Montgomery County	54.4	21.5	54.5
Moore County	70.7	32.0	39.5
Mooresville City	77.4	46.6	60.0
Mount Airy City	73.8	46.2	-
Nash-Rocky Mount	56.6	20.6	48.7
New Hanover County	71.3	31.5	55.5

<b>LEA</b>	<b>All Students EOG Composite</b>	<b>SWD EOG Composite</b>	<b>AU EOG Composite</b>
Newton Conover City	67.1	47.1	50.0
Northampton County	44.2	27.0	-
Onslow County	66.4	31.1	54.5
Orange County	70.1	33.8	48.0
Pamlico County	68.6	43.5	83.3
Pasquotank County	56.1	28.6	47.2
Pender County	70.7	25.9	33.3
Perquimans County	62.8	21.6	62.5
Person County	62.4	34.6	60.0
Pitt County	58.3	24.7	42.0
Polk County	85.8	70.6	60.0
Randolph County	62.6	24.6	33.3
Richmond County	50.5	15.7	35.7
Roanoke Rapids City	64.5	28.7	40.0
Robeson County	48.1	33.3	58.6
Rockingham County	59.4	20.0	48.3
Rowan-Salisbury	59.2	21.3	39.0
Rutherford County	65.9	30.0	40.6
Sampson County	61.6	36.8	20.0
Scotland County	63.1	46.6	81.0
Stanly County	69.5	46.3	57.1
Stokes County	73.2	43.7	63.2
Surry County	74.6	49.3	58.3
Swain County	66.5	30.2	60.0
Thomasville City	42.5	18.5	-
Transylvania County	77.8	47.8	61.1

<b>LEA</b>	<b>All Students EOG Composite</b>	<b>SWD EOG Composite</b>	<b>AU EOG Composite</b>
Tyrrell County	69.3	45.7	-
Union County	78.5	48.8	44.0
Vance County	53.3	48.5	75.9
Wake County	71.9	38.0	51.1
Warren County	47.0	21.1	60.0
Washington County	40.7	22.8	-
Watauga County	82.2	63.3	45.5
Wayne County	59.3	29.2	62.8
Weldon City	44.1	20.4	-
Whiteville City	66.0	23.2	60.0
Wilkes County	68.1	34.6	52.6
Wilson County	64.2	38.1	57.6
Yadkin County	66.4	30.8	50.0
Yancey County	78.4	47.0	75.0