

Rowan University

Rowan Digital Works

Theses and Dissertations

5-9-2006

Early intervention and applied behavior analysis: a case study

Kathleen I. Westcott
Rowan University

Follow this and additional works at: <https://rdw.rowan.edu/etd>



Part of the [Educational Psychology Commons](#)

Recommended Citation

Westcott, Kathleen I., "Early intervention and applied behavior analysis: a case study" (2006). *Theses and Dissertations*. 952.

<https://rdw.rowan.edu/etd/952>

This Thesis is brought to you for free and open access by Rowan Digital Works. It has been accepted for inclusion in Theses and Dissertations by an authorized administrator of Rowan Digital Works. For more information, please contact graduateresearch@rowan.edu.

EARLY INTERVENTION AND APPLIED BEHAVIOR ANALYSIS:
A CASE STUDY

By
Kathleen I. Westcott

A Thesis

Submitted in partial fulfillment of the requirements of the
Masters of Arts Degree
of
The Graduate School
at
Rowan University
May 2006

Approved by
Professor

Date Approved 5-9-06

© 2006 Kathleen I. Westcott

ABSTRACT

Kathleen I. Westcott

Early Intervention and Applied Behavior Analysis: A Case Study
2005/2006

Dr. John Klanderma and Dr. Roberta Dihoff
Masters of Arts in School Psychology

This is a case study that examines the effectiveness of early intervention and applied behavior analysis. The subject was a two year old male diagnosed with Autism. The subject received applied behavior analysis in his home for a period of two months at a rate of four hours per week. The goal of this study was determine whether or not early intervention and applied behavior analysis increase the cognitive and behavioral functioning of the subject. The effectiveness was measured by the subject's ability to complete three goals set by the family and the early intervention program at Rowan University. The goals were pointing to objects, imitating spoken words and sitting for ten minutes. The results from this case study indicate that applied behavior analysis and early intervention are effective.

Acknowledgments

I would like to acknowledge the Rowan University Early Intervention Program, the subject's family and Dr. Roberta Dihoff for allowing me to complete this case study.

I would also like to acknowledge my co-workers at Subranni Ostrove & Zauber for their kindness and support during this stressful time in.

Lastly, I would like to thank Paul and my family for their continued support, patience and love. Without them I would have not been able to complete my masters degree.

Table of Contents

Chapters	Page
I. Introduction.....	1
Need.....	1
Purpose.....	2
Hypothesis.....	2
Theory/Background.....	2
Definitions.....	6
Assumptions.....	7
Limitations.....	7
Summary.....	8
II. Review of Literature.....	9
Paragraph of Organization.....	9
Literature Review.....	9
Summary.....	19
III. Methodology.....	21
Participant/Subject.....	21
Design.....	22
Procedure.....	22
Analysis of Data/Assessment.....	23
Summary.....	24
IV. Results.....	25
V. Discussion.....	30
Future Research.....	32

	Conclusion.....	32
VI.	References.....	34

List of Graphs

	Page
Graph 4.1 – Analysis of goal attainment – Pointing to objects.....	27
Graph 4.2 – Analysis of goal attainment – Imitation of spoken words.....	28
Graph 4.3 – Analysis of goal attainment – Average number of minutes sitting per session.....	29

CHAPTER I

INTRODUCTION

Need

Effective early intervention is crucial to the success of our young who are diagnosed with Autism Spectrum Disorder (ASD). It has been shown “that without effective intervention most people with ASD require lifelong specialized educational, family and adult services” (Jacobson et al, 1998). These necessary services can and will become a burden to our government as well as our society as the number of cases of ASD continues to grow. It is estimated that the costs of these lifelong services for those with ASD are “estimated at upwards of \$4 million in some states” (Jacobson et al, 1998). The implementation of early intervention programs can help ease these burdens but more importantly it can help those with exceptionalities be successful in our school systems and later in society. The Center for Disease Control and Prevention estimated New Jersey has between 12 to 18 thousand individuals with ASD and that “1 in 166 children are diagnosed with ASD” (New Jersey Department of Health and Senior Services, 2004). Since there is not a known cure for ASD, without early intervention, those afflicted will need continuous supportive services.

Early intervention with our toddler and pre-school age children is a phenomenon that was a long time in the making. In recent years, there has been a great deal of focus and research performed on the effectiveness of early intervention. There have been numerous studies that have had conflicting results on its effectiveness. Many praise early intervention programs for the services they provide to our young and the progress they facilitate, while others say the results are not lifelong. In general, most reports state that

the edge early intervention gives to those with ASD allows them to start their educational path on the right foot and also provides the foundation required so they can continue to thrive.

Purpose

The purpose of this study was to examine the effectiveness of early intervention when using applied behavior analysis with a child who has exceptionalities that fall within the Autism Spectrum.

Hypothesis

This research will prove that the use of an applied behavioral analysis technique will increase the cognitive and behavioral functioning of an individual diagnosed with an ASD when used as part of an early intervention program. The independent variables for this study are the applied behavioral analysis and the cognitive and behavioral functioning of the individual over the sessions. The dependent variables for this study are the goals set for the subject. Those goals are pointing to objects, imitation of words and sitting for ten minutes all without physical guidance.

Theory/Background

As previously stated, the use of early intervention to assist those in need has been a tool that has only been fully utilized in recent history. It has been stated that “early intervention as we know it today, is the consequence of over 300 years of social, political, and academic influences” (Karoly et al, 1998). These influences of early intervention can be traced back to European enlightenment philosophers. These philosophers were some of the first to consider childhood “as a separate period in life, subject to unique

developmental influences” (Karoly et al, 1998). In the many years that have passed, the definition of childhood has continued to change multiple times depending on the time and also societal conditions. In 1912, the federal government started the Children’s Bureau. The bureau was the “first federal agency concerned exclusively with the health and well-being of children” (Karoly et al, 1998). With the creation of the bureau, research began on “developmental and physical milestones of childhood” (Karoly et al, 1998). The tremendous amounts of new research being performed led way to the government passing Title V of the Social Security Act of 1935. This act allowed for funds to be allocated for “child welfare services and for maternal and child health programs” (Karoly et al, 1998).

After 1945, research began that supported early intervention as a significant part of the learning process. Donald Hebb’s neuropsychological theory delved into the relationship between “learning later in life and the quality and quantity of early experiences” (Karoly et al, 1998), while Benjamin Bloom and J. McVicker Hunt’s research had shown how crucial the beginning years are and how significant environmental factors are to development. Bloom stated that “50% of intellectual development occurred by age 4” (Karoly et al, 1998). Based on these findings early intervention practices were started as an attempt to hinder these factors and “enhance development” (Karoly et al, 1998).

The most significant event that led to early intervention being a staple for our young occurred with the passing of P.L. 99-45, The Education of the Handicapped Act Amendments of 1986. This act “encouraged a comprehensive program for infants and toddlers and virtually ensured services for preschool age children” (Guralnick, 2000). Prior to this act, many families were not able to properly handle the intricate and

“stressful circumstances they encountered” (Guralnick, 2000) on a daily basis while dealing with their disabled child. The reality was that these families could not cope with these issues alone and there was no access to properly trained individuals that could assist them with their struggle prior to the development of early intervention programs. In order to create an early intervention program that is effective, the stressors that effect both the child and the family diagnosed with an exceptionality must be examined.

The programs must take into consideration the real life stressors resulting from too little or no access to accurate information regarding services and supports, interpersonal and family distress, resource stressors, such as financial and time requirement and confidence threats felt by the parents (Guralnick, 2000). It is also imperative that the early intervention program be comprehensive, intensive, extended over time, individualized and delivered directly to the child for it to be effective (Jacobson et al, 1998).

There are numerous techniques that are employed to treat the behavior and communication difficulties those with ASD display. A few of the approaches are TEACCH, which is based on environmental adaptations to promote executive functioning skills, Picture Exchange Communication Systems (PECS) which is a form of Applied Behavioral Analysis that aids in communication by using pictures as a means of communicating and LEAP which uses peers as reinforcers (Autism Society of America).

Applied Behavioral Analysis (ABA) is a treatment approach that began in the 1960's as an all-encompassing approach to treat problem behavior, it was not fully intended to be used as a tool for treating those with disabilities (Critchfield, 2002). ABA is based upon B.F. Skinner’s Operant Conditioning theory and uses his behavior theory to

promote change. Recently, the use of Applied Behavioral Analysis (ABA) as a technique in early intervention has been used to treat those with ASD. Many studies have found that the use of ABA can result in “substantial benefits for many children with ASD” (Jacobson et al, 1998). These findings are based upon the school of thought that believes ASD is a disorder that is the result of a “dysfunction within the neural system, with the most consistent finding indicating impairment in the amygdala, related limbic structures and/or cerebellum” (Jensen et al, 2002). It is thought that these particular areas control an individual’s “social reciprocity and emotional responsivity” (Jensen et al, 2002). The use of ABA for those with ASD “targets specific skills in a specialized sequence, the goal being to alter behavior so as to increase and/or improve socialization, communication and general adaptive functioning” (Jensen et al, 2002). If used properly ABA can allow those with ASD to gain the needed cognitive and behavioral skills to successfully enter into the school system.

ABA can be considered a broad theory, which has many subtypes that have their foundations in Skinner’s theory. Discrete Trial, Lovaas therapy and Early Intensive Behavioral Intervention (EIBI) are some of the most widely used. Discrete trial training involves the child performing an action repeatedly to gain mastery. Lovaas therapy is a highly intensive approach that “intervention is delivered through direct one-on-one instruction, 40 hours per week” (Rogers, 1998). EIBI involves “intensive (usually 25 to 40 hours per week), individually administered treatment interventions” (Jensen et al, 2002) specifically targeted to toddler and preschool age children. Each of these techniques are similar in their approaches to ABA with their main focuses remaining operant conditioning and learning through consequences.

Definitions

Early intervention

Early intervention is a tool used “to improve child health and development by providing children and their families with various services and social supports during part or all the period of early childhood” (Karoly et al, 1998).

Autism Spectrum Disorder (ASD)

ASD is a “biologically-based disorder that affects the development and functioning of a person’s verbal and non-verbal communication skills, social interactions and patterns of behaviors” (NJDHSS, 2004). There are five disorder that fall into this spectrum. They are autistic disorder, Rett’s syndrome, Childhood Disintegrative Disorder, Asperger’s Disorder and Pervasive Developmental Disorder (PDD) Not Otherwise Specified (NOS) (Jacobson et al, 1998).

Applied Behavioral Analysis (ABA)

ABA can be defined as the “science of applying what is learned from the analysis of behavior to understand the functional relationship between behavior and conditions” (Jensen et al, 2002). ABA employs the use of “basic principles of learning and behavioral development that cut across diagnoses” (Jacobson et al, 1998).

TEACCH

Treatment and Education of Autistic and Communication Handicapped Children (TEACCH) is a strategy that uses scaffolding and other structured teaching techniques when treating individuals diagnosed with Autism.

PECS

Picture Exchange Communication System (PECS) is a treatment strategy in which individuals with Autism can use pictures as devices for communication. The strategy is used to treat the poor communication skills of those with Autism.

Joint Attention

Joint attention can be defined as “the ability to coordinate attention between an object and a person in a social context” (Whalen et al, 2003). It is a “naturalistic behavior modification technique using components from Discrete Trail Training and Pivotal Response Training” (Whalen et al, 2003).

LEAP

Leap is a treatment for Autism, which employs the use of behavioral and developmental strategies. This technique uses the individual’s peers in place of adults to help reinforce the desired behavior and developmental responses.

Assumptions

For purposes of this study it must be assumed that the diagnosis placed upon the child was the proper diagnosis. If the child was suffering from a different type of disorder the effectiveness of the tailored ABA can be put in question. It must also be assumed that the child was not suffering from any additional medical or psychological disorders that may effect the outcome of the early intervention.

Limitations

A limitation of this study was the duration of study. This particular individual

may require an extended period of early intervention in order to reach their full potential. The intervention must also be able to be altered in order to allow for changes in the ABA based upon their performance. An additional limitation of the study is reliance on the child's family for reinforcement of the behavioral techniques applied. If the family is not reinforcing the ABA, the effectiveness may be hindered.

A further limitation of this study was the competency in measuring the effectiveness of the intervention services. The measurement of the effectiveness of the early intervention was a difficult task when dealing with a short time span. The research will be unable to present long-term future outcomes for the individual due to the fact that the study will only be two months in duration.

When examining limitations one must also consider the reactivity of the subject. Reactivity is a change in phenomenon for no other reason than the subject is being observed. Since the data is being collected using observation you must consider the effect of the observation on the subject.

Summary

In Chapter II, a literature review of all pertinent studies and information examining the effectiveness of early intervention and the use of Applied Behavior Analysis will be presented.

In Chapter III, the research design will be discussed. The research design will be a case study that examines the cognitive and behavioral functioning of a child who has been diagnosed with ASD. The study will take place over a five-month period.

In Chapter IV the data collection processes will be examined. It will discuss in detail the procedures and methods used during the early intervention and ABA.

CHAPTER II

REVIEW OF LITERATURE

Paragraph of Organization

Chapter II will discuss a few of the numerous types of early intervention techniques as well as their effectiveness. It will examine briefly the techniques of TEACCH, LEAP, PECS and Joint Attention and Play therapies and their effectiveness in helping those with Autism.

Chapter II will also examine in detail Applied Behavior Analysis along with the factors that have the most significant impact on the effectiveness of the applied behavior analysis as an early intervention technique. It will look more specifically at the factors of parental involvement, age of onset of treatment and treatment intensity and context. It will examine several studies that discuss the importance of these factors along with the research designs employed to substantiate the claims.

Literature Review

When examining early intervention for those with Autism, we must examine the effectiveness of the techniques employed as well as the specific areas of deficit each technique targets. While some techniques may focus on communication skills others may have a broader focus. As discussed in Chapter I, there are many techniques that are employed to treat the symptoms associated with Autism. While some are similar in technique and practice to Applied Behavior Analysis, some use developmental or environmental techniques as opposed to the behavioral techniques. There are countless studies that examine these developmental and/or environmental techniques in detail. The main consensus of these studies has shown that these techniques, as well as Applied

Behavioral Analysis, can be successful as early intervention strategies for those with Autism. It has been shown that “behavioral treatments were found to be significantly effective in reducing problem behavior in individuals with Autism” (Campbell, 2003). Most scholars who support Applied Behavior Analysis contend that the reduction of problem behaviors will lead to improvements in all areas of functioning.

TEACCH

In a study that employed the use of TEACCH, which is a strategy that uses scaffolding and other structured teaching techniques in the classroom, done by Ozonoff and Cathcart (1998) it was shown that individuals who entered the study with higher cognitive ability and milder symptoms attained further improvements than their counterparts (Ozonoff and Cathcart, 1998). This study’s design called for the comparison of twenty-two individuals separated into two groups with the parent’s of the individuals playing a significant role. The experimental group’s parents received approximately 9 hours of training in TEACCH while the control group’s parents received none. They employed the use of a pre test, post test design using the Psychoeducational Profile-Revised as a measure of progress and improvement (Ozonoff and Cathcart, 1998). A common parental complaint of this technique is that it does not supply the parents with a “research-based recovery-rate percentage” (Choutka et al, 2004). Without seeing actual recovery research and rates parents are apt to question the actual effectiveness of this technique.

LEAP

A study performed by Hoyson, Jamieson, & Strain (1984) examined the effectiveness of the intervention program LEAP. This program uses behavioral as well as developmental strategies to treat Autism. The main premise of this intervention technique is to use the child's peers in place of adults to help reinforce the desired behavior and developmental responses. This was a center-based study in which the children involved received approximately 15 hours of treatment a week for 6 months. It was shown that those who received the treatment showed progress (Hoyson et al, 1984). The effectiveness of center-based treatment interventions will be examined more thoroughly later in Chapter II.

PECS

A very significant characteristic of those with ASD is poor communication skills. Many types of early intervention techniques attempt to correct these communication deficits. The Picture Exchange Communication System (PECS) as previously discussed in Chapter I uses pictures as communication devices. While this technique has not had many published studies regarding its effectiveness a few have shown promising results. In a study done by Bondy and Frost (1994b; 1994c; 1998) that examined 66 non-communicative preschool children, "over 95 percent were using at least two pictures within 1 month of starting PECS" (Magiati et al, 2003). It was also found that in one year, "41 children were able to use speech independently and another 13 were using a combination of pictures or symbols and speech." Those who acquired speech after the intervention also exhibited fewer characteristic ASD behaviors. In addition to the study by Bondy and Frost, a study by Magiati and Howlin (2003) also showed positive results

for PECS. Magiati and Howlin conducted a pilot study to determine whether a full-scale study of PECS is warranted. They found “significant increases in children’s use of PECS following training” (Magiati et al, 2003).

Joint Attention and Play

Many studies have determined that the some of the earliest determinants for children with Autism are joint attention and play deficits. Both of the factors must be examined when looking at early intervention techniques. Joint attention training is a technique similar to PECS in that it also targets the communication skills of those with ASD. It has been shown that deficits in joint attention are a “fundamental aspect of the early presentation of Autism” (Mundy et al, 1997). This deficit has been shown to be a “significant predictor of language outcome” (Woods et al, 2003). Research done by Mundy, et al (1990) showed that “measures of gestural joint attention at initial testing were a significant predictor of language development one year later for preschool children with ASD” (Woods et al, 2003). The direct targeting of these joint attention lags has been shown to have a positive impact on those with ASD. In a study by Whalen and Schreibman (2003) joint attention training was examined using eleven children (five with ASD and six average) in which they received two ten week attention training sessions with assessments between each phase. The results from this study showed that the children with ASD displayed significant improvements in joint attention after training (Whalen et al, 2003).

Play interventions have also been used to treat communication deficits present in those with ASD. Play interventions can be defined as “experienced-based, playful and enjoyable interactions used to enhance shared attention, pretend play, initiations and

responses” (Bernard-Opitz et al, 2004). Play interventions can consist of natural, structured and facilitated methods, each with their own benefits and weaknesses. It is beyond the scope of this study to examine each method individually but when looking at play as a whole, it has been shown to have positive impacts upon the communication skills of those with ASD. In a comparison study by Bernard-Opitz, Ing, & Kong (2004) between behavioral and natural play interventions, it was shown that both techniques produced “changes across test and behavior measures” (Bernard-Opitz et al, 2004) for all children in the study. In a similar type of study performed by Kok, Kong & Bernard-Opitz (2002) which compared structured and facilitated play, it was shown that while structured play did produce “more appropriate communicative responses” (Kok et al, 2002) both techniques are beneficial towards optimal effectiveness.

Applied Behavior Analysis

Autism is an exceptionality that is extremely difficult to diagnose as well as treat. While many different theories and techniques have been examined and been shown to be effective, most of the results have been mixed in terms of the most beneficial towards progress. These mixed results have brought about many “questions about the actual effectiveness of specific treatment models as well as factors that may influence treatment outcomes” (Gabriels et al, 2001). These factors include but are not limited to “age of treatment onset, treatment intensity, treatment duration, pre-treatment intelligence and language levels, program variation, Autism symptom severity, visual-spatial abilities, cognitive flexibility, co-morbid conditions and neurological conditions” (Gabriels et al, 2001). When examining Applied Behavior Analysis’ effectiveness you must look at these factors individually as well as together to get a true overall picture.

Parental Involvement

The influence and the knowledge of technique by the parents are very crucial to the success of Applied Behavioral Analysis. While we know their input is crucial to improvement, it is still up for debate how crucial. It is has not been researched thoroughly and “exact data relating to quality of training are generally unavailable” (Bibby et al, 2002). However, there were a few studies found that supported the significance of parental involvement. One study performed by Smith, Buch & Gamby (2000) found “that parent-employed therapists who had received short-term training were less effective than college trained therapists” (Smith et al, 2000). In a conflicting study performed by Bibby, Eikeseth, Martin, Mudford & Reeves (2002) parent-managed behavioral interventions were examined using 66 children treated by 25 various early intervention providers. Their research showed that parent-managed behavioral interventions have been shown to be less effective than those professionally based programs (Bibby et al, 2002).

In a study completed by Dillenburger, Keenan, Gallagher & McElhinney (2004) that examined both the perceptions and the evaluations of parents with regard to Applied Behavior Analysis it was “found that parents considered ABA to have high effectiveness in facilitating development of their children” (Dillenburger et al, 2004). In a related study that examined the treatments employed by the parents of those with Autism, Green, Pituch, Itchon, Choi, O’Reilly, and Sigafos (2004) found that “standard therapies and treatments focusing on skills training, especially those based on the principles of ABA, remained among the most commonly used” (Green et al, 2004).

Age of Treatment Onset

A factor discussed above that has a very significant impact on the effectiveness of a program is the age of treatment onset. Many studies have shown the importance of services beginning early in childhood. In a comparison study performed by Fenske, Zalenski, Krantz & McClannahan (1985) it has been shown that the time of intervention made an significant impact upon the outcome of the child. Their study compared two groups of nine children diagnosed with Autism. The first group received intervention services prior to 5 years of age, while the second group received intervention services after 5 years of age. The group that received the services prior to 5 showed a greater amount of overall progress and improvement overall (Fenske et al, 1985).

Harris and Handlemen (2000) performed a later study which studied both the age of onset as well as the cognitive functioning of the individual at treatment onset. They employed a research method consisting of the assessment of 27 participants that were enrolled in a treatment center for intervention services. They assessed the individuals both before and after treatment. The study found that “those children who were enrolled at the center before 48 months of age were far more likely to achieve an inclusive educational placement in a regular education class” (Harris et al, 2000).

Treatment Intensity and Context

The factors of treatment intensity and context are constantly at the forefront when discussing the effectiveness of early intervention programs. Dawson and Osterling (1997) performed an analysis on early intervention programs and found that the majority involve 15 to 25 hours of treatment hours per week (Dawson et al, 1997). In a study performed by Lattal & Neef (1996) that examined reinforcement schedules in behavior

analysis found strong evidence supporting the importance of reinforcement schedules in early intervention programs (Lattal et al, 1996).

A major factor that can determine treatment intensity is the location where the treatment is provided. There are two contexts in which the individuals afflicted with Autism can receive treatment. They can receive either home-based or center-based behavioral treatments. There are many valid studies that discuss the positives and negatives of both techniques. While we must remember that treatment outcome is not solely effected by the treatment context and intensity, these two factors play a major role.

The study that has shown the most significant results regarding intensive home-based therapy was performed by I.O. Lovaas. In his research, he reported that 47% of the children in the study achieved “recovery” (Lovaas, 1987). For this study, the design consisted of a long-term comparison study that was conducted on young children with Autism. This was an extremely intensive treatment study in which one group children received over 40 hours of one on one therapy, while a second group received fewer than 10 hours of therapy also on a one on one basis. As with many of the studies cited in this literature review, the parental involvement played a significant part in this study. The subjects were given both pre and post tests measuring their cognitive abilities such as IQ and school placement. In addition to the cognitive measures tested, the children’s Vineland Adaptive Behavioral Scores as well as personality were also measured (Lovaas, 1987).

A study performed by Anderson, Avery, DiPietro, Edwards, & Christian (1987) showed a significant change in the performance of subjects after intensive treatment. The study consisted of a home-based applied behavioral analysis, more specifically Lovaas

therapy, performed on 14 children with symptoms in the autistic spectrum. The children had a mean age of 32 months. This treatment was extremely intensive, with the children receiving treatment 15 to 25 hours per week for an entire year. It is interesting to note that in this study six of the children received this intensive treatment for an additional year. While the progress of the children was a primary focus of this study, the study also focused upon “parent training and checked for fidelity of parent teaching” (Anderson et al, 1987). For this study, the research design consisted of a pre and post test design, with the progress of the children being assessed using the Vineland Adaptive Behavior Scale, the curriculum measure, UPAS, as well as multiple measures of intelligence and language abilities. The researchers were examining the changes in the scores on “mental, social and language ages, UPAS scores, and parent teaching” (Anderson et al, 1987).

In a study completed by Birnbrauer and Leach (1993) in which they examined the conclusions of the Murdoch Early Intervention Program, an Applied Behavior Analysis program that employed the use of Lovaas therapy in a home-based setting, it was reported that growth in both the language skills and IQ’s was seen in those in the experimental group. In this study, the therapy was supplied to nine children between the ages of 24 and 48 months for approximately 29 hours per week. The research design consisted of a comparison study in which the experimental group was tested against a control (Birnbrauer et al, 1993).

Sheinkopf and Siegel (1998) performed a research study on applied behavior analysis, where the participants were selected based upon their previous participation in a “larger longitudinal study” on Autism (Sheinkopf and Siegal, 1998). The purpose of their study was to examine the effectiveness of home-based interventions with regards

solely to the cognitive ability of the individuals. The study was a control and an experimental group research design using both pre and post tests. Each group consisted of 11 children. The researchers used matching criteria when comparing the groups in an attempt to eliminate confounds. The matching criteria were based upon mental age, chronological age, previous treatment and also diagnosis. They also matched the pairs based upon sex when possible. This criterion matching resulted in the experiment having ten pairs of children diagnosed with Autism and one pair diagnosed with PDD-NOS. The control group consisted of children, who received intervention services on average of 11 hours per week, while the experimental group received an average of 27 hours of services per week. The pre and post tests given to the children consisted of multiple cognitive exams, such as the Merrill-Palmer Scale of Mental Tests, the Bayley Scales of Infant Development and the Wechsler Preschool and Primary Scale of Intelligence (Sheinkopf and Siegel, 1998). The results from this comparison study supported the positive effectiveness of home-based intervention services. It was shown that “intensive home-based behavioral treatment can be implemented successfully in the field, without the direct support of an academic center” (Sheinkopf and Siegel, 1998).

A study performed by Luiselli, O’Malley Cannon, Ellis and Sisson (2000) combined the factors of treatment intensity as well as age of onset of treatment to examine the effectiveness of applied behavior analysis. The study consisted of the examination of sixteen children who had received home-based intervention treatment at varying intensities as well as varying ages of onset. The study examined the children using the Early Learning Accomplishments Profile (ELAP) or the Learning Accomplishments Profile (LAP). These two profiling tests “assess a child’s skill level

within six domains: communication, cognition, fine motor, gross motor, social-emotional and self-care” (Luiselli et al, 2000). This study found that those individuals who received early services and a stronger intensity of services showed greater improvements in the areas of cognition, socio-emotional functioning and communication skills than those who received later and less intense services (Luiselli et al, 2000).

On the opposite side of the spectrum from those who support the premise of home-based early intervention are the proponents of center-based treatment. Similarly to home-based interventions, center-based interventions have a large amount of supporting research. Harris, Handlemen, Kristoff, Bass, & Gordon (1990) did a comparison study with 10 children, divided into two groups; each group receiving center based intervention therapy. The two groups of five were divided based upon school setting, 5 were placed in an inclusion class while the other 5 were in a non-inclusion class. They based their research upon the comparison of the progress exhibited in both developmental and language skills. This study found no significant differences between the two groups with each group showing progress and improvement after the therapy (Harris et al, 1990).

Summary

This review of the literature on applied behavior analysis and early intervention program effectiveness has shown that the children who receive such services benefit in some way from the treatment. While the benefits seen may be greater in some circumstances than in others, it has been shown that a large majority of those with Autism show some improvement after invention. It has been found that there are certain factors that can contribute to the effectiveness of the interventions. Some of these factors are, but not limited to, parental involvement, age of treatment onset and treatment intensity

and context. It has been shown that the more learned, experienced and involved a parent is in the therapy, the more effective the treatment program. The age of treatment onset has been determined to be a crucial factor with regard to future performance and ability. Those with Autism reap the most rewards from the intervention when it is begun before the age of three. The intensity of treatment provided also plays a major role in the outcome for the child with Autism. The more intensive a program is, the more progress the child makes.

Early intervention and applied behavior analysis have been determined to be an invaluable tool when treating those with Autism. The study results discussed provide concrete evidence that applied behavior analysis is an effective treatment technique and should be utilized to treat those diagnosed with Autism. The proper use of this technique will provide those individuals with Autism the head start that they require to flourish in our schools and throughout their lives.

CHAPTER III

METHODOLOGY

As discussed in the previous chapters, the treatment of children with Autism is as varied as the syndrome. This research was attempting to prove the benefit and effectiveness of applied behavior analysis as an early intervention technique. This research was a case study that examined the effectiveness of applied behavioral analysis and early intervention on a two-year-old male diagnosed with Autism. It examined the individual's ability to perform certain goals both before early intervention services and after. The case study attempted to prove this researcher's hypothesis that the use of applied behavioral analysis will increase the cognitive and behavioral functioning on the subject individual who has been diagnosed with Autism when used as part of an early intervention program. The use of a case study approach allowed for a more in-depth look at this technique's effectiveness than would a comparison study with more subjects. Below the research method will be discussed in detail.

Methodology

Participant/Subject

The participant for this research study was a two year old male diagnosed with Autism. The subject resided full time with his family. According to previous examinations and observations completed, he was functioning at a twelve-month old age level. A more complete description of his functioning and cognitive level will be discussed in Chapter IV. The subject had been evaluated and had an Individual Family Service Plan, which had determined that his symptoms fall within the Autism spectrum and that he was eligible for early intervention services through the Rowan University

early intervention program.

Design

The research design was a single-case descriptive research design in which the subject was examined both prior to and after intervention. Since this was a case study, the use of naturalistic observation was employed to observe the subject in their home. The research design consisted of a pre-test, post-test design, also known as the A-B-A design. The use of this design was employed because of its effectiveness when performing a single-case experiment. The design consisted of a baseline phase (A) in which no treatment will be received, a treatment phase (B) in which the subject will receive intervention services and the withdrawal phase (A) in which services are withdrawn to determine effectiveness of intervention.

Procedure

The procedure for this research was based upon the Applied Behavior Analysis technique. The case study subject was provided with home-based intervention services at a rate of four hours per week. Each two-hour session consisted of using the ABA technique to foster goal attainment.

The research began by taking a behavioral baseline of the subject. This baseline was used to determine (a) the subject's functioning and cognitive ability at the onset of services and (b) the subject's progress throughout the intervention. As with all behavioral baselines, the subject received no intervention during the data collection period. Throughout the baseline the subject's age appropriate functioning was examined.

Upon completion of data collection for the baseline, the implementation of ABA

techniques was used to facilitate the attainment of the goals established for the subject. As previously discussed in Chapter I, ABA is a technique in which the use of reinforcements is employed to promote specific behavioral outcomes. The basis of this technique is that the subject will eventually no longer need the reinforcement and such they will be phased out leaving only the desired behavioral outcomes.

The goals that have been set for the subject were behavior goals, which will nurture success in future school years. The goals set for the subject were as follows: sitting for ten minutes on directed activity, pointing to objects and imitation of spoken words. Please note that this list of goals may not be a complete list. The goals were subject to alteration by the parent or the researcher anytime prior to the baseline phase of the research. Any additional goals determined will be discussed in Chapter IV.

Upon completion of the baseline session, the subject received behavioral interventions for two months with a frequency of four hours per week. At the conclusion of the designated time period for intervention, the subject was tested again to determine the current level of functioning and goal attainment.

The data gathered during the pre-test and the post-test was compared to determine (a) the extent to which the subject has shown improvement, stayed the same or fallen behind in functioning and (b) the subject's ability to perform the designated goals.

Analysis of Data/Assessment

The data for this research was assessed by an observation of performance. The goals set for the subject were assessed using quantitative methods prior to intervention services, during intervention and then again after services. The subject either completed the desired goal in the trial or he did not. The researcher noted the number of times out

of the five trials performed the subject completed the task. The data was then charted and examined to determine if over time any significant improvement of functioning can be noted.

Summary

In summation, this research consisted of a case study that examined the effectiveness of applied behavior analysis and early intervention in a single subject. The subject was assessed on his performance on specific goals then he received home-based applied behavior analysis for a period of two months. At the conclusion of the intervention services, the subject was assessed based upon his performance on the same goals. The use of a case study research design allowed the research to examine very closely the effectiveness of applied behavior analysis and early intervention, it also removed many of the confounds that can exist when dealing with a large number of subjects.

CHAPTER IV

RESULTS

The purpose of the this study was to prove this researcher's hypothesis that the use of applied behavioral analysis will increase the cognitive and behavioral functioning of an individual diagnosed with an ASD when used as part of an early intervention program. This was a case study examination done upon a subject who has been diagnosed by an IFSB to have Autism. The in-home data was gathered by the Early Intervention Program at Rowan University. In the remainder of Chapter IV, the specific findings and results of the reinforcement trials will be discussed in detail.

Findings

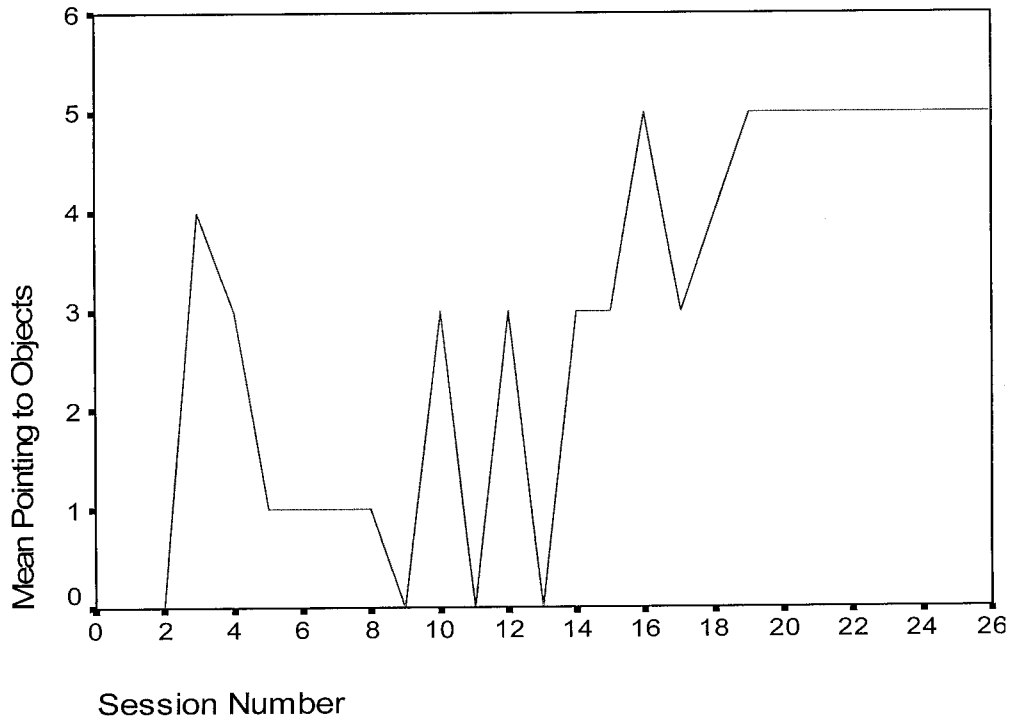
Upon completion of data collection, the information was entered into SPSS for analysis. The dependent variables as discussed before were: number of times out of the five trials the subject pointed to an object without being physically guided, the number of words the subject the imitated in the five trials, and the average amount of time the subject spent sitting over the five trials. This study was to examine that effectiveness of ABA over a certain time period; therefore the independent variables were the number of the session, as well as the ABA treatment used.

The data collection process began with a baseline. The baseline is a crucial aspect when documenting progress of an individual when using applied behavior analysis. Without a baseline, you can not determine accurately whether or not the subject displays improvement. The data from the baseline examination sets the standard for the remaining sessions. As you can see from Graphs 4.1 through 4.3, the subject was functioning at a very low level in regards to the goals set prior to the intervention services. The subject

failed to complete any of the goals without physical guidance during the baseline examination. For the purposes of this study the physical guidance of the subject by the therapist will not be considered a completion of the task. Only the spontaneous completion of a task will be examined and considered task attainment.

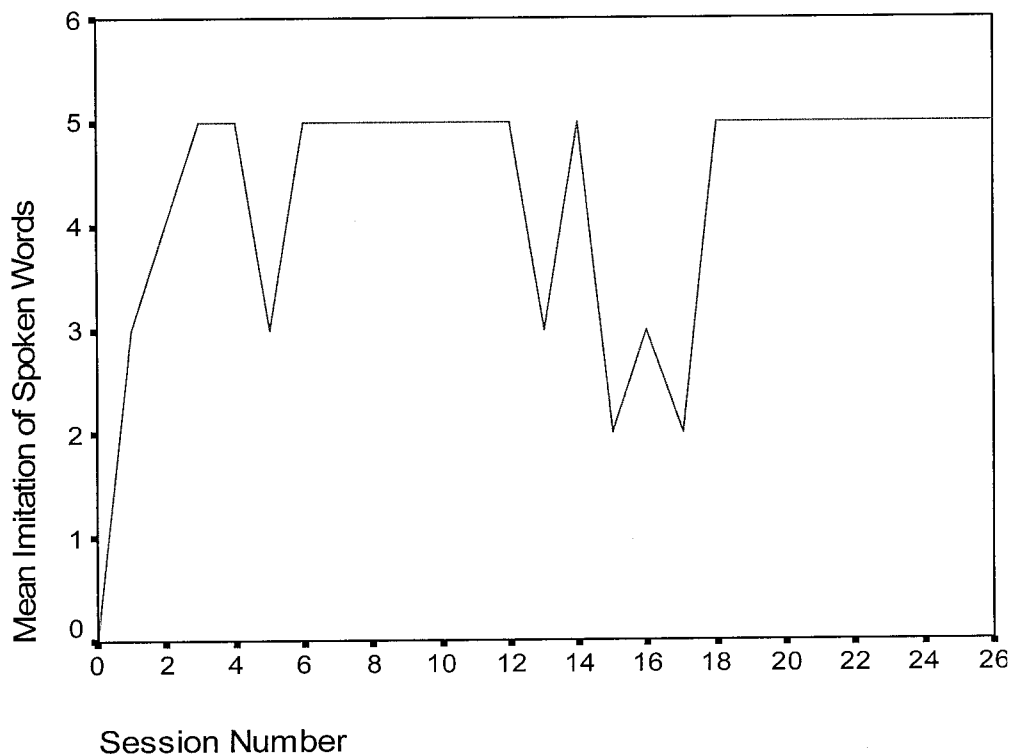
In Graph 4.1, which examines the goal of pointing to objects, you can see that he made tremendous progress. He went from not pointing to a single object without physical guidance during the five trials of the baseline to consistently and spontaneously pointing to an object during each of the trials in the latter sessions. The one area of note was that the subject did have large amounts of fluctuations in task completion during the ninth through fourteenth trials. Chapter five will discuss some of the possible reasons for these fluctuations. After the fourteenth trial, the subject made a steady increase in goal attainment through the twentieth trial, after which he performed this task without fail in every trial.

GRAPH 4.1 – Analysis of goal attainment – Pointing to Objects



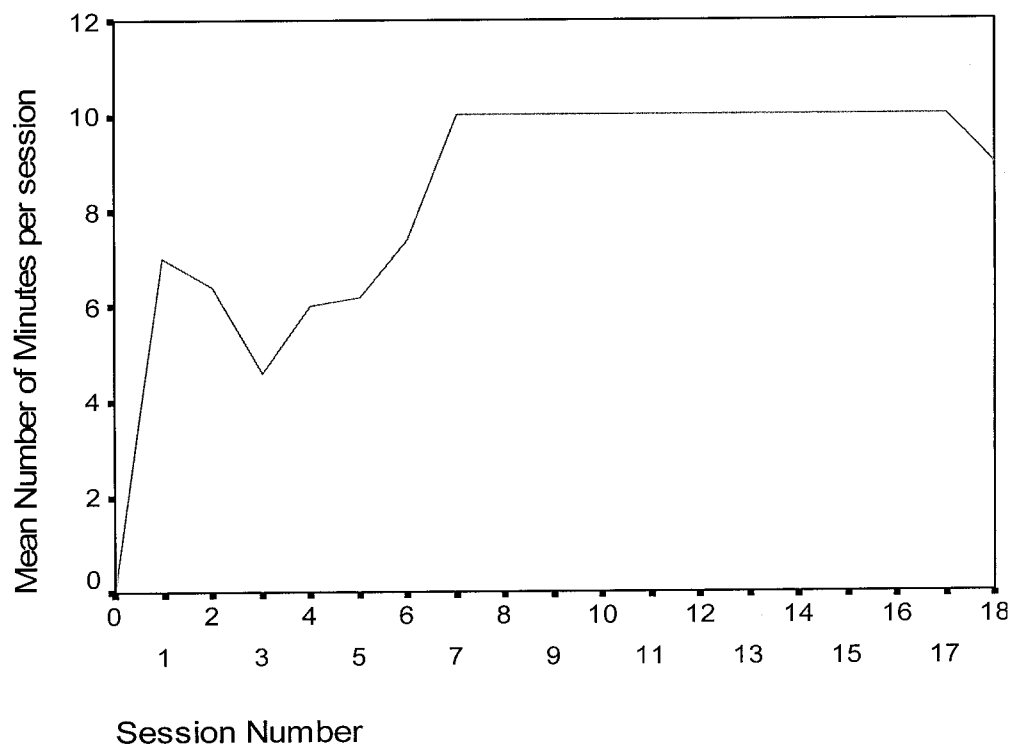
In Graph 4.2, the subject's imitation of spoken words increased dramatically after the baseline examination. He went from not speaking prior to services to imitating three words during his first session, to consistently imitating five words per session. The subject's progress with this goal was significant. While he did have some days when he did not attain the goal of imitating a word during each of the trials, he more times than not accomplished the goal set.

GRAPH 4.2 – Analysis of goal attainment – Imitation of spoken words



Graph 4.3 examines the average number of minutes the subject remained seated during the five trials conducted during each session. The subject had the most success with this goal attainment. As shown in the Graph 4.3 the subject did not sit at all during the baseline examination, the subject began sitting for the desired ten minutes after the seventh session. An interesting aspect of the variable was that the subject only fell below an average of less than five minutes during one session. He was able to accomplish the goal set for him without fail so consistently that this was no longer considered a goal after the nineteenth session; it was a perfected behavior.

GRAPH 4.3 – Analysis of goal attainment – Average number of minutes sitting per session



CHAPTER V

DISCUSSION

This case study was conducted to determine whether or not applied behavior analysis and early intervention are effective. The effectiveness of this technique was measured by the completion of specific behavioral and cognitive goals set for an individual with Autism. As you can see from the findings in Chapter IV, the researcher's hypothesis was proven. The subject made dramatic improvements in all goal areas. The most significant improvement was seen in the sitting time of the subject. He went from not sitting for any period of time while performing a task, to sitting consistently for ten minutes after only seven sessions of intervention (as shown in Graph 4.3). In addition to the behavioral gains showed by his sitting, the subject made strong gains in his language skills. The subject barely spoke at all prior to intervention services, only saying a few words spontaneously. At the conclusion of the two months, he was imitating and spontaneously saying many words (as shown in Graph 4.2). The goal of pointing to objects spontaneously was also achieved. As with the other goals, the subject was not able to point to objects consistently prior to services. After services the subject pointed to multiple objects consistently and spontaneously (as shown in Graph 4.1).

This researcher has noted a problem that may have skewed the data in this case study. A confound noticed by this researcher was the fact that the baseline data was extremely low. The subject did not perform any of the tasks requested even though he had performed them a sporatically in the past. The fact that the subject was nervous around new people could have caused the low figures in the baseline. This researcher believes that this confound did not have a large impact on the study.

This researcher also noted that if the data were collected on more than one subject the reliability and validity of the experiment would be increased. While the subject studied in this case study would be considered a representative sample of those with Autism, an experiment with a larger sample population would have higher reliability and validity.

The results from this research supported the prior research completed on applied behavior analysis and early intervention. In Chapter II, studies by Anderson, Avery, DiPietro, Edwards and Christian (1987) and Birnbrauer and Leach (1993) were examined. Both studies showed great improvement in language skills with the subjects. While their studies were more intensive than this case study, the results were quite similar.

Chapter II discussed some of the factors that may influence the effectiveness of applied behavior analysis. One of the key factors is age of treatment onset. For the purposes of this study a two-year-old boy was the subject. The subject in this research showed tremendous gains from the applied behavior analysis similar to the gains of individuals who took part in the study by Fenske, Zalenski, Krantz & McClannahan (1985). That study examined the factor of age of treatment onset solely, not considering the prior cognitive functioning of the individual. The children who received intervention services prior to age 5 showed greater improvement than those individuals receiving services after age 5. The study supports the data collected from this case study, that early intervention is crucial when intervening with children diagnosed with Autism.

Future Research

This case study is just one of the many that has shown the importance of effective early intervention services. The data collected shows conclusively that applied behavior analysis is an effective technique for improving the functioning levels of individuals with Autism.

While this case study has shown the effectiveness of applied behavior analysis and early intervention, there are still many factors that must be examined more closely to allow for even greater improvement of those with Autism. An area that should be examined more closely is the factor of parental involvement as a determinant of effectiveness. Since this was a case study, the researcher was unable to take into account the effect that parental involvement had on the subject. If this factor can be better understood, the intervention services might be able to be started even earlier and reinforced more consistently in the home. As stated in Chapter II, “exact data relating to quality of training is generally unavailable” (Bibby et al, 2002). Future research should examine this factor more closely as a determinant of improvement.

Another area for future research is the long-term effectiveness of early intervention and applied behavior analysis. A study should be conducted to follow those children provided with intervention services throughout their school career to determine the long-term effectiveness of applied behavior analysis.

Conclusion

Early intervention and applied behavior analysis are useful tools in assisting our children afflicted with Autism thrive in and society. This case study is evidence of effectiveness of applied behavior analysis. It shows that a typical individual diagnosed

with Autism can make tremendous gains in their cognitive and behavioral functioning after intervention services. Autism is a disorder that effects a large portion of our youth and this percentage is continuing to increase. We must therefore increase the number of children who receive early intervention services. Early intervention and applied behavior analysis should be part of the common treatment protocol for children with Autism.

REFERENCES

- Anderson, S.R., Avery, D.L., DiPietro, E.K., Edwards, G.L., & Christian, W.P. (1987). Intensive home-based early intervention with autistic children. *Education and Treatment of Children*, 10, 352-366.
- Autism Society of America. Behavioral and Communication Approaches. Retrieved October 6, 2005 from the World Wide Web: <http://autism-society.org>.
- Barnett, W.S. (1995). Long-Term Effects of Early Childhood Programs on Cognitive and School Outcomes. *The Future of Children*, Vol.5, No. 3.
- Bernard-Opitz, V., Ing, S., & Kong, T.Y. (2004). *Comparison of behavioural and natural play interventions for young children with autism*. Retrieved October 15, 2005 from The National University in Singapore, Department of Psychology, Web site: www.sagepublications.com.
- Bibby, P., Eikeseth, S., Martin, N.T., Mudford, O.C., & Reeves, D. (2002). Progress and outcomes for children with autism receiving parent-managed intensive interventions. *Research in Developmental Disabilities*, 23, 81-104.
- Birnbrauer, J.S., & Leach, D.J. (1993). The Murdoch early intervention program after 2 years. *Behaviour Change*, 10, 63-74.
- Bondy, A.S. & Frost, L.A. (1994b) "The Delaware Autistic Program:", in S.L. Harris and J.S. Handleman (eds) *Preschool Education Programs for Children with Autism*, pp.37-54. Austin, TX: Pro-Ed.
- Bondy, A.S. & Frost, L.A. (1994c) "The Picture Exchange Communication System", *Focus on Autistic Behavior* 9 (3): 1-19.
- Bondy, A.S. & Frost, L.A. (1998) "The Picture Exchange Communication System",

Seminars in Speech and Language 19 (4): 373-89.

- Campbell, J.M. (2003). *Efficacy of behavioral interventions for reducing problem behavior in persons with autism: a quantitative synthesis of single-subject research*. Retrieved October 25, 2005 from the University of Memphis, Department of Psychology, Web site: www.sciencedirect.com.
- Choutka, C.M., Doloughty, P.T., & Zirkel, P.A. (2004). The "Discrete Trials" of Applied Behavior Analysis for Children with Autism: Outcome-Related Factors in the Case Law. *The Journal of Special Education*, 38, 95-103.
- Corsello, C.M. (2005). Early Intervention in Autism. *Infants & Young Children*, 18, 74-85.
- Critchfield, T.S. (2002). Evaluating The Function of Applied Behavior Analysis: A Bibliometric Analysis. *Journal of Applied Behavior Analysis*. 35, 423-426.
- Dawson, G., & Osterling, J. (1997). Early Intervention in autism. In M.J. Guralnick (Ed.), *The effectiveness of early intervention* (pp.307-3026). Baltimore: Brookes.
- Dillenburger, K., Keenan, M., Gallagher, S., & McElhinney, M. (2004). Parent Education and Home-based behaviour analytic intervention: an examination of parents' perceptions of outcome. *Journal of Intellectual & Developmental Disability*, 29, 119-130.
- Fenske, E.C., Zalenski, S., Krantz, P.J., & McClannahan, L.E. (1985). Age at intervention and treatment outcome for autistic children in a comprehensive intervention program. *Analysis and Intervention in Developmental Disabilities*, 5, 49-58.
- Gabriels, R.L., Hill, D.E., Pierce, R.A., Rogers, S.J., & Wehner, B. (2001). *Predictors of*

treatment outcome in young children with autism: A retrospective study.

Retrieved October 15, 2005 from the University of Colorado Health Sciences Center, Web site: www.sagepublications.com.

Green, V.A., Pituch, K.A., Itchon, J, Choi, A., O'Reilly, M., & Sigafos, J. (2004).

Internet survey of treatments used by parents of children with autism. Retrieved October 25, 2005 from The University of Texas at Austin, Department of Educational Psychology, Web site: www.sciencedirect.com.

Gresham, F.M., & MacMillan, D.L. (1998). Early Intervention Project: Can Its Claims Be Substantiated and Its Effects Replicated? *Journal of Autism and Developmental Disorders*, 28, 5-13.

Guralnick, Michael J. (2000). Early Childhood Intervention: Evolution of a System. *Focus on Autism and Other Developmental Disabilities*, Vol 15, Num. 2, 68-79.

Harris, S.L., Handlemen, J.S., Kristoff, B., Bass, L., & Gordon, R., (1990). Changes in language development among autistic and peer children in segregated and integrated preschool settings. *Journal of Autism and Developmental Disorders*, 20, 23-31.

Harris, S.L., & Handleman, J.S. (2000). Age and IQ at Intake as Predictors of Placement for Young Children with Autism: A Four- to Six-Year Follow-Up. *Journal of Autism and Developmental Disorders*, 30, 137-142.

Hastings, R.P. & Symes, M.D. (2002). Early intensive behavioral intervention for children with autism: parental therapeutic self-efficacy. Retrieved October 25, 2005 from University of Southampton, Department of Psychology, Web site: www.sciencedirect.com.

- Hoyson, M., Jamieson, B., & Strain, P.S., (1984). Individualized group instruction of normally developing and autistic-like-children: The LEAP curriculum model. *Journal of the Division of Early Childhood*, 8, 157-172.
- Jacobson, J.W., Mulick, J.A., & Green, G. (1998). *Autism and ABA: What Does the Diagnosis "Autism" Mean?*. Retrieved September 28, 2005, from Cambridge Center for Behavioral Studies, Web site:
http://www.behavior.org/autism/autism_diagnosis.cfm.
- Jacobson, J.W., Mulick, J.A., & Green, G. (1998). *Autism and ABA: Summary Cost-benefit estimates for Early Intensive Behavioral Intervention for Young Children with Autism*. Retrieved September 28, 2005, from Cambridge Center for Behavioral Studies, Web site:
http://www.behavior.org/autism/autism_costbenefit.cfm.
- Jensen, V.K. & Sinclair, L.V., (2002). Treatment of Autism in Young Children: Behavioral Intervention and Applied Behavior Analysis. *Inf Young Children*. 14(4), 42-52.
- Karoly, L.A., Greenwood, P.W., Everingham, S.S., Hoube, J., Kilburn, M. R., Rydell, C.P., Sanders, M., & Chiesa, J. (1998). *Investing in Our Children*. Rand Publication.
- Kasari, C. (2002). Assessing Change in Early Intervention Programs for Children with Autism. *Journal of Autism and Developmental Disorders*, 32, 447-461.
- Kok, A.J., Kong, T.Y., & Bernard-Opitz, V. (2002). *A comparison of the effects of*

- structured play and facilitated play approaches on preschoolers with autism: A case study*. Retrieved October 15, 2005 from The National University in Singapore, Department of Psychology, Web site: www.sagepublications.com.
- Lattal, K.A., & Neef, N.A. (1996). Recent Reinforcement-Schedule Research and Applied Behavior Analysis. *Journal of Applied Behavior Analysis*, 29, 213-230.
- Lovaas, O.I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting & Clinical Psychology*, 55, 3-9.
- Luiselli, J.K., O'Malley Cannon, B., Ellis, J.T., & Sisson, R.W. (2000). *Home-based behavioral intervention for young children with autism/pervasive developmental disorder*. Retrieved October 15, 2005 from The May Center for Applied Research, The May Institute, Web site: www.sagepublications.com.
- Magiati, I., & Howlin, P. (2003). *A pilot evaluation study of the Picture Exchange Communication System (PECS) for children with autistic spectrum disorders*. Retrieved October 15, 2005 from St. George's Hospital Medical School, Department of Psychology, Web Site: www.sagepublications.com.
- Marshall, J.K., & Mirenda, P. (2002). Parent-Professional Collaboration for Positive Behavior Support in the Home. *Focus on Autism and Other Developmental Disabilities*, 17, 216-228.
- McEachin, J.J., Smith, T., & Lovaas, O.I., (1993). Long term out-come for children with autism who received early intensive behavioral treatment. *American Journal on Mental Retardation*, 97, 359-372.
- Mundy, P., Sigman, M., & Kasari, C. (1990). A longitudinal study of joint attention and

- language development in autistic children. *Journal of Autism and Developmental Disorders*, 20, 115-128.
- Mundy, P., & Crowson, M. (1997). Joint Attention and Early Social Communication: Implications for Research on Intervention with Autism. *Journal of Autism and Developmental Disorders*, 27, 653-676.
- New Jersey Early Intervention System. *Autism Guidelines*. Retrieved November 9, 2005 from www.njeis.org/autismguidelines.pdf.
- New Jersey Department of Health and Senior Services, Division of Family Health Services Special Child Health and Early Intervention Services. (2004). Autism Spectrum Disorders. Retrieved September 28, 2005 from the World Wide Web: <http://www.state.nj.us/health/fhs/autism.htm>.
- Ozonoff, S., & Cathcart, K. (1998). Effectiveness of a home program intervention for young children with autism. *Journal of Autism and Developmental Disorders*, 28, 25-32.
- Rogers, Sally J. (1998). Neuropsychology of Autism in Young Children and Its Implications for Early Intervention. *Mental Retardation and Developmental Disabilities Research Reviews*, 4, 104-112.
- Schopler, E., Mesibov, G., & Baker, A. (1982). Evaluation of treatment for autistic children and their parents. *Journal of the American Academy of Child Psychiatry*, 21, 262-267.
- Sheinkopf, S.J., & Siegel, B. (1998). Home based behavioral treatment of young autistic children. *Journal of Autism and Developmental Disorders*, 28, 15-24.
- Smith, T., Buch, G.A., & Gamby, T.E. (2000). Parent-directed intensive early

intervention for children with pervasive developmental disorder. *Research in Developmental Disabilities*, 21, 297-309.

Symes, M.D., Remington, B., Brown, T., & Hastings, R.P. (2005). *Early intensive behavioral intervention for children with autism: Therapists' perspectives on achieving procedural fidelity*. Retrieved October 25, 2005 from the University of Southampton, School of Psychology, Web site: www.sciencedirect.com.

University of Michigan. (2004, June 16). Early Intervention Lessens Impact of Autism.

Retrieved September 28, 2005 from World Wide Web:

<http://www.sciencedaily.com/print.php?url=/releases/2004/06/040616063622.htm>

Whalen, C., & Schreibman, L. (2003). Joint attention training for children with autism using behavior modification procedures. *Journal of Child Psychology and Psychiatry*, 44:3, 456-468.

Woods, J.J., & Wetherby, A.M. (2003). Early Identification of and Intervention for Infants and Toddlers Who Are at Risk for Autism Spectrum Disorder. *Language, Speech, and Hearing Services in Schools*, 34, 180-193.