THE FLORIDA STATE UNIVERSITY

COLLEGE OF EDUCATION

THE EFFECTS OF DIALOGIC READING ON THE EXPRESSIVE VOCABULARY OF CHILDREN WITH AUTISM CHARACTERISTICS

BY

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A Dissertation submitted to the School of Teacher Education in partial fulfillment of the requirements for the degree of Doctor of Philosophy

Degree Awarded: Spring Semester, 2011
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This dissertation is dedicated to my devoted husband.

We earned this together.
ACKNOWLEDGEMENTS

First I would like to express my appreciation to the families, teachers, and schools who participated in this study. My research ideas begin and end with the children. They are the priority. I am also very grateful to the graduate students who volunteered to implement the interventions in this study. Their commitment and hard work did not go unnoticed.

Thank you to my committee; Dr. Stephanie Al’Otaiba, Dr. Beth Phillips, and Dr. Chris Schatschneider. Your expertise and advice on this project was highly valued. A special heartfelt thank you to my major professor: Dr. Bruce Menchetti. You believed in me from the beginning. Thank you for the countless hours of hard work you have invested in me. I was lucky to have you as a mentor.

Thanks to my family near and far. You are a wonderful reminder of what is truly important in life and keep me balanced. I am thankful that my mother and father instilled in me a love for learning at a very young age that has carried me here.

Further, I must acknowledge my husband who I dedicated this dissertation and my life to. You gave me the confidence to begin, the support to continue, and the patience to finish. I am grateful for your endless faith in me not only throughout this one experience but throughout our entire lives then, now, and forthcoming.

Finally, a short message to my dear daughter; let this be a reminder that we are only given one life, never be afraid to follow your dreams.
# TABLE OF CONTENTS

List of Tables ........................................................................................................... vii  
List of Figures ........................................................................................................... viii  
Abstract ..................................................................................................................... ix  

I. INTRODUCTION ................................................................................................... 1  
   Purpose and Goal .................................................................................................... 2  
   Rationale ............................................................................................................... 3  
   Strengths of Study ................................................................................................. 4  
   Delimitations of Study ......................................................................................... 4  
   Limitations of Study ............................................................................................. 5  
   Summary .............................................................................................................. 5  

II. LITERATURE REVIEW .......................................................................................... 7  
   Epidemiology of Autism ....................................................................................... 7  
   Attention Characteristics of Children with Autism ............................................. 9  
   Language Development of Children with Autism .............................................. 12  
   Emergent Literacy and Children with Autism .................................................... 22  
   Adult-Child Book Reading .................................................................................... 24  
   Conclusion ............................................................................................................ 50  

III. METHODS .......................................................................................................... 52  
   Participants ........................................................................................................... 53  
   Descriptive Measures ........................................................................................... 53  
   Informed Consent ................................................................................................ 56  
   Training of Readers .............................................................................................. 56  
   Treatments ............................................................................................................ 57  
   Data Collection ..................................................................................................... 59  
   Materials ............................................................................................................... 60  
   Inter-Observable Reliability .................................................................................. 61  
   Treatment Fidelity ................................................................................................. 62  
   Social Validity ....................................................................................................... 62  
   Data Analysis ....................................................................................................... 62  
   Summary .............................................................................................................. 63  

IV. RESULTS ............................................................................................................. 65
LIST OF TABLES

4.1: Participant Descriptors ................................................................. 65
4.2: Pre-test Screening Scores ............................................................. 68
4.3: Pre-test and Post-test Storybook Vocabulary Test Scores .................. 87
4.4: Pre-test and Post-test Standardized Measures Scores ...................... 87
4.5: Treatment Intensity ....................................................................... 88
LIST OF FIGURES

2.1: Trial with Distracter Stimulus................................................................. 11

4.1: John’s Correct Cumulative Responses to Vocabulary Queries..................... 70

4.2: Mike’s Correct Cumulative Responses to Vocabulary Queries.................... 71

4.3: Chase’s Correct Cumulative Responses to Vocabulary Queries.................... 72

4.4: Luke’s Correct Cumulative Responses to Vocabulary Queries..................... 73

4.5: Steven’s Correct Cumulative Responses to Vocabulary Queries................... 74

4.6: John’s Correct Cumulative Responses to Follow-up Queries....................... 76

4.7: Mike’s Correct Cumulative Responses to Follow-up Queries....................... 77

4.8: Chase’s Correct Cumulative Responses to Follow-up Queries....................... 78

4.9: Luke’s Correct Cumulative Responses to Follow-up Queries....................... 79

4.10: Steven’s Correct Cumulative Responses to Follow-up Queries.................... 80

4.11: John’s Appropriate Spontaneous Verbalizations...................................... 81

4.12: Mike’s Appropriate Spontaneous Verbalizations..................................... 82

4.13: Chase’s Appropriate Spontaneous Verbalizations..................................... 83

4.14: Luke’s Appropriate Spontaneous Verbalizations..................................... 84

4.15: Steven’s Appropriate Spontaneous Verbalizations..................................... 85
ABSTRACT

Delayed language development is often the primary concern for parents of children with autism. It is this delay that initially provokes parents to have their children evaluated for the disorder. Delayed oral language affects an array of important life skills such as social communication and emergent literacy. This study has been designed to target expressive vocabulary, a fundamental aspect of language, using a storybook intervention based on dialogic reading. The differential effects of dialogic reading enhanced with attention cues compared to dialogic reading alone on expressive language behaviors were measured using an alternating treatment design. The results of this study indicate that the participants with autism spectrum characteristics benefited from dialogic reading with or without attention cues. All the children with autism were able to increase their vocabulary use by the completion of the intervention regardless of the treatment condition. Additionally, positive gains were noted on the standardized assessments related to vocabulary acquisition. The teachers of the children with autism reported the interventions resulted in favorable changes in their students’ vocabulary use during storybook reading sessions and in spontaneous language use within the classroom.
CHAPTER I.
INTRODUCTION

Autism is a pervasive developmental disorder that affects children in three domains: communication, social skills, and idiosyncratic patterns of behavior (American Psychiatric Association, 1994). Within the communication domain, children with autism often have impaired language. Language impairments manifest in a multitude of ways such as delays or deficits in expressive (Charman, Drew, Baird, & Baird, 2003; Smith, Mirenda, & Zaidman-Zait, 2007) and receptive vocabulary, language comprehension, spontaneous use of language, and pragmatics (Tager-Flusberg, Paul, & Lord, 2005). Delays or deficits in language become a serious obstacle for children with autism both socially and academically. In particular, these language delays have an impact on their emergent literacy skills and ultimately their conventional reading ability.

Emergent literacy skills are the pre-literate skills that children acquire starting from birth that aid in later reading development (Teale & Sulzby, 1986). These skills include oral language, phonological awareness, print awareness, and emergent writing (Lonigan, Burgess, & Anthony, 2000). Research has found that children who have deficits in these emergent literacy skills are at risk for reading failure (Bus, van Ijzendoorn, Pellegrini, 1995; National Early Literacy Panel, 2008). Given that most children with autism have delays in oral language, a prime emergent literacy skill, their risk for reading failure is imminent. Therefore, it is imperative that children with autism are provided early interventions that increase their opportunities to improve their oral language skills such as vocabulary use (Lanter & Watson, 2008).

Dialogic reading (DR) may be a suitable intervention for improving expressive vocabulary of young children with autism. Dialogic reading is a research-based form of adult-child book reading that has been shown to have positive effects on the expressive language use of typically developing children and children with language delays (U.S. Department of Education, 2007). DR maximizes adult-child interactions within a storybook reading session. In
phase one of DR the adult uses a combination of wh-questions, follow-up questions, modeling, and praise to provoke the child’s use of language (Zevenbergen & Whitehurst, 2003).

Many of the same characteristics of DR are also recommended by the National Research Council to incorporate into interventions for children with autism. Such intervention characteristics include providing naturalistic routine activities, social activities, relatively short learning sessions (i.e. 15-20 minutes), and individualized instruction (NRC: National Research Council, 2001). Naturalistic behavioral interventions occur within routine daily social interactions (Woods & Wetherby, 2003) and are useful in promoting generalization of skills (Cowan & Allen, 2007). DR is a naturalistic intervention because it uses storybook reading as the context for socially interacting to increase language. DR is a social activity because it is based on the adult-child communicative interactions. The adult attempts to engage in a conversation with the child about the book. A typical DR reading session is about 15 minutes and DR was originally designed to be implemented individually with young children (Zevenbergen & Whitehurst, 2003).

Despite the promise of DR for many children, it may be difficult to implement with children with autism because it does require the child to attend to an activity that includes both verbal and visual stimuli. Children with autism tend to have deficits in tasks that require selective attention and shifting attention (Tsatsanis, 2005). When presented with a stimulus-rich environment, children with autism struggle to identify the most important information to process. These difficulties have an impact on their learning. One recommendation to help children with autism focus and shift attention to salient information is to provide static visual supports to cue their attention to the important features of the target stimuli (Tsatsanis, 2005). These attention cues may be a useful addition to DR when used with children with autism.

**Purpose and Goal**

The purpose of this study was to compare the effects of adding attention cues to typical dialogic reading procedures to the effects of dialogic reading alone on the expressive vocabulary use of young children with autism. The research has suggested that using attention cues can accelerate learning by focusing attention to the relevant dimensions of the task stimuli (Mercer & Snell, 1977). Attention theory (Zeaman & House, 1963) suggests that learning occurs in two stages. Stage one consists of focusing attention on the relevant stimuli dimensions. In stage two, learning begins because the learner can attend to the important features of the stimuli. This
theory states that learning problems of individuals with intellectual disabilities are not due to their inability to learn but rather their difficulty to attend to relevant cues. Therefore, if the individual’s ability to attend to relevant cues can be improved then their learning curve can also improve. In theory, by improving the child’s attention to the visual stimuli presented in DR, the child will improve his ability to learn to use new vocabulary.

Specifically, the research questions for this investigation were: what are the differential effects of two DR-based interventions on:

(1) the participants’ correct independent verbal responses to vocabulary queries;
(2) the participants’ correct independent verbal responses to follow-up queries; and,
(3) the participants’ appropriate spontaneous verbalizations.

The first intervention in this study was based on DR phase one as described by Zevenbergen & Whitehurst (2003). The second intervention consisted of implementing phase one of DR but with the addition of attention cues to help the participant focus on relevant dimensions of the task stimuli. The goal of this study was to utilize an alternating treatment without a no-treatment control design to assess how rapidly each intervention changes the expressive vocabulary learning of the participants. Participants in this study were children between the ages of 5 and 7 years who were described as being on the autism spectrum and had limited expressive and receptive vocabulary.

Rationale

As outlined in the Simple View of reading (Hoover & Gough, 1990), meaning-focused and code-focused skills are both needed to become a successful reader. Children with autism usually develop code-focused skills with relative ease. Code-focused skills are those that aid in breaking the “code” of grapheme-phoneme correspondence to sound out words. However, due to their consistent language deficits, children with autism tend to struggle with meaning-focused skills such as vocabulary use and comprehension. Meaning-focused skills, such as vocabulary knowledge, are necessary for understanding the printed text (Whalon, Al Otaiba, & Delano, 2009). Without both sets of skills a child cannot become a proficient reader. These emergent literacy skills typically start developing early in life prior to when children actually start reading print (Whitehurst & Lonigan, 2001). Early intervention for children with autism is recommended to increase meaning-focused skills (Lanter & Watson, 2008).
The research indicates that DR successfully improves expressive language use for typically developing children and children with language impairments. Given that some of the language deficits of children with autism resemble the language deficits of children with specific language impairments (SLI) (Williams, Botting, & Boucher, 2008) DR may be a suitable intervention. There is at least one learning characteristic of children with autism, however, that is very different from children with SLI and may require supplementing typical DR procedures.

Difficulty in focusing on salient information and shifting attention is a characteristic associated with autism and not necessarily a characteristic of SLI. This may become problematic during DR sessions because DR requires the child to attend to multiple auditory and visual stimuli simultaneously. Traditionally, in order to reduce the distracting stimuli during learning tasks educators have recommended providing children with autism visual supports in order to improve learning conditions. This recommendation is supported by Zeaman and House’s (1963) attention theory.

**Strengths of the Study**

This investigation was designed to be applied educational research. Applied research advances knowledge by searching for practical ways to incorporate promising interventions into real-world settings. Applied research can help close the research to practice gap because it is conducted in an authentic educational setting. By doing so, the results of applied research studies can more easily be replicated in the real-world classroom.

Using an alternating treatment design to answer the research questions was appropriate because this design assesses the differential effects of two or more treatments. This design attempts to directly replicate any effects each time a treatment is reinstated. The two treatments in this study differ on a single variable, attention cues. By only changing a single variable, the effects of attention cues are isolated allowing the differential effects of attention cues on learning to be clearly assessed.

**Delimitations of the Study**

The design of this research study was constricted by time, participant availability, and resources. The intervention was implemented within a school setting. The data collection and intervention sessions needed to be consecutive. Long holiday breaks had to be avoided. In order to achieve this, the data collection had to begin after the summer vacation and be completed by winter vacation. Identifying participants that met the specific criteria of this investigation was
difficult. Finally, the resources needed to implement this study were costly in both time and money. Many materials were purchased and created (e.g., storybooks and attention cues). Time was needed to train graduate students to implement the interventions.

Another delimiting parameter of this study was its measurement of very specific language behaviors. This study focused on changes in expressive vocabulary use. Other language behaviors are also important to communication and emergent literacy in children with autism (e.g., pragmatics, language comprehension, and phonological awareness). Given the applied nature of this study and its limited resources only expressive vocabulary was measured.

**Limitations of the Study**

Due to the design of this study, it is not possible to generalize the results to other children with autism, to language behaviors beyond the dependent variables being measured, and to other DR interventions. This limited generalization is a threat to external validity. Single-subject research results require many direct and systematic replications to enhance the external generalization of results. Therefore, the outcome of this study cannot be generalized to a larger group of children with autism. This study measured one specific emergent literacy behavior, expressive vocabulary. Vocabulary represents only a small sample of emergent literacy skills. In addition, only phase one of dialogic reading was implemented. Phase one does not incorporate all the prompts that make up DR in its entirety. Finally, a possible threat to internal validity when using alternating treatment design is always the potential for an interaction effect to occur.

**Summary**

Given that children with autism are at risk for reading failure due to their delayed language skills, an early intervention that targets meaning-focused emergent literacy skills such as vocabulary is warranted. This research investigation was designed to examine the differential effects of dialogic reading enhanced with attention cues compared to dialogic reading alone on the language use of children with autism. It was hypothesized that dialogic reading plus attention cues would be beneficial because children with autism struggle with focusing and shifting attention on the important dimensions of stimuli during a learning task. The attention cues were theorized to provide an attentional spotlight on the important features of the targeted stimuli and improve the individual’s ability to attend to the salient features resulting in an improvement in the individual’s learning curve. By improving the individual’s learning curve in answering vocabulary and follow-up questions, the individual was assumed to provide more independent
verbalizations and ultimately increase expressive vocabulary during dialogic reading sessions. The results indicated this to be true for some of the participants on particular observational measures. Overall, neither intervention was determined to be superior. The conclusion of this investigation was that the participants benefited from dialogic reading with or without attention cues. More research is needed to determine the individual factors that may indicate when attention cues are necessary.
CHAPTER II.
LITERATURE REVIEW

Epidemiology of Autism

Autism is a neurological disorder that significantly affects communication and social interactions. The prevalence of autism has been rising steadily over the last thirty years. In 1970 the prevalence rate was approximately 0.7 in 10,000 births within the United States (Fombonne, 2005), but currently autism occurs in approximately 91 in 10,000 births (i.e. 1 in 110 births) (Center for Disease Control and Prevention, 2010). In addition to more children actually having autism, the rising prevalence rate may be attributable to a broader definition, improved diagnostic tools, and increased public awareness. Autism occurs in males about four times more often than it occurs in females (Fombonne, 2005). It is estimated that 30% of children with autism do not have intellectual disabilities (Fombonne, 2005). No empirical evidence supports that autistic disorder differentiates among race, ethnicity, or social class (Fombonne, 2005). Parents of one child with autism are 3% more likely to have a second child with autism. This disorder is believed to be genetic; however no specific “autism gene” has been identified to date (Rutter, 2005).

Current Definitions

DSM-IV. The most widely used definition by practitioners and researchers in the United States comes from the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV) of the American Psychiatric Association (1994). The current DSM-IV definition of autistic disorder falls under the umbrella category of pervasive developmental disorders (PDD). This term is often referred to as autism spectrum disorders (ASD), however ASD is not considered an official diagnostic term (Volkmar, Paul, Klin, Cohen, 2005). In addition to autistic disorder four more disorders are included under the continuum of PDD: Rett disorder, childhood disintegrative disorder, Asperger disorder, and pervasive developmental disorder not otherwise specified (PDD-NOS) (American Psychiatric Association, 1994).
Autistic disorder, also known as classic autism, is defined as a delay or abnormal functioning in three core domains: social interaction, communication, and idiosyncratic patterns of behavior. Qualitative impairments in social interaction include impaired use of nonverbal behavior such as eye gaze, poor peer relationships, lack of spontaneous emotional affect, and lack of social reciprocity. Qualitative impairments in communication include impaired spoken language, conversation skills, and social play. Idiosyncratic patterns of behavior include abnormal restrictive patterns of interests, abnormal adherence to routines, repetitive motor manners, and a fixation with parts of objects. To receive the diagnosis of autistic disorder, children must show delays or abnormal functioning prior to age three in social interactions, language, and/or symbolic play (American Psychiatric Association, 1994).

ICD-10. The International Classification of Diseases (ICD-10; World Health Organization [WHO], 1992) provides diagnostic criteria of autism that is used worldwide. The ICD-10 criteria of autistic disorder are very similar to the DSM-IV criteria. The major difference is that the ICD-10 offers more flexibility in diagnosis by including sets of criteria for four differential diagnoses in addition to childhood autism. This flexibility allows for easy use across countries and cultures (Volkmar & Klin, 2005).

IDEA. Individuals with Disabilities Education Act (2004) also provides a well established definition used within school settings. IDEA is the federal legislation that ensures students with disabilities receive special education and related services. The IDEA definition of autism is “a developmental disability that significantly affects a student’s verbal and nonverbal communication, social interaction, and educational performance” (Turnbull, Turnbull, & Wehmeyer, 2007, p. 260). If an emotional disturbance is primarily affecting the student’s educational performance, the student cannot be classified as having autism. The IDEA definition describes characteristics often related to autism such as repetitive behaviors, resistance to change, and unusual sensory reactions.

Summary. The most widely used definitions of autism are the three discussed within this paper, DSM-IV, ICD-10, and IDEA 2004. Each definition highlights delays in social interactions, communication impairments, and repetitive behaviors. Impairments must be evident before age 3 and not caused by other disorders such as Rett syndrome or emotional disturbances. It is also important to note that the characteristics of autism may manifest themselves in multiple
combinations and in multiple severities making this a heterogeneous disorder (NRC; National Research Council, 2001).

**Attention Characteristics of Children with Autism**

In general, individuals with autism have impaired selective attention. This creates difficulty discriminating the salient dimensions of stimuli from the irrelevant dimensions (Tsatsanis, 2005). Selective attention impairments affect the ability to focus on the most meaningful features of an educational cue or task. Shifting attention within and between response modalities is another attention challenge (Tsatsanis, 2005) for individuals with autism. This makes it difficult to adjust their attention by disengaging from one mode of stimuli (e.g. auditory) and re-engaging in another mode (e.g. visual) (Courchesne, Townsend, Akshoomoff, Yeung – Courchesne, Lincoln, James, Saitoh, Haas, Schreibman, & Lau, 1994). Consequently, deficits in selective attention and shifting attention affect joint attention. Impaired joint attention is a core deficit of autism (Wetherby, Woods, Allen, Cleary, Dickinson, & Lord, 2004). Joint attention involves following another person’s gaze to a surrounding object or event (Tsatsanis, 2005). This is a key social-communication skill that impacts language development.

**Attention Theory**

These deficits in selective attention, shifting attention, and joint attention, directly affect the learning of children with autism because new information to be learned comes in the form of external stimuli that must be attended to before it can be processed or learned. Zeaman and House’s (1963) attention theory provides a framework to further understand the role of attention in learning. Attention theory was tested with children with intellectual disabilities (ID). However, this theory can provide insight to the learning of children with autism due to the known attention deficits present with this disorder.

According to Zeaman and House (1963) discrimination learning has two stages, the attention stage and the improvement stage. In the attention stage the learner is attending to the stimulus, selecting relevant information, shifting attention to other relevant information, and maintaining this behavior over a period of time. During this stage correct responses occur at chance level until the learner identifies the salient information needed to discriminate the meaningful characteristics of the stimulus from the irrelevant dimensions. Once the learner can spot the meaningful characteristics of the stimulus he enters stage two, the improvement stage. Here improvement in correct responses consistently rises (Mercer & Snell, 1977).
As described by Mercer and Snell (1977) Zeaman and House first tested this theory in 1963. Children with and without ID were presented two trays, each consisting of a stimulus. In one tray a reinforcer (i.e., candy) was placed under the stimulus. The child was asked to select one. If the child selected the stimulus with the reinforcer he was given the reinforcer. The two trays were presented to the child using the Wisconsin General Test Apparatus (WGTA). The WGTA is a desk with a one-way mirror that separates the child from the adult. The mirror allowed the adult to see the child but the child could not see the adult to ensure the adult did not influence the child’s response. The adult filled the trays with stimuli behind the mirror and then slid the trays under the mirror to present the stimuli to the child. The number of correct responses was recorded over the course of 110 trials. Each child had to discriminate among the many stimuli dimensions (e.g., size, shape, color, etc.) to learn which dimensions provided information to determine the correct choice (i.e., relevant dimensions). The results revealed that individuals with intellectual disabilities (ID) spent more time in stage one (attention stage) compared to individuals with higher mental ages. However, once individuals with ID entered stage two (improvement stage), their number of correct responses improved and their rate of learning was actually similar to individuals with higher mental ages. The conclusion was that individuals with ID go through the same learning stages as individuals without ID. Therefore, Zeaman and House (1963) suggested that learning deficiency in children with ID rests primarily in their ability to attend in stage one of learning (Mercer & Snell, 1977).

A number of studies conducted in the 1970’s support Zeaman and House’s attention theory (Mercer & Snell). Two are described in this paper, one by Ulman and Routh (1971) and one by Klein, Klein, Oskamp, and Patnode (1972). The purpose of Ulman and Routh’s study was to determine the effect of increasing the number of relevant dimensions of stimuli on learning. A relevant dimension is a significant characteristic of the stimulus used to derive an understanding or meaning of that stimulus. Forty-eight children with ID (low IQ level) and 48 children without ID (normal IQ level) participated. Children from both IQ levels were randomly assigned to one of four groups. In group one; the stimuli presented to the learner consisted of only one relevant dimension. The stimuli in group two consisted of two relevant dimensions, group three had four relevant dimensions, and group four had eight relevant dimensions. The dependent variable was the number of errors produced prior to reaching the criterion on a two-choice discrimination task. Ulman and Routh found that by increasing the number of relevant
dimensions both children with and without ID improved in making correct choices and children without ID performed better than children with ID. This study supports the attention theory because over time all the children mastered the task, however the children with ID “required more time to begin to discriminate correctly than children without ID” (Mercer & Snell, p. 106, 1977). The finding that increasing the number of relevant dimensions improved learning also reinforced Zeaman and House’s theory because increasing the number of relevant dimensions makes it easier to discriminate.

Another study that supports the attention theory was conducted by Klein, Klein, Oskamp, and Patnode (1972). Based on Zeaman and House’s theory, they hypothesized that children with ID would be distracted by irrelevant stimuli more than children without ID. Twenty children participated, 10 with ID and 10 without ID. During each trial a child was shown four figures and was to select the different figure. On some trials one figure was in red ink and served as the distracter, it was not the different figure targeted for as the correct response. (see the Figure 2.1 below for an example).

![Figure 2.1. Trial with Distracter Stimulus](image)

The results of this study indicated that children with ID made more mistakes overall and more mistakes when the color distracter was present compared to children without ID (Mercer & Snell, 1977). This finding suggests that irrelevant stimuli can distract attention and increase the time in stage one of learning.

**Teaching Implications for Children with Autism**

Teaching procedures must be tailored to meet the specific attention needs of children with autism. Previous research on attention theory resulted in best practices to improve the attention of children that would make learning more efficient by decreasing the amount of time the child spends in the attention stage of learning. Among these suggestions include reducing irrelevant stimuli dimensions of a learning task, increasing meaningful stimuli dimensions, and making meaningful stimuli dimensions distinct (Mercer & Snell, 1977). These suggestions imply
the need for cues to improve attention or attention cues. Using isolated pictorial cues as attention cues for children with autism includes all of these suggestions and is a common form of assistive technology used across classrooms today. Pictorial cues can be found in the picture exchange communication system (Ganz & Simpson, 2004), the TEEACH program (Mesibov et al., 2004), and in many programs based on applied behavior analysis (e.g. using choice boards and picture schedules) specifically designed for children with autism to support language development and academics.

Language Development of Children with Autism

Definition of Language

Language is defined as “a system of conventional spoken or written symbols by means of which human beings, as members of a social group, and participants in its human culture, communicate” (Encyclopedia Britannica, 2008). The five major components of language are phonology, morphology, syntax, semantics, and pragmatics (Turnbull, et al., 2007). Phonology provides rules for using the correct pronunciation and placement of sounds to create words (e.g. the /th/ sound is pronounced differently in the words “thing” and “this”). Morphology involves applying rules that change the meaning of words such as adding past tense to a word. Syntax governs the relationship of words within a sentence (i.e. sentence structure). Semantics consists of rules that govern the meaning of language. Expressive vocabulary and receptive vocabulary are two components of semantics. Finally, pragmatics bridges the gap between sentence meaning and speaker meaning by relying on the context of the environment such as social cues to make inferences (Turnbull et al., 2007). Delayed language development is often the primary concern of parents that propel them to have their child evaluated for autistic disorder (Smith, Mirenda, & Zaidman-Zait, 2007; Tager-Flusberg, Paul, & Lord, 2005; Woods & Wetherby, 2003). “Delay in, or total lack of, the development of spoken language” (American Psychiatric Association, 1994) is one feature of a communication impairment children often exhibit in order to receive a diagnosis of autism as defined by the DSM-IV.

Language Subgroups in Children with Autism

Children with autism vary greatly in their language abilities (NRC, 2001; Smith et al., 2007; Tager-Flusberg et al., 2005) researchers have created three subgroups: (1) normal linguistic ability (25%), (2) impaired linguistic ability (60%), and (3) nonspeakers (15%) (Tager-Flusberg et al., 2005). Approximately 85% of children with autism who receive early
intervention learn to communicate verbally (i.e. normal ability plus impaired ability). Some children with autism develop language skills within the normal range; however the majority of children with autism do have delays and deficits in language (Kjelgaard & Tager-Flusberg, 2001).

In some ways children with autism who have impaired linguistic ability resemble children with specific language impairment (SLI) (Williams, Botting, & Boucher, 2008). Both disorders include delayed expressive and receptive language. To be diagnosed with SLI an individual must have a normal nonverbal intelligence quotient (IQ) and impaired spoken language of at least 1.25 standard deviation below the mean measured by standardized expressive and receptive language assessments (Williams, Botting, & Boucher, 2008). Like autism, SLI can also be divided into subgroups based on language characteristics. Difficulty with language production and comprehension is the most common problem in SLI. Research comparing SLI and autism has been conducted intermittently since the late 1960’s. In a review of the research, Williams, Botting, and Boucher (2008) conclude that there are obvious similarities in language behavior of individuals with autism and SLI. The two disorders are most similar when observed during the early years of life. Their similar language behaviors are “marked difficulties with receptive and expressive phonology, grammar, and semantics” (Williams, et al., p. 959, 2008). The notable language differences in autism compared to children with SLI are prolonged impairment in pragmatics (e.g. conversational skills and narrative skills) and language spontaneity (Tager-Flusberg et al., 2005). Understanding the similarities and differences of these two disorders may be useful in determining effective interventions for children with autism.

**Characteristics of Language in Children with Autism**

**Preverbal language.** Many children with autism start to show delays in preverbal language behaviors at a very early age. Early impairments in pragmatics include poor joint attention, poor use of eye gaze, and limited gestures. Other early delays consist of poor responsiveness to their name, poor responsiveness to their mother’s voice, and poor imitation skills (Tager-Flusberg et al., 2005). An impaired use of symbols also begins to appear at a young age. This is evident when children have difficulty using conventional gestures, conventional meanings for words, and using objects functionally. A deficit in symbolic play is another example of impaired symbolic use. Generally, children with autism have trouble with pretend-play (NRC, 2001).
Speech. The speech characteristics of children with autism are noticeably different than typically developing children. Voice quality tends to be hoarse, harsh, and hypernasal. They may have unusual intonation. Volume tends to fluctuate at random points within an utterance. Sometimes children with autism whisper at inappropriate times. Other times they may have a flat monotone or singsong prosody (Tager-Flusberg et al., 2005). Children with more severe speech and language impairments may have difficulty with producing different sounds of words. Some children with autism may have difficulty with processing auditory sounds (Grandin, 2005); therefore making phonological awareness a challenge. Another speech characteristic, echolalia, is hypothesized to be a processing technique that allows the child to clarify the different sounds within words and phrases (Tager-Flusberg et al., 2005).

Echolalia is a characteristic common in children with autism. Usually echolalia becomes noticeable early in life and then slowly decreases with age (Tager-Flusberg et al., 2005). Echolalia is the imitation of words or phrases said by others. It can be immediate or delayed (NRC, 2001; Tager-Flusberg et al., 2005). This form of speech can serve a communicative purpose, be nonfunctional, or self-stimulatory. Possible functions of echolalia include turn-taking, making statements, confirming answers, and a technique to process sounds and words (Tager-Flusberg et al., 2005).

Language Complexity. Language complexity encompasses morphology, syntax, and expressive language. It is often measured by mean length of utterance and complexity of syntactic structures. Some children with autism have difficulties with morphology that are similar to children with specific language impairment (SLI) such as difficulty using past tense and pronouns (Tager-Flusberg et al., 2005). Syntactical skills are developmentally delayed and tend to reach a plateau for most individuals with autism (Tager-Flusberg, 2004). Unusual word use is common in this population. For example, the language patterns of individuals with high functioning autism (HFA) are described as pedantic, overly precise, and concrete. Children with autism sometimes have difficulty using mental state terms (e.g., think, know, remember) and social-emotional terms (Tager-Flusberg et al., 2005). When compared to the development of children without autism, their rate of expressive vocabulary development is usually delayed (Charman, Drew, Baird, & Baird, 2003; Kjelgaard & Tager-Flusberg, 2001; Smith, et al., 2007). In a study conducted by Lord, Pickles, DiLavore, & Shulman (as cited in Tager-Flusberg et al., 2005) it was found that children with autism at age 2 had expressive language skills comparable
to a 9 month old child without autism. In addition, their expressive language continued to be delayed as they aged.

**Language Comprehension.** Individuals with autism usually have impaired language comprehension. They struggle with understanding long sentences and making inferences. This may be exacerbated by their difficulty with connecting information to real world knowledge, social communication, and using nonverbal cues. Individuals with autism struggle with determining the speaker’s intention which would also weaken oral language comprehension (Tager-Flusberg et al., 2005). Children with autism display developmental delays in word and phrase comprehension when compared to typically developing children. It is important to note that although, as a group, children with autism display delayed vocabulary comprehension much variation exists within the group ranging from typical to very poor vocabulary comprehension (Charman et al., 2003).

**Language Spontaneity.** Language spontaneity is typically lacking in all the language subgroups of children with autism. Spontaneous language use includes commenting, showing, acknowledging, initiating communication, and requesting. These language behaviors occur less frequently in children with autism when compared to typically developing peers. Rates of initiations to communicate remain low even as children age (Tager-Flusberg et al., 2005).

**Pragmatics.** Of the five language components, pragmatics is a marker of autism and universally impaired across the three language subgroups: normal linguistic ability, impaired linguistic ability, and non-speakers. Impaired social use of language is a common pragmatic deficit that children with autism exhibit. These pragmatic difficulties lead to poor conversational skills such as identifying the topic, shifting topics, responding with relevant statements, using gestures, using eye gaze, and turn taking (Tager-Flusberg et al., 2005). These children have trouble gauging the amount of detail to give the listener. Failing to make inferences due to their over literal use and interpretation of language is also common. Poor conversational skills adversely affect the ability to participate in shared dialogue with a partner (Snowling & Hulme, 2007).

Another pragmatic deficit found among children with autism is impaired narrative skills. When compared to matched controls on receptive and expressive language and verbal IQ, children with autism could retell stories with similar length, structure, and complexity as typically developing children. The difference was in how the story was retold. The stories told by
individuals with HFA sounded like a list of unconnected happenings rather than a coherent story with a sequence of events (Diehl, Bennetto, & Young, 2006). This failure to detect the text cohesion suggests that they were not using context clues to make inferences (Snowling & Hulme, 2007) about the story which ultimately affects comprehension.

**Summary.** The language abilities of children with autism vary greatly. This heterogeneity makes it challenging to describe the language development and language use of all children with autism as a group. Children with autism who use speech before age 5 tend to have better language abilities and overall long term outcomes (Howlin, Goode, Hutton, & Rutter, 2004). The use of gestures, joint attention, and verbal imitation are strong predictors of vocabulary development (Smith, et al., 2007). Children with poor receptive language have more severe language impairments and behavioral problems throughout adulthood (Tager-Flusberg et al., 2005). Furthermore, language skills are associated with reading ability. In general, children who continue to have language impairments past the age of 5-years and 5-months (5.5) have more difficulty with reading comprehension later in life (Snowling & Hulme, 2007).

**Continuum of Language Interventions**

**Traditional Behavioral Approach.** Language interventions for individuals with autism fall on a continuum from (a) traditional behavioral to (b) contemporary behavioral to developmental (Woods & Wetherby, 2003). Characteristics of traditional behavioral (TB) interventions include; one-on-one teaching, highly structured setting, previously set goals, teacher directed sessions, decontextualized reinforcers, and teaching conducted in mass trials (Allen & Cowen, 2008). Discrete trial training (DTT) is the classic example of a traditional behavioral approach (Smith, 2001). DTT was made a popular teaching intervention for children with autism by Lovaas and colleagues during the 1970’s and 1980’s (Tarbox & Nojdowski, 2008). A discrete trial is a short teaching session, about 10 seconds, implemented in a one-on-one session. The five parts of a discrete trial are: (1) stimulus, (2) prompt, (3) child response, (4) reinforcement, and (5) inter-trial interval (i.e. a break). DTT is used to teach a variety of skills across domains such as communication, academic, self help, motor, and adaptive behavior (Smith, 2001).

Lovaas (1987) examined the longitudinal effects of a traditional behavioral treatment approach (using DTT components) on intellectual functioning and educational placement. Thirty-eight participants with autism from the Young Autism Project were assigned to the
treatment group (n = 19) or the first control group (n = 19) based on staff availability. A second control group (n = 21) was also included in the study. These participants were not from the Young Autism Project but were diagnosed from the same agency that had diagnosed the majority of children in the first control group and the treatment group. One purpose of the second control group was to ensure that the referral process of participants to the Young Autism Project was not biased. The two control groups received either (1) a less intensive one-on-one intervention for 10 hours per week and no physical punishment or (2) no treatment from the Young Autism Project but did receive an intervention similar to control group 1. Very little information was provided on the intervention implemented with control group 2. The type of reinforcement given was not explained in detail.

An analysis of pretreatment measures found the two groups to be comparable at the start of the study. The only significant difference was found in chronological age, the control group was approximately 6-months older than the treatment group.

Pretreatment measures included mental age (MA), prorated mental age (PMA), behavioral observations, and a parent interview. Mental age was assessed using a variety of tools such as the Bayley Scales of Infant Development (Bayley, 1969), Cattell Infant Intelligence Scale (Cattell, 1960), Stanford-Binet Intelligence Scale (Thorndike, 1972), the Gesell Infant Development Scale (Gesell, 1949), and the Vineland Social Maturity Scale (Doll, 1953). The PMA was calculated for each participant at 30 months of age by dividing mental age by chronological age (CA) and multiplying by 30. The PMA was used to compensate for the discrepancies in mental age that was caused by the differences in CA when tested. During the behavioral observations the participants were observed playing with toys. Frequency of self-stimulatory behaviors, appropriate play behaviors, and use of recognizable words were recorded. The parent interview collected diagnostic and descriptive information on each participant. The answers parents provided were assigned points. The total number of points revealed a sum pathology score.

At the start of the study the children were under 2-years-old. The treatment group received a traditional behavior treatment that consisted of the standard discrete trial training (DTT) components plus punishment. As a last resort, the intervention in the Lovaas (1987) study employed punishment (i.e. shouting & a slap on the thigh) as a consequence for the children’s undesirable behavior. This would not be considered best practice. The children in the treatment
group received 40 or more hours of the intervention per week over the course of three years. Trained student therapists and parents delivered the intervention in one-on-one sessions. The target skills were selected based on each child’s individualized needs. Skills were taught in a variety of settings such as the home, school, and community. Various target skills included teaching behaviors such as imitation, appropriate toy play, expressive language use, and preacademic tasks.

Post-treatment measures included measures of IQ and educational placement. IQ was measured using assessments that were most appropriate for each child’s developmental level. Post-treatment comparisons revealed the two control groups did not significantly differ. By the end of first grade, participants in the treatment group scored significantly higher than the control groups on measures of IQ such as the Wechsler Intelligence Scale for Children – Revised (WISC-R; Wechsler, 1974). Neither control group significantly improved in IQ scores. Educational placements of participants were determined by school personnel, who were not associated with this investigation. The children were placed in one of three classes: general education, special classes for the language delayed, and special classes for children with mental retardation. Compared to both control groups, more children from the treatment group were placed in a general education first grade classroom (Lovaas, 1987). Effect sizes were not reported.

**Naturalistic Approach.** On the other end of the language intervention continuum lie contemporary behavioral and developmental approaches, also known as naturalistic approaches (Allen & Cowan, 2008). The principles of naturalistic approaches state that learning should be authentic, functional, meaningful, and occur within social interactions. Naturalistic approaches use incidental teaching that embeds learning into daily routines such as story time, meal time, and play time. Strategies embedding intervention into routines provide naturally occurring reinforcement, arrange the environment to prompt social interaction, provide a time delay to give the child time to respond to the situation, and imitate the child’s actions (Woods & Wetherby, 2003). The characteristics of naturalistic approaches include: natural settings, functional goals, child directed activities, natural and social reinforcers, and teaching conducted in interspersed trials (Allen & Cowan, 2008). A well known naturalistic method is enhanced milieu teaching (EMT).
Milieu teaching incorporates a variety of naturalistic approaches, for example, incidental teaching and time delay. Enhanced milieu teaching or EMT adds responsive interaction techniques such as expanding on the child’s utterance, building turn taking, and following the child’s lead to teach communication skills. Hancock and Kaiser (2002) studied the effects of clinician-implemented EMT on social communication skills of children with autism and how well they generalize to parent-child interactions. Four children between the ages of 2.5- to 5-years-old diagnosed with autism or pervasive developmental disorder participated in the study. A single subject, multiple baseline across participants design was employed.

The dependent measures of social communication behaviors consisted of total utterances, spontaneous utterances, mean length of utterance, and diversity of utterances. During baseline, the clinician and child played together for 15 minutes while being videotaped in the clinic playroom. Training sessions were videotaped and 10 minutes of each session was coded for social communication behaviors. During the intervention, the children received 15 minutes of EMT two times per week. Individual language targets were selected to improve during the EMT sessions. One example of a language target was an agent-action semantic relationship (e.g. daddy throw). The session took place while playing with toys in the clinic playroom. Parents did not receive any EMT training and did not watch the EMT sessions. Observations were conducted within the child’s home to check for generalization of social communication across settings and to parent-child interactions. During generalization sessions parents played with their children. Overall, the results revealed positive changes in social communication behaviors. All four children increased their use of target skills, increased frequency of utterances, and increased word diversity. Also, generalization occurred within parent-child interactions. Three of the four children generalized their skills to parent interactions.

Comparing Traditional and Naturalistic Approaches. Currently it is unclear which intervention approach is best for which children with autism. However, naturalistic teaching methods have been found to be more effective in generalizing learned skills across settings when compared to traditional behavioral (TB) methods (NRC, 2001). Koegel, et al. (1998) directly compared TB methods to naturalistic methods in an ABA reversal single subject design. Five children with autism, ranging from 3- to 7-years old, participated. Each child had a 12 month language delay and poor speech production.
Language skills were measured prior to the intervention with multiple assessments including the Peabody Picture Vocabulary Test-Revised (PPVT-R; Dunn & Dunn, 1981), the Expressive One Word Picture Vocabulary Test-Revised (EOWPVT-R; Gardner, 1990), and the Clinical Evaluation of Language Fundamentals-Revised (CELF; Semel, Wiig, & Secord, 1980). For the dependent measures, three speech sounds that each child produced incorrectly were selected as the target sounds to improve. For example, some target sounds included /v/, /s/, and /l/. Language samples were collected during baseline by calculating the percent of correct production of the target sounds during a conversation with an adult. Data was collected in three settings: clinic, home, and school.

Each of the three sounds was taught using one of the treatments in an alternating order for each child reversing back to baseline after each phase. For two of the participants the phases were implemented in the following order: baseline, naturalistic, baseline, traditional behavioral (TB), baseline, and naturalistic. The phases for the other three participants were implemented in the opposite order: baseline, TB, baseline, naturalistic, baseline, and TB. During the TB treatment, stimuli (e.g. pictures representing words that contained the target sounds) were selected by the clinician; sounds were taught in isolation of words using a drill and practice method until mastered. Then sounds were taught within words and then within sentences. The teaching procedure consisted of a model, lead, test, direct instruction approach very similar to DTT. Correct responses were shaped by reinforcing successive approximations. Reinforcers consisted of using verbal praise paired with desired objects or edibles.

The naturalistic method allowed the child to choose the stimuli (toys). This was done by pre-selecting a set of 20 stimuli that contained the target sounds and then allowing the child to select the stimulus he or she preferred. Sounds were taught at the word and sentence level immediately. The teaching procedure consisted of the clinician modeling the correct sounds within words and sentences during play interactions. Attempts and correct responses were reinforced using social and natural reinforcers by allowing the child to play with the preferred item (Koegel et al., 1998).

The dependent measure for both treatments, percent of correct sound production, was measured by taking periodic language samples within different settings (i.e. home, school, and clinic) using video recording. In addition, a pre- and post-rating Likert scale was completed by listeners, unfamiliar to the study, to determine the improvements of overall speech intelligibility.
The highest levels of percent correct occurred during the naturalistic intervention (nearly 100% for all children). The TB condition had much lower percent correct, ranging from 0% to about 60%. This was replicated across all five participants. Also, the results indicated that the naturalistic method produced higher percents of correct production of target sounds in a variety of settings. Koegel et al. (1998) concluded that naturalistic methods: (1) may increase the generalization of speech across settings, (2) may increase motivation, therefore decreasing disruptive behaviors and increasing learning opportunities, and (3) naturalistic methods may increase natural imitative behavior that facilitates speech development.

**Summary.** Both traditional behavioral and naturalistic teaching methods have their strengths. Research has indicated TB methods provide rigorous stimulus control, which is useful when teaching new or complex skills (Cowan & Allen, 2007, Smith, 2001). Research has also suggested naturalistic methods promote generalization, but loosen the control over stimuli (Cowan & Allen, 2007). Families, teachers, and clinicians, should consider the type of skill being targeted and the child’s individualized needs when selecting an intervention approach.

**NRC Recommendations.** The National Research Council or NRC (2001) recommended certain features that interventions for children with autism should include. Interventions for children with autism should start early, preferably before age 3, and be implemented for 25 hours a week, 12 months a year. Family involvement was identified as the key factor. Goals should be individualized and progress monitoring should be documented every three months. The National Research Council (2001) recommended that, if necessary, adjustments should be made to meet the child’s needs. A low student/teacher ratio was suggested as a best practice. Settings should allow interactions with typical peers. Teaching opportunities should be planned and repeated, preferably broken down into 15 - 20 minute intervals. Finally, the priority goals of early education should be on improving functional and spontaneous communication for young children with autism (NRC, 2001).

Communication and language skills are extremely important in all aspects of life. Without language an individual has very limited means to communicate, and this limitation could cause confusion, frustration, and isolation. Children with autism experience these problems due to their language impairment and often this results in inappropriate behavior (NRC, 2001). Language is a key part of social interactions. Consequently, people use language to connect emotionally and form relationships. Language is also a mediator in academic success. It is the
most common tool teachers use to relay information to their students and it is interrelated with literacy. Finally, children with impaired oral language are at risk for reading failure (Nation, 2007).

**Emergent Literacy and Children with Autism**

**Simple View of Reading Model**

The Simple View emphasizes the integral relationship between language and reading (Hoover & Gough, 1990). In the Simple View, reading is comprised of two distinct complex parts: language comprehension and decoding skills. These two parts work together in a multiplicative relationship to create the product of skilled reading. Neither language comprehension nor decoding alone is sufficient for skilled reading. Therefore, if an individual lacks one of these skills he cannot read proficiently (Gough, Hoover, & Peterson, 1996). Language comprehension skills are meaning-focused and decoding skills (e.g. phonological awareness, phonics, and fluency) are code-focused, each equally important in reading (Whalon, Al Otaiba, & Delano, 2009).

**Lexical Restructuring Theory**

The lexical restructuring theory (Metsala & Walley, 1998) further illustrates the interconnection between early language and early literacy skills. The lexical restructuring theory is based on the hypothesis that young children store whole words in their mental lexicon and as children mature they start to restructure words into segments and start storing word parts instead of whole words (Lonigan, 2006). This restructuring process makes it more efficient for children to store more words as their vocabulary increases. As a child’s vocabulary increases, the child gains more experience segmenting words. Therefore, an increase in vocabulary (i.e. oral language) facilitates phonological awareness. Phonological awareness is defined as “the ability to detect and manipulate the sound structure of oral language” (Lonigan, 2006, p. 78) and is a key skill that predicts normal reading development (Schatschneider, Fletcher, Francis, Carlson, & Foorman, 2004).

**Overview of Emergent Literacy Definitions**

Over four decades ago, Marie Clay was the first to use the term *emergent literacy* to describe how young children interact with books, reading, and writing before they receive formal instruction. Since then, a commonly cited definition of emergent literacy is the process by which children learn interrelated language, reading, and writing skills that develop into conventional
literacy (Teale & Sulzby, 1986). Teale and Sulzby (1986) indicated that emergent literacy develops between the period from birth to age six. A more recent definition of emergent literacy is “the skills, knowledge, and attitudes that are developmental precursors to reading and writing, as well as the environments that support these developments” (Storch & Whitehurst, 2002, p. 934). The main emergent literacy components are oral language, phonological awareness, print awareness, and emergent writing (Lonigan, Burgess, & Anthony, 2000).

**Emergent Literacy Model**

An in depth, more current, model of emergent literacy is offered by Whitehurst and Lonigan (1998, 2001). This model contains two domains: (1) outside-in components and (2) inside-out components. Outside-in components use knowledge that does not come directly from the written word to support comprehension. Instead, this knowledge is derived from an understanding of language, context, and semantics that are found outside the printed text (Whitehurst & Lonigan, 2001). Outside-in skills are essentially meaning-focused skills. Examples of outside-in skills include expressive vocabulary, receptive vocabulary, and story recall.

Inside-out components use information derived directly from the printed word such as sound units (phonemes) and print units (graphemes) to decode print into sound (Whitehurst & Lonigan, 2001). In essence, inside-out skills are code-focused skills. Examples of inside-out skills are blending letter sounds, naming letters, identifying letter sounds, rhyming, segmenting words, and writing one’s own name. The components are called outside-in and inside-out skills and not simply outside and inside skills because this emphasizes that both components work together to result in skilled reading. This model of emergent literacy works well with the simple view reading model. Both stress the importance of meaning-focused and code-focused skills working together to create skilled reading.

**Research on Emergent Literacy and Children with Autism**

Emergent literacy is a strong predictor and foundation of later reading skills (Bus, van Ijzendoorn, Pellegrini, 1995; Justice & Kaderavek, 2002; National Emergent Literacy Panel, 2008). Therefore, it is understandable that a strong emphasis has been placed on providing children with emergent literacy experiences through embedded and direct instruction. The heterogeneous nature of autism spectrum disorder (ASD) makes it difficult to describe how emergent literacy develops in all children within this population. However, what is known is that
children with oral language impairments are at risk for delays in emergent literacy skills (Snow, Burns, & Griffin, 1998). This puts children with autism who have impaired linguistic ability at risk for delays. Despite the importance of emergent literacy skills, little research has been conducted describing or improving these skills for children with communication impairments (Ezell, Justice, & Parsons, 2000) such as autism (Koppenhaver & Erickson, 2003). Adult-child book reading is one highly recommended intervention for increasing emergent literacy skills with typical children who exhibit specific language delays (Allor & McCathren, 2003) and more recently, children with autism (Lanter & Watson, 2008).

Adult-Child Book Reading

Adult-Child Book Reading Description

Adult-child book reading has also been referred to as shared storybook reading and joint book reading. In its most basic form it is defined as an adult reading a book to a child with varying levels of interaction. The purpose of adult-child reading is to increase language and literacy skills and to develop an appreciation for books. Shared reading can be implemented one-on-one or with a group of children (United States Department of Education, 2006). Shared storybook reading provides a routine and structured, yet naturalistic, context to practice language and emergent literacy skills. In addition, during shared reading the book becomes a static referent which promotes joint attention (Hockenberger, Goldstein, & Haas, 1999). These characteristics suggest adult-child book reading would be an attractive teaching arrangement for all children and especially those children with autism.

Social-Constructivist Theory

Vygotsky’s (1978) social constructivist theory of learning provides a framework to understand how adult-child book reading fosters language acquisition (van Kleeck, Stahl, & Bauer, 2003) and other emergent literacy skills. Vygotsky’s learning theory is based on the notion that learning is innately social and meaning is primarily constructed using language as a tool. Vygotsky (1978) stated that learning occurs in the zone of proximal development (ZPD). This zone is where the more capable person (the teacher or parent) scaffolds or supports the learner to reach his or her level of potential. The ZPD is just beyond what the learner can do independently (Vygotsky, 1978). Scaffolding is defined as the teacher providing temporary structural supports to promote learning and constantly adjusting to meet the needs of the learner (Liboiron & Soto, 2006). Adult-child book reading is a shared or social activity that transfers the
meaning of the story from adult to child by using language as the tool. Knowledge of oral language, print awareness, and phonological awareness is scaffolded by the adult through techniques such as modeling and questioning.

**Effectiveness for Children with Autism and other Developmental Disabilities**

Some research has emerged that uses shared storybook reading contexts for children with autism spectrum disorders (ASD) (Bellon, Ogletree, & Harn, 2000; Colasent & Griffith, 1998; Davie & Kemp, 2002; Koppenhaver, Erickson, & Skotko, 2001) and other developmental disabilities (Bellon-Harn & Harn, 2008; Davie & Kemp, 2002; Hockenberger, et al., 1999). For example, in an ABA single subject design conducted by Bellon, Ogletree, and Harn (2000), one 3-year-old boy with high functioning autism received a shared storybook reading intervention implemented by a clinician over a seven week period. The intervention package consisted of using repeated readings, adult scaffolding techniques and manipulatives during shared storybook readings plus follow-up activities. Pages of the storybook were repeated throughout the sessions. Scaffolding strategies consisted of cloze procedures, binary choices, wh-questions, and expansions. A cloze procedure was defined as the adult prompting the child with a pause to fill in the last word of a stated sentence. A binary choice was defined as the adult offering the child two alternate utterances to use through modeling. A wh-question was defined as the adult asking a question that elicits specific information regarding who, what, where, when, and why answers. Expansion was defined as the adult elaborating on the child’s utterance. Manipulatives were used during the storybook reading and during follow-up activities as concrete examples of story concepts. For example, during the story *The Monster Party* (Cowley, 1990a), party hats and monster puppets were provided. Follow-up activities consisted of doing an activity that was related to the story. For example, for the story *Mrs. Wishy Washy* (Cowley, 1990b), the students washed a variety of items.

The dependent variables measured by Bellon et al. (2000) were percentage of spontaneous speech and echolalic speech. Spontaneous speech was defined as “any child verbalization following adult scaffolding that was not echoic in nature”. Echolalia was defined as “imitation of speech”. Baseline and intervention sessions were audio-recorded and transcribed. During baseline wh-questions were asked throughout the storybook reading without other scaffolding strategies over four 45-minute sessions. The intervention phase consisted of eight 45-minute sessions. Five books were used during the intervention. During the final baseline phase
two 45-minutes sessions occurred. It is unclear how many books were used during the baseline phases and if they were different from the books used during the intervention phase. The results revealed an overall increase in spontaneous speech and a decrease in echolalic speech. Bellon et al. (2000) determined that repeated storybook reading plus scaffolding was a useful technique to promote spontaneous speech in children with autism.

A major limitation of this study is that a functional relation between independent variables and the dependent variable was not clearly established. In order to establish a functional relation in an ABA design patterns of behavior within the final baseline phase should be similar to behavior patterns in the initial baseline phase (Kennedy, 2005). This study consisted of three phases, initial baseline, intervention, and final baseline. During the final baseline phase, data were only collected over two sessions. This was not a sufficient amount of data to establish a clear pattern of behavior. The final baseline data may not have had time to return to patterns consistent with the initial baseline data. Also, it is unclear how the learned effects of the intervention were reversed during the final baseline. Typically it is difficult to use reversal designs with newly learned behaviors (Kennedy, 2005). A multiple-baseline design across participants may be advantageous in the future to further investigate the effects of this packaged shared storybook reading intervention.

Another study which examined the effectiveness of shared-reading was conducted by Koppenhaver, Erickson, and Skotko (2001). This study used mother-child storybook reading as the context to increase communication modes and acts of four girls with Rett syndrome. Like autism, Rett syndrome is found on the continuum of pervasive developmental disorders as defined by the DSM-IV (American Psychiatric Association, 1994). The children ranged from 3.6- to 7- years-old. All of the children had severe communication impairments and intellectual disabilities as measured by the Bayley Scales of Infant Development (BSID-II; Bayley, 1993) and the Vineland Adaptive Behavior Scales (Sparrow, Balla, & Cicchetti, 1984). The experimental design employed was a multiple baseline design across behaviors.

During baseline (phase I), the mother-child dyads were videotaped reading two unfamiliar storybooks. The intervention consisted of three phases (phase II-IV). In phase II, the children wore custom-made hand splints during storybook readings. Hand splints support the child’s hand in order to move it more effectively to operate assistive devices. Assistive devices were introduced in phase III. These devices consisted of Picture Communication Symbols,
Bigmack (voice output device), Four In-Line Cheap Talk (voice output device), and stands for mounting the devices. Mothers were not instructed on how to use these devices until phase IV. During phase IV mothers were trained on how to use the assistive devices in sessions lasting less than 2 hours. Mothers were taught to: (a) attribute meaning to their child’s communicative attempts, (b) use natural questioning (instead of commands) to prompt their child to use the assistive devices, (c) provide a wait time after each question before offering assistance, and (d) maximize the use of the assistive devices by using high frequency vocabulary words in voice output devices. As in baseline, all sessions were video recorded. Frequencies of communication modes and acts per minute were recorded. Communication modes included pointing, facial expressions, and using voice-out put devices independently. Communication acts were labeling and commenting independently.

After the assistive devices were introduced in phase III, all four girls demonstrated higher frequencies in using voice-output devices, labels, and comments compared to phases I and II. Pointing was highest during baseline and actually decreased during phase IV. The authors explain that pointing may have decreased because the girls were now using the new modes of communicating (e.g. voice output devices). Results were not reported for the frequency of facial expressions.

Overall, Koppenhaver et al. (2001) concluded that the symbolic communication of young girls with Rett syndrome can be enhanced by mother-child storybook reading interventions supported with assistive devices. However, these results are difficult to interpret. A functional relationship cannot be determined because data were not presented in the typical manner for the multiple baseline design. Only one data point was recorded in each phase by Koppenhaver et al. (2001). An additive effect may have occurred between the three different phases. As each new phase was implemented it was added on to the previous phase. This is problematic because the ability to determine which intervention alone created effects becomes diminished. Because of these limitations, more research is needed to determine the effects of using assistive technology for children with ASD during shared book reading to increase communication.

Story retellings of children with autism were examined using a thematic repeated shared storybook reading intervention in a descriptive study by Colasent and Griffith (1998). The participants included one 13-year-old boy, one 14-year-old boy, and one 14-year-old girl. Their verbal IQ scores as measured by the Wechsler Intelligence Scale, third edition (Wechsler, 1991)
and Stanford Binet Intelligence Scale, fourth edition (Thorndike, Hagen, & Sattler, 1986) were 64, 51, and 51 respectively. The three students were in the same classroom and all received the same intervention. Prior to the intervention, students were read stories but not within a thematic context. The students’ daily curriculum focused on daily living skills and functional reading skills (e.g. reading object labels).

The intervention consisted of using a thematic approach to present the stories. By using a theme the students were exposed to familiar language throughout the intervention. The theme was fictional stories about rabbits (e.g. The Velveteen Rabbit [Williams, 1971]). Three stories were selected. Each story was read to the students by the teacher over a three day period. Before the story was read to the students, they were given a pre-reading lesson on rabbits. During the reading students were asked to predict upcoming events. After each reading students participated in a “radio talk show”. This was a pretend game in which the students acted as if they were at a radio talk show being interviewed about the book. This made talking into a microphone part of the activity therefore the researchers could easily audio record the students talking about the book. During the radio talk show game students were asked 20 questions about the story. These questions were used to direct story retellings (e.g. Is there a problem in the story? Tell me.). After the interview questions, the students were asked to tell about their favorite part of the story and make changes to the original story by creating a new story through writing and drawing.

Data were collected by observing the students during the book reading, audio recording their verbal responses during the interview, and collecting writing samples. Results were analyzed using a triangulation technique of the three data sources (Colasent & Griffith, 1998). Student retellings were reported to improve after they wrote and drew about the story. In addition, writing samples taken one month prior to the intervention were compared to writing samples during the intervention. It was found that all the students made writing improvements such as writing longer sentences, longer passages, and more sophisticated vocabulary words. Over time changes in behavior were observed during the book readings such as a decrease in repetitive behaviors, inappropriate verbal outbursts, hyperactivity, and echolalia. In addition, students started making spontaneous comments that were relevant to the story.

The Colasent and Griffith (1998) study was one of the first to focus on literacy skills beyond sight word acquisition for students with autism. Like many children with autism, these students were not receiving rich literacy experiences in their daily curriculum, and their literacy
abilities seemed to be overlooked (Kluth & Chandler-Olcott, 2008). Although experimental research is needed to strengthen the conclusions, this study does suggest that students with autism benefit from shared reading activities such as those used in general education (Colasent & Griffith, 1998). This suggestion opens many doors to future literacy research for individuals with autism.

In a comparison study conducted by Davie and Kemp (2002) shared book reading was compared to facilitated play activities to determine which context elicited more language. Twenty-two children between the ages of 4 and 6 with intellectual disabilities and delayed language participated. The children were diagnosed with Down syndrome, autism spectrum disorder, or global delays. Three of the 22 children had autism spectrum disorder. Number of utterances, number of intelligent utterances, number of complex utterances, and degree of conversational interaction were recorded for each child. All children received both shared book reading and facilitated play. In the shared book reading condition probing techniques were employed to elicit language. For example, the adult would ask open-ended questions and forced choice questions. The facilitated play condition consisted of the adult interacting with the child to encourage play and language while using interactive toys (e.g., kitchen utensils). It was unclear whether or not storybooks were also included in the play condition. The type of probing techniques used to encourage language during the play sessions were vaguely described. Although, the use of communicative temptation techniques was mentioned. Communicative temptation was described as creating a situation where the child is tempted to ask for an object or help.

All sessions were videotaped. Three minute language samples of each videotape were coded and analyzed. Means were compared using paired t-tests. The shared book reading condition produced a significantly greater amount of utterances and intelligible utterances. The complexity of utterances were analyzed by recording the number of morphemes in each utterance and classifying them as single, two, three, and four or more morphemes. A greater number of two or more morphemes (2+) was found in the book condition, this difference was determined significant. The degree of conversational interaction was measured by determining the spontaneity of each utterance. Utterances were coded as imitations (least spontaneous), responses, and initiations (most spontaneous). No significant differences were found for imitations and initiations; however, significantly more responses were found in the book
condition. In sum, more language, more complex language, and more responses were produced in the shared book reading condition than in the facilitated play condition. The authors concluded that the results support the usefulness of shared book reading as a means for collecting language samples of children with mild to moderate intellectual disabilities.

Due to the limited number of studies on shared book reading that include children with autism, this study contributes some needed evidence that children with autism benefit from shared book reading. However, the unclear description of the two conditions makes this study difficult to replicate. It is possible that less probing to elicit language from the children occurred during the play session, or the probing style may have been different. During the book reading session the children were asked very direct questions (e.g., forced choice questions). Less direct questioning may have occurred during the play session. If this was the case, then were the effects of the storybook reading truly being isolated, or were the probing techniques confounded with the book reading context? In other words, would the results have been different if the probing techniques in each condition were held constant and only the contexts changed? Nevertheless, shared book reading provides a context conducive to eliciting language from young children.

Bellon-Harn and Harn (2008) recently compared the effects of two different storybook reading conditions on communicative behaviors. The first condition, consisted of repeated shared storybook reading, with scaffolding (RSR condition). The second condition consisted of repeated storybook reading with scaffolding plus augmentative and alternative communication (AAC condition). A single subject, multi-element design was employed to compare the two conditions. Emily, a 6-year-old girl diagnosed with a moderate to severe intellectual disability, participated. Emily’s speech production was considered unintelligible. Prior to the study, Emily frequently engaged in adult-child repeated storybook reading with scaffolding but did not have experience using augmentative and alternative communication.

Ten storybooks were selected for the study. Five of the books were used in the RSR condition and five different books were used in the AAC condition. The characteristics of the books selected were: (a) reactive sequences (b) stimulating pictures, (c) limited text, (d) redundant text, and (e) pictures with high contrast colors. All storybooks were written by the same author, Joy Cowley. Emily was familiar with the characters and events within the stories.

In both conditions, RSR and AAC, scaffolding strategies were utilized to support Emily’s language use. Scaffolding strategies were the same for both conditions and consisted of asking
wh-questions, modeling, and expanding on the child’s utterances. The AAC condition included an additional scaffolding technique of prompting the use of the AAC device. The AAC device was a voice output communication aid (VOCA). This device was programmed to produce three phrases related to the storybook being read. The three phrases included one question, and two statements that correctly answered the question.

Emily received two 20 minute reading sessions per week for a total of 10 sessions. A session consisted of one 10 minute RSR reading and one 10 minute AAC reading using different books. All books were read for two consecutive sessions. The RSR condition was always implemented first; therefore conditions were not randomly assigned or counterbalanced. All sessions were audiotaped and coded using the Child Language Analysis computer program (MacWhinney, 2000). The following communicative behaviors were recorded: (1) mean length of utterance (MLU), (2) consonant deletions (initial and final), (3) number of utterances (oral and aided), (4) child initiations, (5) correct responses to wh-questions, (6) off-topic utterances, and (7) imitations. In addition, the percentage of adult scaffolding strategies used was recorded.

Bellon-Harn and Harn (2008) found that in both conditions similar amounts of each type of adult scaffolding strategy were implemented, with modeling having the highest percentage across sessions in both the RSR condition and AAC condition. The number of utterances was the only dependent variable that showed differences between the two conditions, with more utterances occurring in the AAC condition. These utterances included oral and aided utterances. Both initial and final consonant deletions decreased in each condition implying increases in phonology complexity. No differences between the two conditions were found for MLU, child initiations, correct responses, off-topic utterances, or imitations. MLU stayed relatively stable for both conditions ranging between 1.0 and 1.5 words per utterance. The authors discuss that the lack of MLU changes may be due to the small number of intervention sessions. It was assumed that over time an increase in MLU would eventually be facilitated by the increase in phonology complexity which was observed. Child initiations ranged from 0 to 7 initiations per session and increased in number until session seven, followed by a slow decrease. The number of correct responses were similar in both conditions, varying from about 8 to 30. Off-topic utterances improved across sessions in both conditions. The percentage of imitations of adult models was relatively high in both conditions ranging from about 68% to 92%. 

31
Overall, both conditions produced positive changes. The results revealed that within the AAC condition, the number of child utterances was higher compared to the RSR condition. An increase in child utterances also increases the number of opportunities for the adult to scaffold the child’s language. Given that this was a multiple element design without a baseline phase, the only conclusion that can be drawn from this investigation is that the AAC condition produced a higher number of child utterances compared to the RSR condition. Results from this study must be heeded with caution. Since the two interventions were always implemented in the same order, with the RSR condition being first an interaction effect could have occurred. Therefore, effects from the RSR condition could have interacted with effects from the AAC condition making it difficult to determine the true effects from only the AAC condition. Conclusions from Bellon-Harn and Harn (2008) only suggest using shared storybook reading as a natural context for which to increase communicative behaviors of children with developmental delays. More research is needed to determine a functional relation between shared book reading (with and without AAC support) and communicative behaviors of children with developmental disabilities.

Hockenberger, Goldstein, and Haas (1999) also examined using storybook reading as a context to increase communicative interactions among children with developmental disabilities. The participants included three children with developmental disabilities, four typically developing children, and their mothers; creating seven mother-child dyads. Developmental disabilities were determined before the start of the investigation using the following measures: the McCarthy Scales of Children’s Abilities (McCarthy, 1972), the Battelle Developmental Inventory (Newborg, Stock, Wnek, Guidubaldi, & Svinicki, 1984), the Test of Early Language Development-2 (Newcomer & Hammill, 1988), the Expressive One-Word Picture Vocabulary Test (EOWPVT; Gardner, 1979), and the PPVT (Dunn & Dunn, 1981). All participants were from a low socioeconomic status (SES) background. The average age of the children was 5-years-old. The experimental design utilized was a multiple baseline across participants with an embedded withdrawal. Both parent and child communicative behaviors were analyzed by coding audio recordings. Specifically, the total number of parent comments and number of specific comments were recorded. Also total number of child utterances and specific utterances were recorded.

During baseline, parents were told to read to their child at home as they normally would. Developmentally appropriate books were provided by the researchers and a different book was
read each night. Parents audio recorded four sessions per week. After baseline data was collected, parents were taught within three one hour training sessions to use six specific comments during book readings that would relate the child’s personal experiences to the story content. An example given within the study was: while reading “Clifford is a big red dog” the mother then said, “Aunt Diane has a big dog named Max” (Hockenberger, et al., 1999, p. 18). During the intervention condition, parents read to their child using the commenting technique for approximately 12 sessions. Parents were told not to initiate comments during the withdrawal phase, however they were encouraged to respond to their child’s comments and questions.

The intervention was introduced in a tiered fashion across all participants as in a typical multiple baseline design. For example, the intervention was introduced with the first mother-child dyad and when this dyad reached a predetermined criterion the intervention was introduced to the second dyad. This was repeated until all the mother-child dyads implemented the intervention. The withdrawal phase began after four weeks of intervention if the dyads reached a criterion of four consecutive reading sessions with improved rates of communicative behavior. In addition to communicative behaviors, data on emergent literacy skills were collected using pre- and posttest scores on the Concepts About Print Test (Clay, 1979a, 1979b).

A functional relation was established between the commenting intervention and communicative behaviors by observing a clear change in behavior across participants when the intervention was implemented. As a result of the commenting intervention all mothers increased the number of comments used during joint book reading and all children increased the number of verbalizations produced. In addition, all the children increased their letter knowledge and their concept of book directionality. Hockenberger et al. (1999) warned readers to interpret the pre-posttest emergent literacy results with caution. These results only suggest that the intervention contributed to these improvements, other factors such as maturation and preschool activities could have also caused improvements. The Hockenberger et al. (1999) study is unique compared to many of the shared storybook studies because instead of implementing a packaged intervention involving multiple components, a single component (commenting) was implemented. However, a few mothers were reported to become over reliant on using specific comments, therefore it may be beneficial to teach adults to use a variety of conversational acts such as those taught in dialogic reading.
Very few studies have examined the benefits of adult-child book reading for children with autism. Some of these studies included design flaws. In the studies discussed here, only three included children with autism. More research is needed to examine the effects adult-child book reading and children with autism.

**Dialogic Reading**

Dialogic reading (DR) is a researched-based shared reading method created for children ages 2-to 5-years (U.S. Department of Education, 2007). The DR technique was first described by Whitehurst, Falco, Lonigan, Fischel, DeBaryshe, Valdez-Menchaca, and Caulfield, (1988). DR can be implemented by parents or teachers reading to children in a one-on-one or small group setting. A set of specific techniques are used while the adult reads a storybook to the child. This shared reading approach is based on three general principles: (a) adults should encourage the child to participate, (b) adults should provide feedback to the child and (c) adults should adapt scaffolding styles as the child’s language abilities evolve (Hargrave & Senechal, 2000; Whitehurst et al., 1988; Zevenbergen & Whitehurst, 2003). The goal of DR is to allow the child to become the storyteller while the adult builds upon or scaffolds the child’s language use by providing interactive assistance as prompts. Adult prompts include the use of questioning, expanding on the child’s verbalizations, and using praise and correction. Two sets of DR techniques have been created, one set for children ages 2- to 3-years and one set for children ages 4- to 5-years (Zevenbergen & Whitehurst, 2003).

**Dialogic Reading Techniques**

For children 2-to 3-years old, the adult learns to use DR in two separate phases. The first phase is more adult directed while the second phase is more child directed. In the first phase the adult follows seven steps (Zevenbergen & Whitehurst, 2003):

1. Ask “what questions” – ask the child “what” questions about the story. The questions may require the child to name objects, people, places, and actions that occur (e.g., “What is that?” or “What is the girl doing?”).
2. Follow answers with additional questions – ask the child another question that is related to an answer that has just been provided (e.g., “Yes the girl is eating, what is she eating?”).
3. Repeat what the child says – This reinforces the child’s correct verbalizations (e.g., “Yes, that’s an apple”).
4. Help the child as needed – Model the correct answer if the child is having difficulty answering a question. Then have the child repeat the correct answer. (e.g., “That is called a basket. Can you say basket?”).

5. Praise and encourage – Give the child general (e.g., “very good”) and specific (e.g., “great work telling me about the girl”) praise throughout the reading session when the child attempts to talk about the story.

6. Follow the child’s interests – If the child starts talking about something related to the story follow the child’s lead and encourage the child to keep talking. It is acceptable if not all the words on a page are read or if the story is not finished since the goal is to promote language development.

7. Have fun – This should be an enjoyable experience. Some children like to turn book reading into a game by taking turns reading the pages. If the child starts to lose interest try reading a few pages without asking questions or put the book away for a while.

Once the child has sufficient practice with the first phase the adult can move on to implementing the second phase. In the second phase the adult scaffolds the child with less structured questions to allow for the child to expand on his own ideas more. To do this the adult implements three steps (Zevenbergen & Whitehurst, 2003):

1. Ask open-ended questions – ask the child more general questions that have more than one answer so that the child answers in his own words (e.g., “Tell me about the girl”)

2. Expand what the child says – repeat what the child says and add more words to extend the verbalization. For example, if the child says, “Sad girl”, the adult could say, “Yes, the sad girl is crying”.

3. Have fun – Some children like to take turns talking about the story with the adult. The adult should encourage and praise all verbalizations from the child. If the child becomes disinterested it may be time to stop the session.

For older children, 4- to 5-years of age, different DR practices are implemented by the adult. The types of questions become more challenging. This idea is based on the DR principle that adults should adapt their scaffolding styles during shared reading as the child’s language abilities evolve (Whitehurst et al., 1988). The adult learns to use these advanced DR prompts in one phase. The acronyms CROWD and PEER are used to help the adults remember the prompts.
The acronym CROWD represents the five types of prompts that should be used (Zevenbergen & Whitehurst, 2003):

1. C: completion—Adult prompts child to fill in the word at the end of a sentence that is related to the story (e.g., “The wolf huffed and he puffed until he blew the house ____”).
2. R: recall—adult asks a question that requires the child to remember a part in the story (e.g., “What were the three games the friends liked to play?”).
3. O: open-ended—prompts that encourage the child to use his own words (e.g., “Tell me about this picture”).
4. W: wh- - ask wh questions (e.g., what, where, who, why, when) about the story and pictures (e.g., “Why is the boy laughing?”).
5. D: distancing – ask questions that require the child to relate the story to his or her own life experiences (e.g., “Have you ever played baseball with your friends, like Tommy has?”).

Four steps should be followed when implementing the CROWD prompts. To help adults remember these four steps the acronym PEER is used (Zevenbergen & Whitehurst, 2003):

1. P: prompt the child
2. E: evaluate the child’s response (e.g., praise or correct by modeling)
3. E: expand on the child’s response (e.g., repeat the child’s utterance and expand on it)
4. R: have the child repeat the expanded verbalization

**Dialogic Reading Book Selection Criteria**

Not all books are appropriate to use during shared reading sessions. Books should be selected carefully. The guidelines developed for shared reading book selection may also be appropriate for DR reading. Based on previous suggestions (Al Otaiba, 2004; Bellon et al., 2000; Hargrave & Senechal, 2000) four criteria have been created in this paper to use when selecting books for DR.

First, the selected books should be engaging for children. Storylines that are engaging provide the adult many opportunities to scaffold the child and help grasp the child’s attention. Characteristics of engaging books include being humorous, predictable text, not too long, having a temporal sequence of events, and a cause-effect narrative structure. Second, the book should contain good illustrations. The pictures should be simple, realistic, bright, and clear. Third, the
storyline should be applicable to the child’s life. Stories about daily events are easy for children to relate to. Avoid stories about holidays if that holiday is not being celebrated. It is also good to include stories with character diversity. In addition, if the intention is to focus the child’s attention on the print, it is beneficial to select books with large, bold, and redundant print and few words on a page (Justice & Kaderavek, 2002). Finally, it is very important to use books that are age appropriate yet provide new information and vocabulary. The child should have some background knowledge on the theme or topic of the book. It is recommended that 70% of the information and vocabulary is familiar and 30% is new (van Kleeck, 2003).

**Effectiveness of Dialogic Reading**

Over the last 20 years DR has been researched and shown to be an effective intervention for improving language and emergent literacy skills in children across different economic backgrounds and different levels of ability. Nine prominent studies are discussed in this paper and organized into three groups; high SES, low SES, and children with language delays.

**Children with High SES.** The first study on dialogic reading (Whitehurst et al., 1988) trained mothers to use this intervention with children of about 2-years of age. The children were developing typically with normal expressive and receptive language skills as measured by the Denver Developmental Screening Test (DDST; Frankenburg, Dodds, & Fandal, 1973) and the Early Language Milestones Scale (Coplan, 1982). All participants were of middle- to upper-socioeconomic status (SES).

Twenty-nine mother-child dyads were randomly assigned to either the DR experimental group or to the control group. In the DR group mothers were trained in two 30 minute sessions to use DR and then implemented DR over a four week period. The mothers in the control group read to their children as they would normally. Both groups audiotaped the reading sessions and recorded the number of sessions that occurred. In both conditions, the parents decided on the books they wanted to read to their children with some guidance from the researcher. The books were from the families’ homes.

The analysis of the audiotapes revealed that the DR group had a significantly higher mean length of utterance (MLU) compared to the control group, 2.55 to 2.04 respectively. The MLU was calculated based on words per utterance instead of calculating morphemes per utterance. This was done because young children rarely use rule-based plurals and tense endings. Also, morphemes are difficult to discriminate from audio tapes. The posttest scores on the
Expressive Language subtest of the Illinois Test of Psycholinguistic Abilities (ITPA-VE; Kirk, MCarthy, & Kirk, 1968) revealed a significant (p = .005) 6 month gain in expressive language for the treatment group. The Expressive One-Word Picture Vocabulary Test (EOWPVT; Gardner, 1981) revealed a significant (p = .009) 8 month gain in expressive language fluency. At a nine month follow up test, the DR group maintained a significant (p = .0625) 6 month advantage over the treatment group on the expressive language measures. Whitehurst et al. (1988) used the PPVT-R (Dunn & Dunn, 1981) to measure receptive vocabulary. This measure revealed no significant gains for the treatment groups. Important changes in parent behaviors occurred. Parents in the DR group significantly increased their use of praise, use of imitative directives (i.e., prompting the child to imitate a word), expansions, complex “what” questions, repetition (i.e., copy what child says), and open-ended questions.

Whitehurst et al., (1988) concluded that by using this systematic approach to picture book reading mothers can increase the rate of their child’s expressive language acquisition. A potential limitation of this study is that the storybooks used for the children in each group were not controlled. Therefore, it is possible that the storybooks in the DR book may have consisted of more similar vocabulary found on the standardized measures administer compared to the storybooks in the control group. One way to avoid this confounding variable would have been to use the same storybooks in each condition. In addition, the sample size of only thirty children leans on the small side; this reduces power, the probability of finding significant results if they existed.

Arnold, Lonigan, Whitehurst, and Epstein, (1994) used videotape training to train mothers to implement DR with their children. Sixty-four children approximately 2-years-old and their mothers participated in this study. The children were also from middle- to upper- SES backgrounds and had average to above average language skills as measured by the Expressive Language Scale of the Reynell Developmental Language Scales (Reynell; Reynell, 1985) and PPVT-R (Dunn & Dunn, 1981). The mother-child dyads in the Arnold et al. (1994) study were divided into three groups: (1) a video training group, (2) a direct training group, and, (3) a control group. Modified random assignment was used to place students in the groups. The first 32 dyads were randomly assigned to the control group of the direct training group. The next 32 dyads were randomly assigned to each of the three groups with a two to one bias for the video group. Therefore, each time one dyad was put in either the control group or the direct training
group, two dyads were put in the video group. The final N for each group was not reported. In the video training group the mothers were trained in two 35-minute sessions using video and written instructions. The direct training group received two 30-minute face-to-face, one-on-one training sessions conducted by trained graduate students. Each session consisted of explanations, modeling, and direct feedback. The interventions lasted four weeks. The control group did not receive any training, however a discussion on the importance of reading was conducted. The control parents were asked to read to their children as they would normally.

The posttests consisted of the same standardized language measures (EOWPVT, ITPA-VE, and PPVT-R) used in the earlier Whitehurst et al. (1988) study. In the Arnold et al. (1994) study an analysis of covariance (ANCOVA) was used. To control for initial language ability the pretest scores from the PPVT-R and Reynell were used as covariates. The video group outperformed the control group on all measures, scoring about 3 to 5 months ahead of the control group. Specifically, a 3.9 month significant gain was found on the ITPA-VE measure, and a 5.1 month significant gain was found on the EOWPVT measure. A 3.3 month gain was found on the PPVT-R, however this was not statistically significant. The video group significantly outperformed the direct training group on all but the ITPA-VE measure. The direct training group only significantly outperformed the control group on the ITPA-VE measure. Poor performance of the children in the direct training group may be due to how the parents were trained by the graduate students. Different trainers were used here than in the Whitehurst et al. (1988) study. The Arnold et al. (1994) study supported the importance of standardizing DR training by using a video training package. It also provided additional support for the use of DR to increase language skills for typically developing children from middle to high SES backgrounds.

**Children with Low SES.** Participants in the previously discussed DR studies only came from high SES backgrounds therefore it was necessary to conduct further research to determine if the effects of DR generalize to other groups. Children growing up in low income families are often at-risk for reading failure. Low SES correlates with low linguistics abilities (Phillips & Lonigan, 2007). This may be because SES is a distal factor of the differences children experience throughout their early reading experiences. Often children from low SES do not have print rich environments and develop emergent literacy skills more slowly than those from higher SES.
backgrounds (Phillips & Lonigan, 2007). Whitehurst and colleagues hypothesized that using DR with children from low income families would improve their language skills.

Valdez-Menchaca and Whitehurst (1992) extended the Whitehurst et al. (1988) study to children of low income families. A total of 20 children approximately 2-years-old in a day care located in Mexico participated in this study. The children were of normal development with low language scores on the pretest measures which included the PPVT-R (Dunn & Dunn, 1981), EOWPVT (Gardner, 1981), and DDST (Frankenburg et al., 1973) all translated from English to Spanish. The treatment consisted of graduate students implementing the DR intervention one-on-one with the children over thirty 10 minute sessions within the day care setting over six to seven weeks. No DR was administered in the control group, instead graduate students worked with the children on fine motor skills doing arts and crafts activities. The posttest measures were the same as used in the Whitehurst et al. (1988) study. The results showed very large effect sizes computed using Cohen’s d formula, for all posttest measures, PPVT-R, ITPA (Kirk et al., 1968), and EOWPVT with effect sizes of 1.3, 1.29, and 2.08 respectively. These scores averaged a developmental gain of 7 months ahead of the control children. In addition, the DR group had significantly higher scores on linguistic complexity such as, sentence complexity, pragmatic characteristics, and MLU. MLU was calculated using words per utterance instead of morphemes per utterance. This study displayed the positive effects of DR on the language skills of children from low SES backgrounds.

A limitation in this study is that the effects on language may be over generalized. The control group may have not been comparable to the DR group in the number of opportunities the children were given to use their language. The control group involved having the graduate students do arts and crafts with the children. It is possible that this activity did not foster much expressive language because the children were busy following directions (receptive language) and working on their projects, therefore the DR groups would automatically foster more expressive language because in these groups the adults were specifically taught to elicit language. To compensate for this problem, the control group could have been taught to use similar child-directed speech.

In a study conducted by Whitehurst, Arnold, Epstein, Angell, Smith, and Fischel, (1994) seventy-three children from low income families, 3-years of age, were assigned to three conditions. Random assignment was initially used. After pre-testing some participants were
reassigned to make the group balanced based on ability. This was done instead of relying on statistical control to avoid the teachers being biased based on the average ability level of a group since the same teacher was used in all three conditions. Five different day cares participated. The number of classrooms and teachers from each day care was not reported. Also, the final n for each group was not reported. The first condition was school reading. In this group the DR intervention was implemented by trained preschool teachers for 10-minutes each day in small groups of five children over a six week period. The second group was school plus home condition. These children received the DR intervention both in their preschool (same as first condition) and at home delivered by a trained parent. Training for the teachers and parents was done using video tapes. In the control condition the children engaged in supervised small group play activities at school and were not exposed to the books used in the other two conditions.

Using the same teachers in each condition could have possibly threatened the internal validity because the teachers were aware of group assignments. The authors speculate that diffusion of treatment was unlikely because the teachers described using DR as “effortful” therefore they probably did not use it more than they had to (i.e. during the control condition). The Hawthorne effect is a phenomenon that can occur when the treatment groups improve from the mere fact that a novel activity was introduced, more attention is provided, and/or the participants know they were part of an experiment. This may have occurred because the children were receiving a new activity with more attention and the teachers were aware of the group assignments.

The same measures were used for both pretest and posttest: PPVT-R (Dunn & Dunn, 1981), EOWPVT-R (Gardner, 1990), ITPA (Kirk et al., 1968), and Our Word. Our Word was developed by the researchers as a proximal measure to assess the children’s expressive language using vocabulary directly related to the storybooks and designed after the EOWPVT-R format. The results showed that both groups using the DR treatment scored significantly better than the control group on the EOWPVT-R and the Our Word expressive language posttests and continued to be superior on the EOWPVT-R at the 6 month follow-up. In addition, the school plus home group did significantly better than the school reading group on the EOWPVT-R. No significant differences were found among the groups on the PPVT-R and ITPA posttest. The results replicated the findings of Valdez-Menchaca and Whitehurst (1992) by showing that DR is a practical intervention for preschoolers from low income background. This study also supports
previous DR research by demonstrating that adults can be trained to use a systematic shared reading technique. It extended the research by showing that the SES and educational background of the adults is not a factor in learning DR. However, this study did not clarify whether it was the parents’ use of DR or the teachers’ use of DR that contributed most to the positive outcomes.

In an effort to disentangle the teacher-parent contributions of the previous study, Lonigan and Whitehurst (1998) replicated the procedures of Whitehurst, Arnold, et al. (1994) and added a fourth parent only condition. Ninety-one children, ages 3- and 4-years-old, of low income backgrounds participated in the Lonigan and Whitehurst (1998) study. The children’s language skills were considered below average as measured by the following pretests: PPVT-R (Dunn & Dunn, 1981), EOWPVT (Gardner, 1979), and the ITPA-VE (Kirk et al., 1968). These were the same standardized measures used in Whitehurst, Arnold, et al. (1994). At posttest, the parent only group did significantly better than the other three groups on the ITPA-VE. All the intervention conditions performed significantly better on the ITPA-VE than the control condition. The effect size from the EOWPVT-R (Gardner, 1990) for the school plus home condition was almost double the effect size of to the other two intervention groups. Lonigan and Whitehurst (1998) concluded that both parent and teacher implemented DR can have positive effects on language skills. However, the authors speculated that descriptive language skills are affected more by parent implemented DR while vocabulary is affected more by teacher implemented DR.

Two studies by Whitehurst and colleagues specifically looked at the effects of DR on an array of emergent literacy skills such as story retell, phonological awareness, and print awareness within Head Start programs. The purpose of the first Head Start intervention study conducted by Whitehurst, Epstein, Angell, Payne, Crone, and Fishel, (1994) was to provide stronger evidence for the relationship between preschool literacy activities, emergent literacy skills, and reading skills. All 167 child participants were about 4-years-old. The children came from low SES backgrounds and attended Head Start preschool. The control condition (n = 73) was to conduct business as usual. The treatment condition (n = 94) was a combination of DR plus the Sound Foundations Curriculum (Byrne & Fielding-Barnsely, 1992). DR was implemented both at home and in school by trained parents and teachers. The teachers implemented DR in small groups of about four children, three to five times a week, for 30 weeks. The books were provided by the
researcher and each parent would borrow a copy of the book being used in class to use at home for the week. Unlike in previous DR studies, the books were adapted by adding hints to remind teachers when to prompt the children. Sound Foundations is a phonemic awareness curriculum and was adapted by the researchers for the purpose of this study.

In the Whitehurst, Epstein et al. (1994) study, the measures for both pretest and posttest were the PPVT-R (Dunn & Dunn, 1981), EOWPVT (Gardner, 1981), ITPA (Kirk et al., 1968), and 18 subscales of the Developing Skills Checklist (DSC; CTB, 1990). The DSC is an assessment of emergent literacy skills. Some of the emergent literacy DSC subscales were: story retell, name letters, identify sounds, identify letters, blend CVC words, identify same-different sounds, segment sentences, segment words, rhyming, hold book-turn pages, identify people reading, and print first name. The intervention group was found to perform higher on writing and print concepts as measured by the DSC with reported medium effect sizes (using Cohen’s d formula) of .516 and .624 respectively. The intervention group did better on identifying sounds and letters as measured by the DSC compared to the control group. No significant differences were found on the language factor among the two groups which was a combination of the PPVT-R, EOWPVT, ITPA, and DSC (story retell and word function subscales). Interestingly, girls performed better on writing and boys performed better on language assessments. Also, parent fidelity to implementing DR was significantly correlated with language outcome (.51). This suggested that the home was a more powerful environment than school for promoting language development. Whitehurst, et al. (1994) concluded that children from low income backgrounds would benefit from DR interventions conducted in one-on-one settings by showing more significant gains in their language skills. One-on-one interactions gave the child more opportunities to talk and allowed the teacher to provide tailored prompts in order to meet the child’s needs. Unfortunately, this study did not separate the effects of DR and the Sound Foundations Curriculum on emergent literacy skills.

The second study examining emergent literacy outcomes (Whitehurst, Zevenbergen, Crone, Schultz, Velting, and Fischel, 1999) was a replication of Head Start intervention study described above. Whitehurst, et al. (1999) followed up on the original cohort of children and added a new cohort for a total of 280 participants. The intervention and standardized measures were the same as the first Head Start intervention study. Additional measures were used to assess children at the end of first and second grade. These measures consisted of the Word Reading
subscales of the Stanford Achievement Test – Eighth Edition (Psychological Corporation, 1989) and the Word Attack subscale on the Woodcock Reading Mastery Tests – Revised (Woodcock, 1987). The results revealed the intervention group maintained the gains made in preschool at the end of kindergarten. Also, the children from the intervention group scored better on language abilities, letter knowledge, letter sounds, and writing assessments in kindergarten as measured by PPVT-R (Dunn & Dunn, 1981), EOWPVT-R (Gardner, 1990), and DSC (CBT, 1990). No differences were found on the reading assessments at the end of first and second grade.

Whitehurst et al. (1999) hypothesized that larger differences will show up in the later years when children are reading to learn and refining their comprehension skills. This may be because DR emphasizes skills that are needed for reading comprehension such as vocabulary knowledge and understanding connected text rather than skills used in learning to read, such as letter-sound correspondence (Zevenbergen & Whitehurst, 2003).

**Children with Language Delays.** Given that a number of studies have replicated the positive effects of DR on language skills this is a promising intervention for children with language delays. Dale, Crain-Thoreson, Notari-Syverson, & Cole (1996) investigated the effects of parent-implemented DR on the language skills of 33 children ages 3- to 6-years-old. The children had mild to moderate language delays functioning between 2- and 4- years-old as assessed by the PPVT-R (Dunn & Dunn, 1981) and their current MLU. The normal MLU for a child 2-years of age is approximately 1.92 (Tager-Flusberg, Paul, & Lord, 2005). The parent child dyads were randomly assigned to two groups, the *book reading program* or the *conversational program*. The *book reading program* trained parents to implement DR. The books were selected and provided by the researchers. The *conversational program* was based on the language training videos Let’s Talk and Now You’re Talking (Educational Productions, Inc., 1987). In this program parents were taught how to facilitate language during play sessions using techniques such as information talk and expansions.

Parents in both groups were videotaped at pretest and posttest sessions reading to their children and playing with toys. Parent language was coded based on eight different categories such as use of open ended questions, and imitations. Child responses were coded based on nine different categories such as statements about the story and nonverbal gestures related to the story. Total number of different words used by the child and MLU were also documented. The data was analyzed using an analysis of covariance and t tests. Dale, et al. (1996) found a
significant increase in the number of different words used and MLU for the DR book reading program. Parents using DR significantly increased their use of open-ended questions, wh-questions, imitations, and expansions. It was found that changes in parental behaviors predicted changes in child behaviors. Through analyzing parental behavior it was found that when parents allowed sufficient response time the child’s verbal engagement increased. An increase in verbal engagement is important for children with language delays because it allows them to comprehend the prompts delivered by their parents. Dale, et al. (1996) suggested using additional pause time when using DR with children with language delays.

A noteworthy strength of this study is that the control group included an intervention that was designed to elicit similar language behaviors as the group using DR. This is important because some previous DR studies (e.g. Whitehurst et. al., 1988; Whitehurst, Arnold, 1994; and Valdez-Menchaca & Whitehurst, 1992) used control groups that did not provide as many opportunities to learn or practice expressive language skills. Providing the participants similar opportunities to use their language in each group make this a more rigorous study. However, some threats to internal validity exist. Implementation fidelity of the interventions in each group was not checked because the audiotape recordings were of poor quality. Also, during training, the parents were not assessed on their ability to implement the interventions correctly; no criterion was set for mastery. Without doing these steps it becomes difficult to know if the parents were implementing the interventions properly. In addition inter-rater reliability was not check for the coding of parent and child behaviors. The researchers justified this because a similar coding system was utilized in a different study they conducted. This problem could have been avoided by having two different observers code a percentage of the data and report the agreement percentage. Finally, only vague descriptions were provided of the coded behaviors. In order to replicate this study operational definitions are necessary.

Crain-Thoreson and Dale (1999) conducted a similar investigation using a modified version of DR with children with mild to moderate language delays. Thirty-two children, about 4-years-old were randomly assigned to one of three conditions. The first condition (n = 10) was one-on-one parent implemented DR. The second condition (n = 13) was one-on-one teacher implemented DR. The third condition was the control (n = 9) and received group story time as part of their regular preschool program. Parents and teachers in the DR groups were trained to use DR with increased pause times and repeated readings. Crain-Thoreson and Dale (1999) used
video coding procedures that were similar to their earlier study to measure language. The interventions took place over an eight week period. Pretests included the PPVT-R (Dunn & Dunn, 1981), EOWPVT-R (Gardner, 1990) and videotape coding of adult and child behaviors while reading a storybook. During the eight weeks of intervention, no data was collected. The adults kept a log of their shared reading and the researcher called them weekly to check for questions. A more rigorous measure of treatment fidelity should have been employed to have confidence the intervention was implemented correctly. At posttest, the same standardized measures were administered and the adult and child were videotaped reading a story.

Both parents and staff in the DR groups significantly increased many of the desired DR behaviors. The only significant difference between parents and staff was that parents read the book verbatim more. Significant increases were found for both intervention groups in MLU, number of utterances, number of different words used, and ratio of participation. No significant difference in vocabulary growth was found across the three groups as measured by PPVT-R and EOWPVT-R. The lack of vocabulary growth may be due to the small sample size. A small sample reduces the power of the study in finding significant results. Crane-Thoreson and Dale (1999) also speculated that children with language delays may need a longer intervention period to make progress. Another possibility is that the measures employed were not sensitive enough to detect individual changes for children with language delays. It may be more appropriate for this population to use assessments based on the actual vocabulary presented in the intervention.

Hargrave and Senechal, (2000) conducted a study that focused on using DR to specifically improve vocabulary skills in preschool children. Thirty-six 4-year old participants with limited vocabularies and a low SES background were assigned to one of two reading conditions, the control group and the DR group. The control group conducted business as usual while teachers and parents in the intervention group were trained to use DR. The training consisted of one hour group sessions using video and role playing. In preschool DR was delivered in groups of eight children to one teacher. The intervention lasted four weeks. Parents were also trained to use DR at home. The books were provided by the researchers and each book was read twice. The measurements consisted of PPVT-R (Dunn & Dunn, 1981), EOWPVT-R (Gardner, 1990), and Book Vocabulary. The test of Book Vocabulary was created by the researchers to measure vocabulary presented to the children from the interventions. Children
were given 18 pictures of nouns from the books used and they were asked to name the pictures. In addition, observations of teacher behaviors were conducted and analyzed.

In the Hargrave and Senechal (2000) study, the trained teachers significantly increased their DR implementation techniques such as more Wh questions, more praise, and more repetition of child utterances. The children in the DR group significantly improved their language ability by four months on the EOWPVT. The DR group had significantly higher expressive vocabulary scores and higher Book Vocabulary scores compared to the control group. However no difference was found in receptive vocabulary as measured by the PPVT-R. This study further supports the positive effects of DR on expressive language for children with both low SES backgrounds and language delays. In addition it extends the research by showing DR can be successful in groups with a ratio of eight children to one teacher. However these conclusions must be interpreted with caution. This study contained some major threats to internal validity and did not provide enough information to replicate the design.

The most prominent threat to internal validity was the confounding variables that may have existed due to the way participants were assigned to groups. The authors did not randomly assign the children to groups. The DR group of children was all from the same preschool, while the regular reading group was all from a different preschool. Also, the pretest scores were not reported for each group, therefore it is unknown how the groups differed at the start of the study. The school and teachers at the school are confounding variables because it is impossible to know if the effects were contributed to the independent variable or to the confounding variables, increasing the chance of a Type I error. For example, it is possible that the teachers at the DR school used child directive language more often throughout the day compared to the regular reading school and this is what caused the significant effects on language.

Other limitations involved treatment fidelity and inter-rater reliability. Treatment fidelity was only checked on two of the 20 reading sessions across the four week period for each teacher. This is only 10% of the reading sessions. More checks would have increased confidence that the teachers were in fact using DR correctly and consistently. No fidelity checks were made for the parent reading sessions. The reliability of the data collected during behavioral observations was not reported. Finally, external validity is weakened because of the poor description of the child participants. The children were described as having poor expressive vocabulary skills but that was not operationally defined. Therefore, it is difficult to determine the generalizability limits of
the results. More research is needed to determine the effects of DR for children with language delays and developmental disabilities.

Summary. Dialogic reading is a combination of techniques that maximize adult-child reading interactions. DR for 2- to 3-year-olds consists of asking wh-questions, modeling correct answers, praising language use, following the child’s interest, asking open-ended questions, and expanding on the child’s utterances. For older children, ages 4- to 5-years, the adult adds advanced prompting techniques such as prompting the child to complete a sentence, recall the story, and relate the story to life experiences (Zevenbergen & Whitehurst, 2003). Dialogic reading has been systematically studied since 1988 in a variety of populations. The range of participants included typically developing children, children of low income backgrounds, and children with identified language delays. Ages of the children ranged from 2- to 6-years-old. Teachers, parents, and graduate students have been successfully trained to implement DR in both one-on-one and small group settings (Arnold, et al. 1994; Crain-Thoreson & Dale, 1999; Dale, et al., 1996; Hargrave & Senechal, 2000; Lonigan & Whitehurst, 1998; Valdez-Menchaca & Whitehurst, 1992; Whitehurst, Arnold, et al. 1994; Whitehurst, Epstein, et al., 1994; Whitehurst et al., 1988, 1999).

Effects of DR have been documented with a variety of standardized and researcher-developed measures. These measures included the PPVT-R (Dunn & Dunn, 1981), EOWPVT (Gardner, 1979, 1981), EOWPVT-R (Gardner, 1990), IT DPA-VE (Kirk et al., 1968), Our Word (Whitehurst, Arnold, et al., 1994), Book Vocabulary (Hargrave & Senechal, 2000) and MLU. Skills assessed included expressive language, receptive language, mean length of utterance, number of different words used, and spontaneous use of language. The standardized language measures so commonly used in the DR studies may not be sensitive enough to detect the effects of DR on language for children with developmental disabilities, however. For example, the novel vocabulary that the children may acquire during the DR reading sessions cannot be directly assessed by distal measures such as the PPVT and EOWVPT. In addition to language skills, emergent literacy skills were assessed using the Developing Skills Checklist (DSC; CTB, 1990) in studies that combined DR with the Sound Foundations curriculum. Emergent literacy skills measured included story retell, name letters, identify sounds and letters, blend CVC words, identify same-different sounds, segment sentences, segment words, rhyming, hold book-turn pages, identify people reading, and print first name.
The most widely established benefit of DR is an increase in expressive language skills. During DR sessions children tend to participate more often, increase their use of different words, and produce longer utterances (Arnold, et al. 1994; Crain-Thoreson & Dale, 1999; Crain-Thoreson, 1996; Hargrave & Senechal, 2000; Lonigan & Whitehurst, 1998; Valdez-Menchaca & Whitehurst, 1992; Whitehurst, Arnold, et al. 1994; Whitehurst et al., 1988; 1999). Also, adding DR to the Sound Foundations curriculum positively affected emergent literacy skills such as vocabulary (Hargrave & Senechal, 2000), print concepts, and writing skills (Whitehurst, Epstein, et al., 1994). There is still much to be explored in using DR. It is unknown which aspects of this approach are essential to its success, how effective this approach can be with children with developmental disabilities including autism, and the long term effects of DR on later story comprehension. Overall, this shared-reading technique is a useful supplement to researched-based literacy curricula. Due to the limitations in sampling, data collection, and data analysis in previous DR studies more research is needed to determine the effects of DR for children with language impairments such as children with autism.

**Potential Educational Implications for Using Dialogic Reading with Children with Autism**

Oral language is an emergent literacy skill known to foster later reading development. Unfortunately, almost all children with autism possess delays in language acquisition. Therefore, it is imperative that children with autism are provided opportunities to increase oral language skills. Structured adult-child shared reading, including dialogic reading, may provide children with autism the natural contexts for which to practice and develop these skills. Currently the effectiveness of dialogic reading on language or literacy skills of children with autism has not been researched.

It is important to note that dialogic reading combines many of the recommended practices for teaching children with autism. Routine activities are helpful in teaching children with autism (NRC, 2001). Reading storybooks to children can easily become a daily routine activity. Parents or teachers can schedule dialogic reading for the same time each day (e.g. before bed or after lunch). Storybook reading can take place in the same location each day (e.g. in bedroom, or in reading corner). Opportunities for joint attention are enhanced through DR. The stimulus (the book) is static, meaning it stays constant. This eliminates the number of referents the adult and child must attend to and increases the chance of joint attention. Since the purpose of dialogic reading is to create a dialogue around the book, turn taking opportunities increase and resemble
natural turn taking within conversational communication. By using picture books during dialogic reading children practice using symbolic representations. Also, the pictures can support language use by acting as a prompt or aid to stimulate discussion. Finally, dialogic reading provides systematic instruction within a naturalistic delivery system. In other words, the adult scaffolds the child with prompts and models while still participating in an activity that resembles more of a natural, fun activity and less of a structured teaching lesson.

**Conclusion**

For about seven decades language and communication skills among children with autism have been described as impaired or unusual. These characteristics have prevailed over time and language skills are still among the most targeted skills for intervention. The ability to use language is a fundamental skill because it affects all areas of one’s life. Dialogic reading has been shown to increase expressive language (Arnold, et al. 1994; Crain-Thoreson & Dale, 1999; Crain-Thoreson, 1996; Lonigan & Whitehurst, 1998; Valdez-Menchaca & Whitehurst, 1992; Whitehurst, Arnold, et al. 1994; Whitehurst et al., 1988; 1999).

Future research is needed to determine the practical implications DR may have on language and emergent literacy skills for children with autism. DR has been shown to have positive effects on the language skills of typical children, children with low SES backgrounds, and children with specific language delays. Surprisingly, research examining the effectiveness of DR on the language skills of children with autism has not yet been published making this area an important field to explore. The lack of research may be due to the fact that DR requires the child to use selective attention to identify and attend to the most meaningful information in stories in order to participate in the dialogue of shared readings. DR requires the child to shift attention from verbal to visual stimuli. It also requires the child to engage in joint attention. All three of these types of attention are difficult for children with autism and may impede their learning. Adapting DR to meet the needs of children with autism by incorporating assistive technology such as pictorial attention cues may be a useful accommodation to typical DR. Attention theory provides support for this adaptation. Based on previous attention theory research some ways to help children attend include increasing relevant stimuli dimensions and decreasing irrelevant stimuli dimensions. Using picture prompts is a common technique used in interventions for children with disabilities especially for children with autism and may serve the purpose of bringing attention to relevant stimuli dimensions. Based on this theory, it was hypothesized that,
in this study, adding attention cues to DR would be more effective in increasing vocabulary use for children with autism compared to using DR alone.
CHAPTER III.
METHODS

The purpose of this study was to compare two DR-based treatments on the acquisition of expressive vocabulary. The first treatment consisted of implementing phase one of DR (Zevenbergen & Whitehurst, 2003). For the second treatment, attention cues were added to phase one of DR (Zevenbergen & Whitehurst, 2003). The purpose of attention cues was to accelerate the attention stage of learning by increasing awareness to the relevant dimensions of a stimulus. In theory, accelerating the attention stage of learning may shorten the individual’s learning curve.

The research questions addressed the differential effects of dialogic reading-based interventions on three types of expressive language behaviors: labeling, explicating, and spontaneous verbalization. Specifically, the research questions were: what are the differential effects of two DR-based interventions on:

1. the participants’ independent verbal responses to vocabulary queries;
2. the participants’ independent verbal responses to follow-up queries; and,
3. the participants’ appropriate spontaneous verbalizations.

Research Design
A single-subject, alternating treatment design without a no-treatment control condition (Cooper, Heron, & Heward, 2007) was employed to assess the differential effects of two treatments, dialogic reading only (DR only) and dialogic reading with the addition of attention cues (DR + AC). The participants were randomly assigned to a pattern of treatments. The pattern of treatments was counterbalanced across participants to avoid the presence of an interaction effect. For example, participant A received: (DR only), (DR + AC), (DR only), (DR + AC), etc. Participant B received the opposite pattern: (DR + AC), + (DR only), + (DR + AC), (DR only), etc.
Participants

Local special education teachers were asked to nominate potential participants for the project by identifying children in their classroom with autism. Five participants were asked to participate who met the following criteria: (a) demonstrated ASD characteristics (b) verbal, can communicate using at least one-word utterances, (c) limited expressive and receptive vocabulary as measured by three descriptive language measures (described below), (d) between the ages of 5- and 7-years old, and (e) not regularly exposed to dialogic reading.

The participants ASD characteristics were described by their teachers. Participants had to be able to communicate verbally using at least one-word utterances which was determined by asking the participants’ teachers to describe their communication. Limited expressive and receptive vocabulary was defined by the range between the lowest possible score for any given age and a score of 1.25 standard deviations below the mean on the receptive and expressive standardized measures implemented. This range is equal to age equivalency scores on the receptive measure between <1.09 – 5.08 years and on the expressive measure between 1.10 – 5.01 years. These criterion scores were based on the same criteria used to diagnose specific language impairments (Williams et. al., 2008). In addition, a score of less than 55% correct on the Expressive Subtest of the Storybook Vocabulary Test (described below) was required. The age range between 5- and 7- years old has been chosen because children with autism vary greatly in their emergent literacy skills and many are functioning as much as two years below the mean. The goal is to find participants who are still in the emergent literacy phase of development. Children with autism could be in this phase beyond 7 years old; however, this age was selected for the upper limit because these DR-based interventions would most likely not be age appropriate for older children. Teachers and parents were asked to describe their storybook reading routines to determine if the children were regularly exposed to DR.

Descriptive Measures

Three assessments were administered prior to the start of the intervention for screening purposes and after the completion of the intervention for descriptive analysis. The three assessments were (1) the Peabody Picture Vocabulary Test – III (PPVT-III; Dunn & Dunn, 1997) (2) the Expressive One-Word Picture Vocabulary Test - 2000 (EOWPVT-2000; Brownell, 2000), and (3) the Storybook Vocabulary Test (SVT) created by the researcher specifically for this study.
The PPVT-III is a standardized norm-reference test of receptive vocabulary. This test is administered individually, untimed, and designed for individuals aged 2 ½ to 90+ years. The PPVT-III takes approximately 12 minutes to administer and requires the examinee to select the picture that represents the word said by the examiner from four options. The pictures representing the vocabulary words are drawn in black and white and progressively get more difficult throughout the test. The standardization sample used to develop the norms included individuals from some special education categories such as learning disabilities and intellectual disabilities. The percent of individuals in each special education category for the standardization sample matched the percent found in the U.S. population. Autism was not included as a separate category. It is possible that individuals with autism were grouped into another category such as intellectual disabilities. Dunn and Dunn (1997) state that “the PPVT-III may be used successfully with persons who are autistic because there is no need to speak or interact verbally with the examiner” (p.3).

The PPVT-III has two forms, form IIIA and form IIIB. The median standard score alternate forms reliability coefficient was .94. The median alpha reliability coefficient for internal consistency was .94 for both forms. The test-retest reliability coefficients for children ranging in age from 2.6 to 5.11, with about one month interval between the first and second testing, on form IIIA and form IIIB were .92 and .91 respectfully. The median standard error of measurement for standard score equivalents across all age groups was 3.7. These high reliability scores increase confidence that an individual’s obtained score is his true score. For criterion validity, the PPVT-III was correlated with other tests of vocabulary and intelligence measures. The overall conclusion from these correlational studies was that the PPVT-III correlates well with other vocabulary measures ranging from .40 to .76 and correlates moderately well with intelligence measures, ranging from .23 to .78 (Dunn & Dunn, 1997).

The EOWPVT-2000 is also a standardized norm-referenced test. This test measures expressive vocabulary skills of individuals ranging from 2- to 18-years old. The EOWPVT-2000 is administered individually in about 10 to 15 minutes. The examinee is shown a series of illustrations and asked to verbally name the objects and actions. As with the PPVT-III, the sample used to develop the standard score norms closely approximated the demographics of the U.S. population. Approximately 10% of the sample did have a disability. The disabilities specifically listed were learning disabilities, speech-language disorder, intellectual disabilities,
and other. Autism was not specifically mentioned but may have fallen within the intellectual disabilities or other groups (Brownell, 2000).

The EOWPVT-2000 has high internal reliability; the median alpha coefficient across age was .96. Given about one month between testing, the test-retest reliability coefficient for 2- to 4-year olds was .88 and for 4- to 7-year olds was .89. The median standard error of measurement across all ages was 3.00. EOWPVT-2000 scores correlated well with numerous other assessments (e.g., assessments of vocabulary, broad measures of language, cognitive ability, etc.) to determine construct validity. The median correlation coefficient when compared to 12 other vocabulary assessments was .79. When compared to the intelligence measures, the EOWPVT-2000 correlation coefficient was .88 for verbal intelligence (Brownell, 2000).

The Storybook Vocabulary Test (SVT) was created by the researcher as a curriculum-based or proximal measure of expressive and receptive vocabulary using vocabulary and pictures directly from the storybooks being used during the treatments. This test was divided into three subtests: (1) Expressive Language subtest, (2) Receptive Language subtest, and (3) Explicating subtest.

The list of vocabulary words in the test were obtained from 12 storybooks that were potential books to be used in the intervention. The words were purposefully selected based on their usability during the DR interventions. The words had to be represented as pictures within the story. Also, the pictures of these words had to be repeated on different pages of the story at least two times. The vocabulary words varied on difficulty. Some words were easier and more common than others. Words of all difficulty levels were purposefully selected because the purpose of the test was to identify words that the participants did not know or use. A total of 100 words were initially selected to be used in the SVT. The same 100 words were used in each subtest in a different random order for each subtest. An additional 22 words were added to the Expressive Language subtest only throughout the course of the intervention, (see Appendix A).

During the pre-test, 100 vocabulary words or items were assessed on the Expressive Language subtest. This subtest was modeled after the EOWPVT-2000 by asking the examinee to say the word that represented the picture presented. The pictures were copied from the storybooks which made them direct symbolic references (no transfer of symbols was required). The Expressive Language subtest was not only used as a pre- and post-test it was also used to individualize the target words for each participant during treatment. The words that represented
the pictures for which the participants labeled incorrectly during the Expressive subtest were put into a pool of potential target words for the treatment conditions. Then four words per book were purposefully selected to target during the treatments for each child.

The Receptive Language subtest was modeled after the PPVT-III. Four pictures were presented by the examiner while asking the examinee to pick the picture that represents the target vocabulary word spoken. During the pre-test, the first 25 items (1 – 25) were assessed, during the post-test the second 25 items (26 – 50) were assessed. During the Explicating subtest, the participant was asked follow-up questions about the pictures that represented target vocabulary words. These follow-up questions were the same type of questions asked during the DR interventions (e.g. what is he doing with the toothbrush?).

For all subtests, the participants were assessed in a quiet setting, one-on-one with a reader. The participants were given as many breaks as needed and the assessment took place over multiple days if needed. The total percent correct was computed for each subtest.

Informed Consent

Before this study began, it was approved by the Institutional Review Board (IRB) at Florida State University (see Appendix B) and the Leon County Schools Research Review Board (see Appendix C). These committees ensured the protection of the human subjects involved in the study. Once approval was granted, informed consent was collected from each of the participants’ primary caregivers (see Appendix D). Also, consent was obtained from the teachers (see Appendix E) because the intervention was implemented in the classrooms and the teachers were interviewed for social validity data. Permission to administer the selected measures and to video record was included in the informed consent.

Training of Readers

Graduate student readers in this study were trained using the following procedure. During the 2009 Fall Semester prior to the start of the intervention, five graduate students were trained to be readers using dialogic reading only (DR only) and dialogic reading plus attention cues (DR + AC). As a group, the readers were presented with a PowerPoint presentation on how to implement the first phase of DR and DR with attention cues by the researcher. Demonstrations by the researcher supplemented the presentations. There were four training sessions and each training session lasted two to four hours, for approximately eight to twelve hours of training in total. During this time the readers were also trained on how to use the record sheets to collect
data. Readers were required to practice with each other under the observation of the researcher during the training sessions. In addition, the readers were trained on how to operate the video cameras.

**Treatments**

**Dialogic Reading**

Trained readers read to the participants individually using an established technique for implementing the first phase of DR (Zevenbergen & Whitehurst, 2003). The target vocabulary words, vocabulary queries, and follow-up queries were pre-selected and scripted for each storybook (see Appendix F for a sample query map). Each story was read four times; this was considered one trial. During the first reading of the story, the reader read all the text and asked about 50% of the vocabulary and follow-up queries. During the second through fourth reading of the story less text was read and more queries were given. During all the readings, if the participant responded incorrectly to the queries provided, the reader verbally modeled the correct answer and then asked the question again (e.g., this is a boot, what is this?). See Appendix G for the protocol for this treatment. The readers followed a script to talk about the pictures in the story and ask vocabulary and follow-up questions (see Appendix H). A script is not typically used during dialogic reading, however, it was necessary to include in this investigation to ensure implementation fidelity across conditions and readers.

For each story, three nouns and one present tense action verb was pre-determined for a total of four target vocabulary words. See Appendix A for complete list and Appendix I for a sample list by participant and book. Vocabulary queries were “what” questions about pictures in the books that represent vocabulary words (e.g. what is this, what is she doing, what are these, etc). The follow-up queries consisted of asking questions about the attribute or function of the target vocabulary word (e.g., what do you do with a scarf or what color is the scarf?). Storybook reading sessions two through four included a minimum of 16 queries and a maximum of 24 queries total. That is, each target word had a minimum of two vocabulary queries plus two follow-up queries throughout the story, for at least four queries per word (see Appendix F for sample query map). In addition, the reader followed the child’s lead if the child began to talk about the book by being responsive to what the child said and expanding on the child’s language.

Each book was read for one complete trial, which was four sessions as recommended in typical DR (Zevenbergen & Whitehurst, 2003). The goal was to read two books each week. The
first book was read for four sessions and the second book will was also read for four sessions, for a total of eight reading session per week (two sessions per day for four days). The intervention lasted six to eight weeks (one report card period). The books were read in the same order to the child participants (but the treatment conditions were alternated to be counterbalanced across participants). A reading script was provided with each book.

At the beginning of the second through fourth reading sessions the readers probed the participants. A final probe was also given after the fourth reading for a total of four probes. The probes were scripted (See Appendix J for an example). The purpose of the probe was to determine the cumulative number of targeted vocabulary and explicating queries the participants was able to answer correctly within a treatment trial.

**Dialogic Reading Plus Attention Cues**

The second treatment consisted of DR with the addition of attention cues (ACs). This treatment was the same as the first treatment except for the use of ACs. In addition to using the first phase of dialogic reading during the intervention condition, attention cues (ACs) were added to prompt verbal responses. The purpose of these cues was to focus a participant’s attention on the relevant dimensions (e.g., color, shape, size, and function) of the stimulus that represented the targeted language response. As in the DR only condition, the target vocabulary words and follow-up questions were pre-selected and scripted. Dialogic reading was implemented in a similar manner as in the DR only condition. The change was when a child did not respond or responded incorrectly, the adult modeled the correct response plus provided an AC. See Appendix K for the protocol for DR + AC treatment.

The ACs were laminated photographs that represented the targeted vocabulary or follow-up response. These pictures were provided for both vocabulary responses and follow-up responses when needed. Prior to the start of the reading session, the reader placed the AC cards on the back of the Velcro board. This side of the board was not visible to the child. When the child did not respond or responded incorrectly the reader placed the AC that represented a picture of the targeted response directly in front of the child and pointed to it while verbally modeling the correct response. The question was asked again while the AC was being presented. Once a card was used it was placed on the front of the Velcro board within the child’s sight. If the card was used again, the card was temporarily removed from the Velcro board and placed directly in front of the child and then returned to the front of the Velcro board. As in the DR
only treatment, a probe of vocabulary and follow-up queries was given to the participant at the start of the second through fourth readings and a final probe was given after the fourth reading. ACs were not used during the probes.

Data Collection

Labeling and Explicating Verbalizations

Vocabulary improvement was measured by the cumulative number of vocabulary words independently and correctly labeled during probes across trials. Improvement in responses to descriptive follow-up queries were measured by cumulative number of attribute or function questions answered correctly during probes across trials. Trials were defined as four readings of one book. Readings (e.g. sessions) were defined as the reader implementing a treatment, DR only or DR + AC. Probes occurred at the beginning of the second through fourth reading of each book and after the fourth reading. Each probe consisted of the reader asking the participant two vocabulary questions and two follow-up questions per target word using the storybook pictures directly from the book as cues (See Appendix L for the probe query map). Each probe was scripted (See Appendix J for a sample scripted probe). A complete list of the definitions for the terms used in this study can be found in Appendix M.

The responses to vocabulary and follow-up queries for each child participant were recorded by hand using a data collection sheet that was imbedded into the scripted probes (see Appendix J). The total number of vocabulary queries and follow-up queries verbally answered independently and correctly were documented for each probe. Then the total number of correct responses for a trial were totaled across the four probes for the same book. Using a separate record sheet (see Appendix N for a blank record sheet), this total was added to the previous trial total to determine the cumulative number correct across trials (see Appendix O for a sample).

Spontaneous Verbalizations

Spontaneous verbalizations were recorded during each of the four readings across all trials. During the first reading of each book data was recorded by hand using only the data collection sheet embedded into the reading script (see Appendix H) because no probes were given for first reading. For the remainder of the sessions, spontaneous verbalizations were recorded on both the reading scripts and the probes. The readers wrote down each word the child spontaneously said on the data collection sheets in one of two columns. In the first column the reader documented words that were appropriate to the story; in the second column the reader
documented words that were inappropriate to the story. The functional definition of appropriate spontaneous verbalizations was any meaning unit of language spoken during the reading session that was not following a prompt and appropriate to the story topic or pictures. Inappropriate verbalization were defined as any meaning units of language spoken that were not associated with the story or pictures. Then the total number of appropriate verbalizations for a trial was totaled across the four readings and four probes for the same book. Using a separate record sheet (see Appendix N), trial totals were added to the previous trial totals to determine the cumulative number of appropriate comments across trials.

**Graphing**

The cumulative number of correct independent verbal responses on probes were graphed and analyzed for each type of query (i.e., vocabulary and follow-up). The cumulative number of appropriate spontaneous verbalizations was also graphed. This resulted in three separate graphs per child participant (i.e., one for vocabulary queries, one for follow-up queries, and one for spontaneous verbalizations). Data collection occurred for eight trials. Data was graphed for each trial.

**Materials**

**Storybooks.** Twelve storybooks were pre-selected prior to the start of the study. All the books that were selected were on a preschool ability level used in a literacy program called Literacy Express (Lonigan, Clancy-Menchetti, Phillips, McDowell, Farver, 2005). The list of books is provided in Appendix P. The storybook selection criteria were (1) books must have clear, realistic pictures, (2) books should have limited text and approximately one to ten sentences per page, and (3) books should be about 30 pages or less. These selection criteria were based on previous research (Al Otaiba, 2004; Bellon et al., 2000; Hargrave & Senechal, 2000). The vocabulary words used in the SVT were obtained from these 12 storybooks. Eight of these 12 books were then used for the intervention. Three copies of each storybook were needed for a total of 24 books. These eight books were selected because these were the books that target vocabulary words were identified from for all five participants using the Expressive Language subtest from the SVT.

**Attention Cues.** Prior to the start of the study, target vocabulary words were selected from the storybooks. An attention cue (AC) was created for each target response to vocabulary queries, attribute queries, and function queries within the DR with ACs treatment. The attention
cue was a photograph that represented the targeted linguistic response. Attention cue images were considered secondary symbolic references unlike the pictures in the SVT which were considered direct symbolic references. The photographs were found by searching photograph databases on the internet. Each photograph was printed in color, approximately 3 x 3 inches, laminated, and had Velcro on the back. The Velcro was used to attach the photograph to a Velcro board once it was presented to the child. The attention cues were stored in plastic bags until needed for the reading session.

**Velcro Boards.** A black piece of foam board, about 12 x 18 inches, with strips of Velcro on each side was used to hold the pictorial cues. One side of the board consisted of ACs that were not yet presented to the child. That side of the board was facing the adult reader so the child could not see it. The ACs were placed on the other side of the board after they were presented to the child. This side of the board faced the child. One Velcro board was needed for each classroom (e.g. three boards).

**Video Cameras.** Each reading session was video recorded using a VHS video camera. One camera for each reader was borrowed from Florida State University’s Learning Resource Center. Each camera was operated by the adult reader during the reading sessions. The cameras were placed on tripods. Extension cords were needed. The tripods and extension cords were also borrowed from the Learning Resource Center. Video tapes were bought new by the researcher.

**Inter-Observer Reliability**

Twenty-five percent of the probes distributed evenly among the five readers (eight probes per reader) were checked for reliability. The researcher watched the video recordings of the probes being implemented to check that the readers coded the data correctly. Any mistakes made by the reader while recording counted as disagreements. Interobserver agreement percentages were calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. These reliability checks occurred at the completion of the intervention. Agreements ranging from 90% – 100% were considered very high. In addition Cohen’s Kappa Coefficient was calculated.

To ensure the readers were recording the data correctly during the intervention the researcher sporadically observed the readers within the classroom and on video recordings. During these observations the researcher took notes on the readers’ strengths and weakness regarding the implementation of the interventions. For the classroom observations, while the
readers were working with the participants, the researcher would coach the reader on how to improve. After the intervention session the researcher would discuss, with the reader, the strengths and weakness observed and how to make improvements. For the video observations, the researcher would email the notes along with suggestions on how to improve to the readers.

**Treatment Fidelity**

A representative sample of 35% of the sessions was checked for treatment fidelity. The representative sample included a random selection of two checks from *Session 1* sessions from each condition, and four checks from *Session 2* through *Session 4* sessions from each condition. This was a total of 12 checks per reader.

When computing treatment fidelity for the DR only condition, five indicators were used. These were: (1) presents correct page/title, (2) reads script correctly (non-queries), (3) presents queries correctly, (4) follows decision rule correctly, and (5) expands upon appropriate spontaneous language. The researcher checked treatment fidelity by watching a video recording of a reading session from the representative sample. While watching each session, the researcher scored treatment fidelity within each of the five indicators with a photocopied script of the session. The researcher checked off on the script whether the reader implemented the treatment faithfully. After each treatment fidelity check, the researcher completed the data summary sheets for each of the two treatment conditions. Since the two treatments differed, two summary sheets were developed. These appear in Appendices Q and R. The data summary sheet for the DR + AC condition included the same five indicators as the summary sheet for DR only with one additional indicator: presents AC appropriately to participant. On each treatment fidelity summary sheet, the researcher computed percent of treatment fidelity for each indicator. In addition, an overall treatment fidelity percentage was calculated.

**Social Validity**

The social validity of the outcome was informally checked by interviewing the teachers about the participants’ behaviors within the classroom. At the completion of the intervention, the teachers were asked if they noticed any differences in the participants’ literacy and language behaviors when the participants engaged in adult-child shared book reading. Also, the teachers were asked if they noticed the participants using any of the target vocabulary words spontaneously within the classroom.
Data Analysis

Observational Data

The vertical distance between the two data paths was visually inspected to determine the differential effect or difference in experimental control produced by each treatment. In alternating treatment designs, experimental control is defined as “objective, believable evidence that different levels of responding are predictably and reliably produced by the presence of the different treatments” (Cooper et al., 2007, p. 189). A clear demonstration of experimental control was determined if little or no overlap occurred between the DR only data path and the DR + AC data path and stable levels or opposing trends were evident. The greater the fractionation or distance between data paths, the greater the differential effect on the dependent variables (Cooper, et al., 2007).

Descriptive Data

Individual gains in language behaviors were noted by documenting changes in score levels from pretest to posttest as measured by the three descriptive language measures: PPVT-III, EOWPVT-2000, and the Storybook Vocabulary Test. In addition to examining the pre- and post-test scores on the language measures implemented, descriptive data was also obtained by calculating the mean differences between the two treatment data for the cumulative responses to (a) vocabulary queries, (b) follow-up queries, and (c) spontaneous language. The mean difference was calculated by subtracting the lowest mean from the highest mean for matched trials among the two treatments for each participant. Matched trials were determined by matching a trial in one condition to a trial in the other condition based on their order of implementation. For example, the first trial in the DR Only condition was matched to the first trial in the DR + AC condition. The mean difference scores represented the average number of more correct responses for a condition within a trial compared to the other condition. These scores were reported to determine the condition that produced the highest average level of responding even when this information could not be visually detected.

Summary

An alternating treatment design without a no-treatment control was employed to determine the effects of dialogic reading plus attention cues compared to dialogic reading alone on expressive vocabulary of children with autism. The two treatment conditions consisted of DR only and DR plus ACs. Five children with limited vocabulary participated. The independent
language responses and spontaneous comments of each participant were recorded. In addition, the participants were pre- and post-tested using the PPVT-III, EOWPVT-2000 and Storybook Vocabulary Test.

Pre-service teachers in a special education teacher preparation program were recruited to be the readers for this study. The readers were trained by the researcher. Eight different storybooks were read to the participant children over the course of six to eight weeks. These books were pre-selected based on criteria that made them conducive to dialogic reading. In order to ensure the DR technique used was standard across adult readers and conditions, the DR queries were scripted for each storybook. The attention cues were laminated 3 x 3 photographs that represented targeted responses. Targeted vocabulary words were pre-selected and mostly nouns with the occasional present tense action verb. Follow-up queries were attribute and function questions about the targeted vocabulary words. Inter-observe reliability, implementation fidelity, and social validity were checked. Finally, the observational data of independent responses was visually inspected to determine if a differential effect occurred between the DR only treatment and the DR plus AC treatment conditions.
CHAPTER IV.

RESULTS

The purpose of this study was to compare the effects of two different methods of dialogic reading on the expressive language use of children with autism. The first method implemented dialogic reading without the addition of attention cues and the second method used dialogic reading with the addition of attention cues.

Participants

Five male elementary school students participated in this investigation. At the start of the study, their ages ranged from 5.2-years to 7.9-years old. The average age was approximately 6.6-years old. According to each student’s educational records, they received a score that indicated greater than a 25% delay on the Cognitive subtest of the Learning Accomplishment Profile Revised Edition (LAP-R) assessment (see Table 4.1 for Participant Descriptors). Two participants were given Autism Spectrum Disorder (ASD) as their primary label by the local school district. Two participants had the primary label of Language Impaired (LI) and one participant was labeled as Developmentally Delayed (DD).

<table>
<thead>
<tr>
<th>Participant</th>
<th>Age</th>
<th>Exceptionality</th>
<th>LAP-R Cognitive Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>John</td>
<td>6-6</td>
<td>ASD</td>
<td>36 mo. @ CA=54 mo., Date administered: 10/07</td>
</tr>
<tr>
<td>Mike</td>
<td>5-8</td>
<td>LI</td>
<td>24 mo. @ CA=36 mo., Date administered: 2/07</td>
</tr>
<tr>
<td>Chase</td>
<td>5-2</td>
<td>DD</td>
<td>24 mo. @ CA=52 mo., Date administered: 12/08</td>
</tr>
<tr>
<td>Luke</td>
<td>7-6</td>
<td>ASD</td>
<td>36 mo. @ CA= 59 mo., Date administered: 4/07</td>
</tr>
<tr>
<td>Steven</td>
<td>7-9</td>
<td>LI</td>
<td>42 mo. @ CA=54 mo., Date administered: 4/06</td>
</tr>
</tbody>
</table>

Participants’ Autism Spectrum Disorder Characteristics

Despite their primary label, all students did exhibit ASD characteristics and were identified by their teacher as having ASD in conjunction with their other labeled disabilities. The adults who worked with the participants (e.g. teachers, aides, and readers) were asked for this
study to describe the characteristics of the participants within the three ASD definition domains: social impairment, communication impairment, and unusual patterns of behavior.

The adults who worked with John described his social skills as being delayed. John was not age-appropriately socially interactive with his peers, he only engaged in parallel play. He often escaped social situations by walking or running away from the scene. John had difficulty understanding and using nonverbal social cues such as eye-gaze and facial expressions. He almost never used language spontaneously to share interest or enjoyment. John’s communication skills were described as delayed for his age. John used repetitive verbalizations, was dependent upon visual supports, and he rarely used language socially. John was described as having restricted, repetitive, and stereotyped patterns of behaviors. John perseverated on activities such as drawing churches. John was easily distracted. He was resistant to change; he flapped his hands and body rocked when over stimulated.

Mike’s social skill delays were described as him having difficulty developing age-appropriate peer relationships. His communication impairment was said to interfere with his ability to sustain a conversation. He would often go on a tangent or get off topic while talking to another individual. He was also described as having repetitive and idiosyncratic use of language. Mike’s unusual patterns of behavior consisted of having an abnormal intense focus on topics of his own interest, such as John Deer tractors. He exhibited a persistent preoccupation with parts of objects; he was resistant to routine changes, displayed awkward motor movements, and hand flapping. In addition, Mike had poor attention and trouble focusing on the tasks at-hand.

The ASD social impairments that Chase displayed were described as him being disconnected with the people in his surroundings. He appeared to be daydreaming often. Chase did not initiate social interactions with others or play with his peers. His communication impairment was described as him having a limited ability to communicate functionally, he relied on visual cues, and he rarely used language spontaneously. Chase exhibited delayed echolalia. The unusual patterns of behavior Chase displayed were repetitive motor mannerisms, such as spinning his body in a circle. He had difficulty focusing on tasks, he was easily distracted. He threw tantrums when asked to do something he disliked. He also showed restricted patterns of interests and intensity of interest such as the need to complete all puzzles in his sight or the need to line objects in a row.
The adults described Luke’s ASD social impairment as him having difficulty with nonverbal social behaviors, such as the use of eye-gaze. He had difficulty initiating play with peers and often acted inappropriately. He usually would only parallel play with other children. His communication impairment was described as him being dependent upon verbal prompts to use language. He rarely used language spontaneously or initiated a conversation. It was common for Luke to engage in delayed echolalia. Additionally, Luke was highly distractible. Luke’s unusual patterns of behavior described were persistent preoccupation with parts of objects or toys. He would often display very repetitive play with toys. For example, Luke did not pretend play with the toy instead he would press only one button on the toy repeatedly to hear the same song over and over again.

The adults described Steven as having difficulty forming peer relationships. He was described as having difficulty understanding other peoples’ emotions. Steven’s spoken language was delayed. He had trouble expressing himself and sustaining a conversation. Steven was inflexible to changes in routines. When angry, Steven would engage in tantrums and aggressive behaviors.

Participants’ Language Characteristics

In addition to ASD characteristics, all participants exhibited delayed language skills detected during the pre-test screening scores and described by the adults who worked with them. The pre-tests implemented for selection purposes included two standardized measures and one curriculum-based measure created by the researcher. The two standardized measures were the Expressive One Word Picture Vocabulary Test (EOWPVT-2000; Brownell, 2000) and the Peabody Picture Vocabulary Test (PPVT-III; Dunn & Dunn, 1997). The EOWPVT is a measure of expressive language; the PPVT is a measure of receptive language. On the EOWPVT, participants’ standard scores ranged from <55 to 68, with an average standard score of 61 and a median standard score of 60. The range of standard scores on the PPVT was from 54 to 75, with an average standard score of 64 and a median standard score of 62. See Table 4.2 for each participant’s individual scores on these standardized measures.
Table 4.2

<table>
<thead>
<tr>
<th>Participant</th>
<th>EOWPVT Standard Score</th>
<th>PPVT Standard Score</th>
<th>SVT Subtest A (Expressive) % correct</th>
<th>SVT Subtest B (Receptive) % correct</th>
<th>SVT Subtest C (Explicating) % correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>John</td>
<td>60</td>
<td>57</td>
<td>45%</td>
<td>88%</td>
<td>0%</td>
</tr>
<tr>
<td>Mike</td>
<td>65</td>
<td>72</td>
<td>49%</td>
<td>96%</td>
<td>52%</td>
</tr>
<tr>
<td>Chase</td>
<td>68</td>
<td>75</td>
<td>50%</td>
<td>76%</td>
<td>40%</td>
</tr>
<tr>
<td>Luke</td>
<td>59</td>
<td>54</td>
<td>44%</td>
<td>88%</td>
<td>0%</td>
</tr>
<tr>
<td>Steven</td>
<td>&lt;55</td>
<td>62</td>
<td>54%</td>
<td>96%</td>
<td>60%</td>
</tr>
</tbody>
</table>

Note: Percent scores have been rounded.

A curriculum-based screening measure was created for this investigation called the Storybook Vocabulary Test or SVT. The SVT consisted of three subtests: Expressive Subtest A, Receptive Subtest B, and Explicating Subtest C. This test contained pictures duplicated directly from the storybooks used during the interventions. In the Expressive Subtest, the participants were asked to name the picture. The Receptive Subtest asked students to point to the picture (among four options) that best answered the question (e.g. “point to the ___”). During the Explicating Subtest, participants were asked questions that required at least a one word answer describing the picture. The questions were mainly about the attributes or function of the object in the pictures, such as, “What is he doing?”

The participants’ pre-test scores on the SVT Expressive Subtest ranged from 44% to 54% correct, with a median score of 49% and an average score of approximately 48% correct. The scores ranged from 76% to 96% correct on the pre-test of the SVT Receptive Subtest, the median score was 88%, and the average score was approximately 89% correct. On the SVT Explicative Subtest, the scores ranged from 0% to 60% correct, with a median score of 40% and an average score of approximately 30% correct (see Table 3).

The participants’ language characteristics were also described by the adults who worked with them. John’s expressive language was described as delayed. The adults who worked with John reported that he only used two-word phrases, he did not speak in full sentences, and he relied on verbal models and visual cues to prompt appropriate language use. His receptive language was described as better than his expressive language use. The adults interviewed said John could understand more than he could express. However, he did have trouble following
directions unless they were broken down into simple short phrases and consisted of only one or two steps.

Mike’s expressive language was described as being very verbal. He could initiate a conversation but often had difficulty staying on topic. His teacher said Mike had better expressive language than receptive language skills. Mike had trouble following simple directions.

Chase could request by using two and three-word phrases when prompted by an adult with either a verbal cue or visual cue. Chase’s vocabulary was large but he rarely used his language functionally or spontaneously. He used language to get what he wanted or needed but not socially. His receptive language was described as better than his expressive language. He did rely on visual cues to follow one step directions.

Adults reported that Luke’s vocabulary was delayed for his age. He could identify 100 vocabulary cards. He usually did not use language spontaneously. He spoke in short phrases or simple sentences. He had trouble comprehending spoken language and processing the different sounds of spoken language.

Steven had trouble with speech which may have exacerbated his language delay. Steven had a limited expressive vocabulary. He was described by his teacher as having a better receptive vocabulary. He was reported to follow verbal directions well.

**Setting**

This investigation was conducted in a medium-sized school district located in a North Florida county. The participants were from three different suburban schools. The special education classrooms included in this study served the students using the self-contained model with some mainstreaming into general education classrooms. Classroom A contained approximately seven students, one teacher, two paraprofessionals, and two practicum students. Classroom B contained approximately 10 students, one teacher, one behavior specialist, two paraprofessionals, and one practicum student. Classroom C contained approximately 15 students, two teachers, three paraprofessionals, and one practicum student.

**Vocabulary Queries**

Figures 4.1 through 4.5 depict results for each participant’s accumulated correct responses for vocabulary queries under the two treatment conditions, dialogic reading only (DR only) and dialogic reading plus attention cues (DR + AC). Three of the participants, John, Chase,
and Steven, performed better under the DR + AC treatment condition. One participant, Luke, performed better in the DR only treatment condition and one participant, Mike, performed equally well under both conditions. Regardless of the treatment condition, all participants showed improvement over time in their correct responses to vocabulary queries as evidence of their increasing slopes per graph.

![Graph of John’s Correct Cumulative Responses to Vocabulary Queries](image)

*Figure 4.1. John’s Correct Cumulative Responses to Vocabulary Queries*

The results for John (see Figure 4.1) show that experimental control over correct responses to vocabulary queries was obtained between the DR only and DR + AC condition because the data paths do not overlap with each other and the trend levels remain stable. The vertical distance, or fractionation, between the two conditions represents the amount of improvement, or differential effect, in correct responses to vocabulary queries produced by the two treatments. A moderate differential effect occurred, with John performing better over time in the DR + AC treatment condition. However, the trend of the data suggests that future overlap could occur weakening the evidence of experimental control. The mean difference was calculated by subtracting the lowest mean of the four trials from the highest mean for the two
conditions. The mean difference for John’s data was 4.25, favoring the DR + AC condition. Therefore, each time the DR + AC condition was implemented John averaged 4 more correct responses compared to his performance under the respective DR only trial.

![Figure 4.2. Mike’s Correct Cumulative Responses to Vocabulary Queries](image)

The results for Mike lacked evidence of experimental control between the two conditions (see Figure 4.2). The data paths for both conditions overlapped frequently, suggesting experimental control was not demonstrated. Consequently, the results for Mike’s cumulative number of correct responses to vocabulary queries showed no differential effect in either condition. The mean difference was 13.75 with the higher number of correct responses in the DR + AC condition. However, due to poor experimental control, the DR + AC condition cannot be considered a superior treatment for Mike.
Chase differentiated his correct responses to vocabulary queries based on the treatment condition he was given (see Figure 4.3). A clear fractionation between the data paths occurred, demonstrating that the DR + AC condition produced more correct responses over time. The differential effects were obvious, given that the vertical distance between the two data paths was large and the trends appeared they would continue to split if more time was given. This pattern was also evidence of strong experimental control between the two treatment conditions. The mean difference in cumulative responses between the DR + AC and DR only condition for Chase was 19.75 in favor of DR + AC.
In Figure 4.4, Luke’s results revealed strong experimental control in favor of the DR only condition. The data paths never overlapped and the trend levels were different between the two treatment conditions. A differential effect occurred between the two conditions. The DR only condition produced more accumulated correct responses to vocabulary queries over time with a mean difference of 18.25.
Finally, Steven always produced more accumulated correct responses over time within the DR + AC condition (see Figure 4.5). The mean difference was 10 in favor of the DR + AC condition. No overlap of treatment data paths occurred. The trend levels remained stable for Steven. For this participant there was strong experimental control as evidence by the lack of data path overlap and trend stability.

In summary, a differential effect occurred for three participants (John, Chase, and Steven) showing higher rates of correct responses to vocabulary queries in the DR + AC condition. The average mean difference in cumulative responses was 11.33 for these participants. Therefore, each time the DR + AC condition was implemented three participants (John, Chase, and Steven) averaged about 11 more correct responses compared to their performance under the respective DR only trials. In addition, Mike also had a mean difference that favored the DR + AC condition, although his graph does not show experimental control. Luke was the only participant who did better in the DR only condition with a mean difference of 18.25.
Interobserver Agreement for Vocabulary Queries

The researcher collected inter-observer agreement (IOA) data on 25% of all reading sessions to determine how consistent the readers were when collecting data. The sessions were randomly selected within each reader. IOA was calculated using the overall agreement method. In this method the number of agreements is divided by the number of agreements plus disagreements and multiplied by 100 (Kennedy, 2005). The average IOA score for vocabulary queries was 94.5% in agreement. The scores ranged from 62.5% to 100%. Approximately 68% of the sessions checked resulted in 100% agreement and 95% of the sessions checked resulted in 80% agreement or higher. Eighty percent is considered the standard benchmark that small N designs should meet (Kennedy, 2005). The inter-observer reliability for each reader using Cohen’s Kappa Coefficient was also calculated. The kappa coefficient was used to control for the possibility that the two observers randomly agreed that a behavior occurred. For vocabulary queries, $k$ ranged from .82 to .95.

Sometimes, the quality of the VHS recordings was not optimal, making it difficult for the researcher to hear the participants’ responses. In the circumstance where the verbal responses were inaudible the researcher omitted the responses from the calculation. However, there were a handful of responses that may have been heard incorrectly or not heard at all by the researcher observing the session resulting in disagreements.

Follow-up Queries

The results for each participant’s accumulated correct responses to follow-up queries are depicted in Figures 4.6 through 4.10. Visual analyses of these graphs suggest that neither treatment condition reliably produced better results across all five participants. One participant, Steven, showed greater improvement to follow-up queries under the DR + AC condition. Another participant, John, showed more improvement to follow-up queries in the DR only condition. The results of these data for the remaining three participants’ suggest weak experimental control and weak differential effects between the two treatment conditions; therefore making it difficult to determine the superior treatment condition for follow-up queries.
Figure 4.6. John’s Correct Cumulative Responses to Follow-up Queries

In Figure 4.6, John’s data revealed greater rates of improvement in the number of correct responses to follow-up queries in the DR only condition. Over time the fractionation between the two conditions appears to grow larger, indicating a clear differential effect, with John consistently performing better in the DR only condition. Experimental control is evident, given that no data points overlap, and the trend lines remain stable. The mean difference is 8, favoring the DR only condition.
Figure 4.7. Mike’s Correct Cumulative Responses to Follow-up Queries

For Mike it is difficult to determine if experimental control was established because the data paths for the two conditions overlap (see Figure 4.7). The slope of the data in the DR + AC condition produced faster rates of responding for Mike however. A split between the two treatment conditions is not evident, making it difficult to determine the differential effects of either condition. Nonetheless, the mean difference favored the DR + AC condition with a score of 11.75.
The data shown on Chase’s graph in Figure 4.8 depicts a similar scenario as Mike. Experimental control was not established and a clean split between the two treatment conditions is not evident. The differential effects of the two different treatment conditions could not be determined. The mean difference was 9.25, with more correct responses occurring in the DR only condition.
Figure 4.9. Luke’s Correct Cumulative Responses to Follow-up Queries

Luke’s data (see Figure 4.9) is similar to Mike’s and Chase’s data. Luke had more correct responses to follow-up queries during first three matched trials in the DR only condition. The mean difference was 8 and favored the DR + AC condition. The trend lines appear to have a split for the first five trials and then overlap starting at trial 6. This overlap reduces the confidence we may have in experimental control and makes it difficult to determine if a differential effect occurred for either condition.
Figure 4.10. Steven’s Correct Cumulative Responses to Follow-up Queries

A noteworthy differential effect did occur between the two conditions in Figure 4.10. Steven produced more correct responses to follow-up queries in the DR + AC condition. A clear fractionation between the two data paths is evident. Also, experimental control was established. No data points overlap, however, the trend lines appear they will overlap in the future. This suggests the experimental control will be weakened. The mean difference for Steven’s data is 11.25 in favor of the DR + AC condition.

Steven’s data is the only data that revealed a differential effect favoring the DR + AC condition with follow-up queries. John’s data is the only data that revealed a differential effect favoring the DR only condition. The majority of the participants’ data was difficult to interpret and ultimately revealed no differential effect between treatment conditions on this measure. Still, all participants improved in their correct responses to follow-up queries overtime regardless of the treatment condition.
Interobserver Agreement for Follow-Up Queries

The same 25% of all reading sessions that were checked for IOA for vocabulary queries were also checked for IOA for follow-up queries. The average IOA score for follow-up queries was 95%. The lowest score was 71% and the highest score was 100%. Sixty-eight percent of the scores were 100% in agreement. Thirty-six percent of the scores were in 80% agreement or above. The kappa coefficients ranged from $k = .81$ to $k = .97$.

Appropriate Spontaneous Verbalization

Figures 11-15 depict the results for the accumulated appropriate spontaneous verbalizations. Spontaneous verbalizations were those appropriate to the story said by the participants. Two of the five participants, John and Steven, exhibited more appropriate spontaneous verbalization within the DR + AC condition. Two participants, Mike and Luke, spontaneously verbalized more during the DR only condition. Only one participant, Chase, did not show differential responding in either condition. However, a steeper slope for spontaneous verbalization was present within the DR only condition for Chase.

![Graph](image)

*Figure 4.11. John’s Appropriate Spontaneous Verbalizations*
John’s data (see Figure 4.11) reveal a notable differential effect favoring the DR + AC condition. Experimental control was clearly established, there was no overlap among the two data paths and the differential effect was evident. The fractionation between the two treatment conditions continued to increase over time. The largest split in the two data paths occurred between the last two trials. The mean difference in cumulative appropriate spontaneous verbalizations produced by John was 21.25, in favor of the DR + AC condition.

![Graph](image.png)

*Figure 4.12. Mike’s Appropriate Spontaneous Verbalizations*

Experimental control was demonstrated under the DR only condition for Mike. His trend lines do not overlap, and continue to remain stable over time (see Figure 4.12). Mike displays more usage of appropriate spontaneous verbalization during the DR only condition. A differential effect existed. The distance between the two data paths remained relatively similar over time. The mean difference of 16 favors the DR only condition.
The data on Chase’s graph (see Figure 4.13) does not show differential responding in either condition. The two data paths intersect between trials 4 and 5. However, the slope of learning is steeper within the DR only condition. Overall, Chase accumulated more correct responses in the DR only condition by the last trials. Due to the overlapping data paths, experimental control was not established. The mean difference in cumulative appropriate spontaneous verbalization was 30, in favor of the DR only condition.
Figure 4.14, shows the cumulative totals for Luke’s appropriate spontaneous verbalization. Experimental control was established and a differential effect is evident. Luke produced more spontaneous language during the DR only treatment condition. The mean difference, 10.25, favors the DR only condition.
Steven’s data (see figure 15) reveals a split between the two data paths with more appropriate spontaneous verbalization used during the DR + AC condition. The distance between the two data paths remained relatively large. For the majority of the time the fractionation continues to expand until trials 7 and 8. Here the fractionation starts to reduce but never overlaps. Experimental control was established. A mean difference of 14 exists for the cumulative spontaneous verbalization favoring the DR + AC condition.

In summary, regardless of the condition, all participants increased their use of appropriate spontaneous language use during the storybook reading interventions. Four of the five participants more than doubled the amount of times they spontaneously verbalized. Two of these participants did better in the DR + AC condition and two did better in the DR only condition. One participant did not show a differential treatment effect for this measure.

**Interobserver Agreement for Appropriate Spontaneous Verbalization**

Again, the same 25% of all reading sessions that were checked for IOA for vocabulary queries and follow-up queries were also checked for IOA of appropriate spontaneous
verbalization. The average IOA score for spontaneous verbalization was 77.4%. The scores ranged from 0% to 100% in agreement. The kappa coefficients ranged from $k = .14$ to $k = .89$. The lowest kappa coefficients were $k = .14$ and $k = .17$. Disagreements mainly occurred for the same reason. Often the readers would record language spoken by the participant as spontaneous, when, if fact it was not spontaneous because it occurred in response to a prompt.

**Storybook Vocabulary Test**

The Storybook Vocabulary Test was a curriculum-based measurement created for the purpose of this study. This test consisted of three subtests: (a) Expressive Language, (b) Receptive Language, and (c) Explicating Language. This test was given both as a pre-test and post-test. See Table 4.3 for each participant’s pre-test and post-test score comparisons. The Expressive Language Subtest, Subtest A, scores ranged from 45% to 54% on the pre-test, with an average of 48%. During the post-test, on the Expressive Language Subtest, the participants’ scores ranged from 51% to 68% correct. The average score was 61%. When Subtest A’s pre-test scores are compared with subtest A’s post-test scores all the participants improved on this expressive language measure. Mike improved the most raising his score 33 points. John had the least amount of improvement, raising his score 17 points. The average increase in points was about 26 points.

For the Receptive Language Subtest, Subtest B, the average pre-test score was 89%. The lowest score was 76%, while the highest score was 96% correct. Scores ranged during the Receptive subtest post-test from 84% to 100% correct. The average score was about 93% correct. During the post-test, two participants achieved the ceiling with 100% correct. From pre-test to post-test, three of the participants improved, one remained the same and one had a slight decrease in score. The participant with the most gain on this measure was Chase, with a 4 point increase. The participant who remained the same was Luke, and John decreased by 1 point. The average increase was 1 point across participants on the SVT Receptive Subtest.

The pre-test scores on the Explicating Language Subtest, Subtest C, ranged from 0% to 60%, averaging 30% correct. The Explicating subtest post-test scores ranged from 20% to 88% correct, with an average score of about 61% correct. All the participants increased their Explicating Subtest scores from pre-test to post-test. Two participants increased their score by 10 points. The least amount of improvement was a 5 point increase for John. The average increase for all the participants was 8 points on the SVT Explicating subtest.
Table 4.3  
Pre-test and Post-test Storybook Vocabulary Test Scores  
<table>
<thead>
<tr>
<th>Participant</th>
<th>Subtest A (Expressive) Pre-test</th>
<th>Subtest A (Expressive) Post-test</th>
<th>Subtest B (Receptive) Pre-test</th>
<th>Subtest B (Receptive) Post-test</th>
<th>Subtest C (Explicating) Pre-test</th>
<th>Subtest C (Explicating) Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>John</td>
<td>45/100 = 45%</td>
<td>62/122 = 51%</td>
<td>22/25 = 88%</td>
<td>21/25 = 84%</td>
<td>0/25 = 0%</td>
<td>5/25 = 20%</td>
</tr>
<tr>
<td>Mike</td>
<td>49/100 = 49%</td>
<td>62/122 = 67%</td>
<td>24/25 = 96%</td>
<td>25/25 = 100%</td>
<td>13/25 = 52%</td>
<td>19/25 = 76%</td>
</tr>
<tr>
<td>Chase</td>
<td>50/100 = 50%</td>
<td>62/122 = 67%</td>
<td>19/25 = 76%</td>
<td>23/25 = 92%</td>
<td>10/25 = 40%</td>
<td>20/25 = 80%</td>
</tr>
<tr>
<td>Luke</td>
<td>44/100 = 44%</td>
<td>65/122 = 53%</td>
<td>22/25 = 88%</td>
<td>22/25 = 88%</td>
<td>0/25 = 0%</td>
<td>10/25 = 40%</td>
</tr>
<tr>
<td>Steven</td>
<td>54/100 = 54%</td>
<td>83/122 = 68%</td>
<td>24/25 = 96%</td>
<td>25/25 = 100%</td>
<td>15/25 = 60%</td>
<td>22/25 = 88%</td>
</tr>
</tbody>
</table>

**Standardized Measures**

Table 4.4 compares each participant’s pre- and post-test scores on the two standardized measures administered during the study. The first standardized measure administered was the Expressive One Word Picture Vocabulary Test (EOWPVT). This is a measurement of expressive language. The mean standard score on the pre-test was 61. The pre-test scores ranged from <55 to 68. The post-test standard scores on the EOWPVT ranged from 60 to 69. The average standard score on the EOWPVT post-test was 63. Four of the five participants increased their EOWPVT standard score from pre-test to post-test. The highest increase was 3 points. John was the only participant who did not increase his standard EOWPVT score during this study. However, John’s scores did not decrease but remained the same.

The second standardized measure administered was a test of receptive language called the Peabody Picture Vocabulary Test (PPVT). The standard scores for this instrument ranged from 54 to 75 on the pre-test and 50 to 87 on the post-test. The average standard pre-test score was 64 and the average post-test score was 69. Four of the five participants improved from pre-test to post-test on PPVT. Chase made the greatest gains, improving 12 points and moving into the normal range on this measure. Luke made the least amount of gains in receptive language. He decreased his score by 4 points during the study.

Table 4.4  
Pre-test and Post-test Standardized Measures Scores  
<table>
<thead>
<tr>
<th>Participant</th>
<th>EOWPVT Pre-test</th>
<th>EOWPVT Post-test</th>
<th>PPVT Pre-test</th>
<th>PPVT Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>John</td>
<td>60</td>
<td>57</td>
<td>59</td>
<td></td>
</tr>
<tr>
<td>Mike</td>
<td>65</td>
<td>72</td>
<td>79</td>
<td></td>
</tr>
<tr>
<td>Chase</td>
<td>68</td>
<td>75</td>
<td>87</td>
<td></td>
</tr>
<tr>
<td>Luke</td>
<td>59</td>
<td>54</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Steven</td>
<td>&lt;55</td>
<td>62</td>
<td>69</td>
<td></td>
</tr>
</tbody>
</table>
Treatment Fidelity

The researcher selected and coded a representative sample of the reading sessions for treatment fidelity. The representative sample consisted of 35% of the original 160 reading sessions. The representative sample consisted of six sessions from the DR Only condition and six sessions from the DR + AC sessions for each reader. Of the six sessions in each condition, two were from session one and four were from sessions two through four.

The average treatment fidelity score across all five participants was 92%. The data revealed that had the highest average was 97%. The other reader’s scores were 95%, 94%, 91%, and 84%. The reader with the lowest score implemented the least amount of sessions resulting in less sessions checked and less practice. Both of these factors may have contributed to her lower score. In addition treatment fidelity was calculated by participant as a measure of treatment intensity, see Table 4.5.

Table 4.5
*Treatment Intensity*

<table>
<thead>
<tr>
<th>Participant</th>
<th>Treatment Intensity Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>John</td>
<td>94%</td>
</tr>
<tr>
<td>Mike</td>
<td>92%</td>
</tr>
<tr>
<td>Chase</td>
<td>91%</td>
</tr>
<tr>
<td>Luke</td>
<td>94%</td>
</tr>
<tr>
<td>Steven</td>
<td>93%</td>
</tr>
</tbody>
</table>

Social Validity

At the completion of the intervention the teachers were interviewed by the researcher to gather information on social validity. Teachers were asked if they noticed differences in their student(s) literacy and language behaviors when engaged in storybook reading activities within the classroom. The teachers were also asked if they noticed their student(s) using any of the target words from the intervention spontaneously within the classroom.

John’s teacher reported that after the intervention John seemed to be more attentive during storybook activities in the classroom. She said he looked at the book more, and tried to leave the activity less often than before. John’s teacher also identified 21 words off the target word list from the intervention that John used spontaneously within the classroom.

Mike’s teacher said since the intervention started Mike’s vocabulary expanded, his expressive language became more appropriate (e.g. he was on topic more often). Also his
receptive language improved. Mike’s mother expressed to his teacher that she noticed improvements at home as well. His teacher said she noticed he used most of the target vocabulary words spontaneously within the classroom since the intervention had started.

Chase’s teacher noticed improvements in his ability to attend to a group storybook reading activity. She did not notice Chase interacting more during storybook reading activities. She identified eight words from the target list that he used spontaneously within the classroom since the intervention started.

Luke’s teacher said that towards the end of the intervention Luke’s conversation skills improved for the first time in two years. He spontaneously initiated more conversations and his conversations were more meaningful. She also reported that Luke seemed more attentive to storybook reading activities. She identified two new target vocabulary words that she noticed Luke using within the classroom. She said he was using some of the words on the list before the intervention started.

Steven’s teacher felt it was difficult to answer the interview questions because she didn’t see Steven in her classroom much since he started spending more time in the general education classroom. She did notice that he was spontaneously talking more often. He was also expressing himself with more coherent sentences since the beginning of the intervention.

Overall, the social validity data gathered from interviewing the teachers indicated that improvements were noticed in both expressive and receptive vocabulary over the course of the intervention in all five participants. In addition, three of the five students, John, Chase, and Luke, were observed to be more attentive during classroom storybook reading activities.

Conclusion

Prior to the start of this investigation it was hypothesized that dialogic reading with the addition of attention cues would be superior to dialogic reading alone in increasing the rate of using new vocabulary words during shared-book reading for the participants with ASD characteristics in this study. The results did not support this hypothesis. The results varied per measure and per participant. It is important to note that all participants improved in expressive vocabulary use across all measures regardless of the condition. These results may encourage teachers and parents to implement dialogic reading techniques with children with ASD characteristics.
CHAPTER V.
DISCUSSION

The intent of this study was to determine the differential effects of two storybook reading interventions on the expressive vocabulary use of children with autism spectrum disorder characteristics. The interventions were based on dialogic reading methods. One treatment intervention consisted of implementing phase one of dialogic reading only (Zevenbergen & Whitehurst, 2003), the second treatment intervention consisted of implementing phase one of dialogic reading with the addition of attention cues. A small N alternating treatment without a no-treatment control condition was employed. Five children with autism spectrum disorder, five graduate students, and three special education teachers participated in this study.

All the children with autism were able to increase their expressive vocabulary use by the completion of the study with or without attention cues. Additionally, positive gains were noted on the standardized assessments related to vocabulary acquisition. The teachers of the children with autism reported the interventions resulted in favorable changes in their students’ vocabulary use during storybook reading sessions and in spontaneous language use within the classroom.

The findings extend the research on the development of naturalistic interventions for children with autism. Dialogic reading can be considered a naturalistic intervention because it takes place within a natural setting, is child directed, and consists of functional goals. Therefore, the results of this study provide further support for the implementation of naturalistic interventions recommended by the NRC (2001).

Interpretation by Measures

A total of 15 analyses across the three types of measures and the five participants were conducted. After analyzing all the data from the vocabulary query data sets, follow-up query data sets, and appropriate spontaneous verbalization data sets the findings are that six of the 15 analyses revealed more improvement occurring within the DR + AC condition. Four analyses revealed more improvement in the DR only condition, and a differential effect could not be
determined for five of the analyses. Neither condition could be considered superior in producing gains, however all of the participants improved when provided with dialogic reading. These findings could not determine if attention cues enhance dialogic reading for children with ASD characteristics but does suggest that dialogic reading with or without attention cues is beneficial. This conclusion is simply general results for this specific study, with these specific participants. Nevertheless, it does add preliminary knowledge on teaching expressive language skills to children with autism using adult-child book reading by providing additional support in two areas of research: using naturalistic interventions with children with ASD (NRC, 2001) and using dialogic reading to increase expressive language (Arnold, et al. 1994; Crain-Thoreson & Dale, 1999; Dale, et al., 1996; Hargrave & Senechal, 2000; Lonigan & Whitehurst, 1998; Valdez-Menchaca & Whitehurst, 1992; Whitehurst, Arnold, et al. 1994; Whitehurst, Epstein, et al., 1994; Whitehurst et al., 1988, 1999). This investigation was another illustration of how naturalistic interventions such as storybook reading can be beneficial for children with autism spectrum disorders. Plus, this investigation extends the external validity of previous DR research that supports the use of DR to increase expressive language. This knowledge leads the field of special education to future research inspiration in emergent literacy interventions using dialogic reading techniques for children with autism.

**Vocabulary Queries.** Over time, all participants improved in their number of cumulative correct responses to vocabulary queries regardless of the condition. The majority of the participants had a higher rate of correct responses within the DR + AC condition. Of all the three measures; vocabulary, follow-up, and appropriate spontaneous verbalization, this measure was the only one that clearly revealed more participants showing improvement in the DR + AC condition. This measure most clearly showed DR + AC to be superior. This may be due to three factors. First, the data collection for this measure was the simplest because the answers to the vocabulary queries were explicit. This made it simple for the reader to collect data and it was easy for the readers to know when to apply the decision rules to correct the participants. The second factor is the attention cues for vocabulary queries were the clearly represented. Assigning a symbolic picture to represent the vocabulary word elicited during a vocabulary query was more straight-forward than it was for follow-up queries. For example, follow-up queries could easily have more than one correct answer and were difficult to represent with a picture compared to vocabulary queries. Finally, the inter-observer agreement for this measure was excellent. This
tells us two things; one, the data collection procedure was reliable and two, the data can be considered valid (Kennedy, 2005).

**Follow-up Queries.** The data for the follow-up queries measure did not reveal a superior treatment condition. The majority of the data analyses did not exhibit experimental control. Of the remaining two, one data set revealed DR + AC to be superior and one data set revealed DR only to be superior. Therefore, no condition can be considered better in producing gains for follow-up queries. Again, it is important to note that all the participants did make gains over time, regardless of the treatment condition. Three possible reasons that the majority of the data on this measure did not show a differential effect are: the AC’s for follow-up queries were difficult to assign as referents, this expressive language skill is more difficult than simply labeling (e.g. answering vocabulary queries), and the readers had the most difficulty following decision rules for this type of query, hindering experimental control.

Identifying attention cues that represented the targeted responses to follow-up queries was challenging. The targeted responses were mostly adjectives and present tense verbs. Verbs and adjectives are more difficult to represent symbolically with a picture than nouns. In addition, AC images were considered secondary symbolic references; therefore some generalization was required by the participant to transfer their knowledge of the picture to the vocabulary word. Combining the poor representation of AC’s with the impaired symbolic use children with autism possess (NRC, 2001) created a problem unique to this measure, answering follow-up queries. It may have been easier for some of the participants, especially the participants who displayed the most classic autism characteristics, if manipulatives were used instead of pictures to cue the targeted response. Manipulatives are a more direct or proximal symbol of the targeted response than a picture. For example, if the follow-up query was “what is the duck doing?” and the targeted response was “splashing” the manipulatives used could have been splashing water in a bowl instead of showing a picture of splashing. Manipulatives were used in a similar manner in the study by Bellon et al. (2000) to provide concrete examples of story concepts.

**Appropriate Spontaneous Verbalization.** A superior condition could not be determined for the appropriate spontaneous verbalization measure either. For this measure, two of the five participants did better in the DR + AC condition and two did better in the DR only condition. That left one participant who did not show a differential effect for either condition. It is possible that for some participants the use of attention cues my have hindered their spontaneous language
if they were waiting for a prompt. On the other hand the ACs may have indirectly helped some participants use spontaneous language pertaining to the story if they had learned more new vocabulary as a result of the addition of ACs. These differences are specific to the individual characteristics of the participants and may be linked to how well the intervention met their zone of proximal development. As described in Vygotsky’s (1978) social-constructivist theory, learning occurs within the zone that is just beyond the learners’ current abilities.

The inconclusive results may also be due to the variance in treatment fidelity regarding how well the readers expanded on appropriate spontaneous language throughout the treatment sessions. The readers struggled with this part of the intervention and the readers’ treatment fidelity scores for the spontaneous language indicator varied from 0% correct to 100% correct. In addition, readers may have been defining appropriate spontaneous verbalizations incorrectly, therefore counting them incorrectly. The functional definition of appropriate spontaneous verbalizations was any meaning unit of language spoken during the reading session that was not following a prompt and appropriate to the story topic or pictures. An incorrect understanding of appropriate spontaneous verbalization by the readers may have had an effect on the inter-observer agreement scores.

**Descriptive Data.** Descriptive data was collected by administering three pre- and post-tests. The three assessments consisted of two standardized measures and one curriculum-based measure. The two standardized measures were the Expressive One Word Picture Vocabulary Test (EOWPVT-2000; Brownell, 2000) and the Peabody Picture Vocabulary Test (PPVT-III; Dunn & Dunn, 1997). This provided a total of 10 pre-test/post-test scores across all five participants. The curriculum-based measure was the Story Book Vocabulary test (SVT) created for this investigation. The SVT consisted of three subtests, for a total of 15 pre-test/post-test scores on the SVT across all participants. When adding the 10 standardized scores to the 15 curriculum-based scores, a total of 25 scores were produced. Of the 25 scores only three scores did not improve from pre- to post-test. One unimproved score was from the SVT Receptive language subtest (John), one was from the EOWPVT (John), and one was from the PPVT (Luke). The remainder 22 scores all increased. Whether or not the increase in these scores was considered statistically significant could not be determined due to the small sample size. However, it is noteworthy that increases were made by the majority of the participants on the majority of the assessments, especially since two of the three assessments were standardized.
Standardized scores are often difficult to improve in short amounts of time for children with developmental disabilities. It is important to note that the post-test gains should be interpreted with caution. These descriptive results cannot be assumed to have improved as a direct result of the intervention. For example, simply maturation could be another feasible explanation for post-test gains.

**Treatment Fidelity.** Treatment fidelity was checked on a representative sample of 35% of the treatment sessions. Overall, across all indicators and across all readers, the treatment fidelity scores were favorable, with an average score of 92%. Although the readers scored high taken as a whole, most of the variance in treatment fidelity came from two sources. The readers did poorly on the *expanding on spontaneous language* indicator, with an average score of 61%. As a group they also did poorly on the *decision rules* indicator, with an average score of 77%. The implication of these low scores is that more training was needed in these areas of the treatment. The readers had a tendency to focus more on the delivery of vocabulary queries and follow-up queries throughout the sessions rather than pausing and allowing time for spontaneous language and then expanding on spontaneous language. Video training, as implemented in the dialogic reading study by Arnold et al. (1994) may have aided in avoiding these problems. Arnold et al. (1994) found that using a video to train interventionists was more successful because it standardized the delivery of the training and provided good models of what was expected of the readers.

Another reason readers may have not expanded upon spontaneous language could have been due to a lack of time to complete the sessions. It was a common situation to have the readers rushing to incorporate time to complete the sessions so that the participants could still participate in their daily classroom routines such as special area, lunch, and academic lessons. Finally, the reader was often managing behavior throughout the sessions which may have diverted some time and energy from fostering spontaneous language.

Following the decision rules was the most scripted and difficult part of the intervention. The most common step of the decision rules to be violated in both the DR only condition and the DR + AC condition was the step for which the reader had to repeat the participant’s correct response. Repeating the participant’s correct response provided the participant with positive reinforcement and a correct model needed to increase future correct responses. It was important that the readers followed the decision rules protocols correctly in order to create a controlled
study. The inspection of this fidelity indicator was scrutinized the most compared to the other indicators.

**Interpretation by Participants**

Five children with autism spectrum characteristics participated in this study. Results indicate that using dialogic reading techniques benefited all participants, but there were individual differences in how they improved.

**Chase.** Chase improved more in the DR + AC condition on vocabulary queries compared to his improvement in the DR only condition. Chase’s results did not show a differential effect for the other two measures; follow-up queries, and appropriate spontaneous verbalization. Chase received the label of developmentally delayed by his school district and was the youngest of the participants; 5.2 years old. Chase seemed to benefit greatly from the attention cues when answering vocabulary queries. During observations of the DR + AC sessions Chase appeared to be very interested in the AC’s. They often redirected his attention back to the task when he would repeatedly get off task due to his short attention span. He also would refer back to the AC’s on the foam board throughout the queries. It was interesting that Chase had the highest expressive and receptive language score on the standardized measures at pre-test compared to his peers participating in this study. Of all the children in this study, Chase’s age and language scores were the most similar to the children in previous dialogic reading studies that included children with language delays (Crain-Thoreson & Dale, 1999; Dale, et al., 1996; Hargrave & Senechal, 2000). The major difference between Chase and the participants in previous studies were his ASD characteristics observed such as his behavior problems, and his short attention span. This may be another reason the DR + AC condition was superior for Chase when answering vocabulary queries; essentially he fit the mold needed for the theory of why AC’s may be beneficial to use during dialogic reading for children with ASD characteristics.

In addition, Chase’s improvement from pre-test to post-test on the PPVT was noteworthy. His pre-test standard score was 75; this is two standard deviations below the mean. His post-test standard score of 87 was only one standard deviation below the mean. This improvement is notable because it is very difficult to change a standard score to such degree over a short period of time (e.g. eight weeks), especially for children with disabilities. It is interesting that the PPVT score improved more than the expressive language score. This may be because in typical development children have larger receptive vocabularies than expressive (Tager-Flusberg, Paul,
This receptive language improvement does not reflect the results of previous dialogic reading studies. Previous dialogic reading studies repeatedly mentioned how difficult it was to significantly improve the participants’ receptive language using dialogic reading and therefore deemed dialogic reading as an expressive language intervention not a receptive language intervention (Zevenbergen & Whitehurst, 2003). It is important to note that the post-test gains are simply descriptive in nature and should be interpreted with caution. The results cannot be assumed to have improved as a direct result of the intervention. Other plausible explanations could be that the intervention taught Chase, and other participants, how to become a better test taker, or the participant became acclimated to the examiners over time, or maturation attributed to his improvement.

John. John’s diagnosis given by the school was ASD and he had the most classic autism characteristics compared to all the participants in this study. He was 6.6 years old during this study, the third youngest of the participants. John responded best during the DR + AC condition for the vocabulary queries measure. Like Chase, John had difficulty attending to the storybook sessions and had some behavior problems throughout. The attention cues may have improved his ability to attend during vocabulary queries, in turn, decreasing the length of time he spent in the attention stage of learning allowing him to increase his rate of learning as theorized in Zeaman and House’s (1963) Attention Theory.

The data for John’s correct cumulative responses to follow-up queries reveals a slow rate of improvement in both treatment conditions as evident by the shallow and gradual slopes on this graph. John may have had difficulty processing the follow-up questions in both treatment conditions. Individuals with ASD commonly have difficulty with language comprehension (Tager-Flusberg et al., 2005).

Surprisingly, John responded slightly better within the DR only condition for the follow-up measure. A possible explanation may be the one given earlier in the discussion explaining that AC’s for follow-up queries are less representative of the targeted response compared to vocabulary query AC’s, therefore, making it easier to associate the correct response to vocabulary queries with AC’s than to responses to follow-up queries with AC’s. Also, given that this participant was labeled with classic autism and displayed an abundance of ASD characteristics, he may have had trouble using pictorial symbols for this level of queries. Manipulatives may have been a better, more concrete, symbol for John in scaffolding correct
follow-up query answers. Manipulatives were used in a storybook reading packaged program in a study conducted by Bellon, et. al. (2000). This study was also a single case design and included one boy with autism. This study, however, did not measure responses to follow-up type questions. The dependent measures in the Bellon, et al. (2000) study were only spontaneous speech and echolalic speech.

For the spontaneous language measure, John’s results favored the DR + AC condition. John’s increase in appropriate spontaneous verbalization during the DR + AC condition may be attributed to John learning new vocabulary appropriate to the story faster within this condition; therefore he had the appropriate vocabulary to use spontaneously. These results verify the premise that DR teaches vocabulary that carries over to better language use. John’s spontaneous language results are comparable to the results found in the Bellon, et al. (2000) investigation. Both investigations included a boy with autism, asked wh-questions throughout the reading, presented the book multiple times, expanded on spontaneous language, and lasted about two months. The major difference was that the Bellon et al. (2000) study used manipulatives and follow-up activities as more of a packaged intervention approach. Both results concluded that the shared book reading increased spontaneous language use.

Mike. Mike only showed a differential effect during the appropriate spontaneous verbalization measure, and it favored the DR only condition. Mike was the second youngest participant, 5.8 years old at the start of the study. His primary label issued by the school district was Language Impaired. Mike showed ASD characteristics but would be considered on the high functioning end of the spectrum. It was evident during observations, both within storybook reading sessions and during other classroom activities, that Mike already had a relatively large amount of spontaneous language for a child with language delays. Possibly, Mike may have showed the greatest gains during the DR only condition for appropriate spontaneous language because this condition did not limit his language use. Whereas, the DR + AC condition could have limited Mike’s language use if he was waiting for a pictorial cue to use language. It was clear during observations that Mike understood the purpose of the AC’s and relied on them during the DR + AC condition. He attended well to the AC’s and often looked for them prior to the session. He sometimes wanted to review the names of each AC prior to starting the session or even during the session. Although AC’s were appealing to Mike, they may not have been necessary. This may be an instance where the attention cues and possibly even the phase of DR
was not appropriately matched to the participant’s zone of proximal development. The social-constructivist theory highlights the importance of meeting the needs of the learner and constantly adjusting how the teacher provides support (Vygotsky 1978).

Mike, like Chase, was also similar in age and language scores to the children in previous dialogic reading studies that included children with language delays (Crain-Thoreson & Dale, 1999, Dale, et al., 1996, and Hargrave & Senechal, 2000). The major difference between Mike and Chase is that Mike’s behavior and attention span was not as problematic as Chase’s behavior and attention. Based on this characteristic, it is possible that Mike was even more similar to the participants in previous DR studies. This could also be why attention cues were not necessary for Mike and why phase two of DR may have been appropriate.

Luke. Luke was 7.6 years old, the second oldest participant. Luke’s primary disability given by the school district was ASD. Luke displayed classic autism characteristics. Luke showed the fastest rates of improvement within the DR only condition for both the vocabulary queries measure and the appropriate spontaneous verbalization measure. He did not show a differential effect for the follow-up measure. Luke’s pre-test scores were low on both the standardized measures and on the curriculum-based measure. Given his ASD characteristics and his pre-test scores, it was hypothesized that Luke would do better with the DR + AC condition for all measures. This was not the case. One possible reason may be that during the DR only condition Luke’s reader improperly prompted responses from Luke using hand gestures that represented the targeted response. For example, if the targeted response was the word rain, then his reader would move her hand in a downward motion and wiggle her fingers to represent rain during both the reading sessions and probes. This may have skewed the results in favor the DR only condition given that hand gestures were not part of the DR only intervention protocol. Another plausible explanation that DR only was superior may be that the attention cues were actually causing Luke to focus his attention more on the pictorial cues rather than the storybook itself. It was noticed during anecdotal observations that Luke had some difficult shifting his attention back to the storybook after presented with a cue.

A noteworthy observation was made by Luke’s teacher and reported in the social validity results. Luke’s teacher indicated that Luke’s conversation skills and spontaneous language improved for the first time in two years at the completion of this intervention. This provides preliminary evidence to previous literature supporting the use of adult-child book reading to
increase appropriate spontaneous verbalizations for children with autism spectrum disorders. Three previous studies discussed in this paper also found an increase in spontaneous verbalizations (Bellon et al., 2000; Colasent & Griffith, 1998; Koppenhaver et al., 2001).

Steven. Steven, the oldest child, 7.9 years old, showed a differential effect favoring the DR + AC condition for all three measures. He was the only participant to improve more in the DR + AC condition on all measures. Steven was diagnosed to have a language impairment. Steven’s ASD characteristics were considered very high functioning. He was an unusual case because at pre-test he had very low standard scores yet very high curriculum-based measurement scores compared to his peers within this study. Also, his schedule was not very consistent due to many absences. He often missed sessions, and then had to make them up. The make-up sessions were either to close together or too far apart. Sessions close together could make the sessions seem monotonous and create boredom. Sessions too far apart could make it difficult for the child to recall the story and correct responses. Based on observations, Steven seemed the most uninterested in the intervention. He often asked when the sessions would be over. He lacked motivation to participate. Steven was much older than the participants in previous DR studies. Past DR research that implemented phase one of DR included participants that were two and three years old (Zevenbergen & Whitehurst, 2003). This intervention may not have been age-appropriate for Steven. Also, Steven quickly recognized how the AC’s worked and realized they provided the answers he needed. This may explain why he did better in the DR + AC condition. It is possible that Steven was taking the easiest route and depending on the AC’s to provide correct answers to complete the sessions as quickly as possible. In this situation the AC’s could be considered a crutch for an individual who was too high functioning for AC’s or they could be considered a good support for an individual with significant language delays. The distinction is difficult to make.

Investigation Strengths

This investigation contains its own distinctive strengths that may set it apart from other studies conducted using dialogic reading interventions that target the emergent literacy skill of expressive language. First, all the participants exhibited ASD characteristics. This is rare to find in dialogic reading studies. The participants in previous dialogic reading studies either had language impairments (Crain-Thoreson & Dale, 1999; Dale, et al., 1996; Hargrave & Senechal, 2000) or did not have any disabilities (Arnold, et al. 1994; Lonigan & Whitehurst, 1998; Valdez-

Also, this investigation was applied research, meaning it took place within real-world classrooms. The applied nature of this study makes the results more likely to be used by practitioners because the circumstances are similar to real-world practice. Throughout the intervention the researcher and readers had to implement the intervention while contending with many day-to-day issues found in schools such as behavior problems, absences, limited space, scheduling dilemmas, and unexpected events. Some unexpected events that occurred were a tornado warning, lock down, power outage, and school wide special activities (e.g. circus day).

Third, the variables were as tightly controlled as possible given the obstacles of the applied research. The readers were given scripts, all the participants were read the same books in the same order, and specific protocols for each condition were employed. The systemized nature of the intervention procedures not only helped control the variables but it also lends it’s self nicely to be replicated both by teachers, parents, therapists, and researchers in the future. Additionally, the systemized fashion may have been an additional reason why all the participants with autism improved over time on all measures. Children with autism and most other disabilities thrive on consistent routine interventions (Davie & Kemp, 2002, NRC, 2001).

Another strength is that improvements were shown over approximately two months, a relatively short time period for individuals with disabilities. Crain-Thoreson and Dale (1999) had difficulty finding significant increases in vocabulary growth for children with language delays over a similar time frame. The sensitivity of the measures employed in this study is a strength, in that the observational measures and curriculum-based measure was able to detect change in individuals with language delays. Only two previous DR studies created curriculum-based measures (Hargrave & Senechal, 2000; Whitehurst et al., 1994).

Further, this study socially validated the outcomes by interviewing teachers of the participants. The social validity was a strong point of this study because it highlighted that a difference was made in the participants vocabulary use that someone else noticed, someone of importance in their lives. The observations of these teachers were important because these are people within the participants’ lives who play a significant role in their well being. The teachers
noticed positive changes among all the participants. The previous shared-book reading, including DR studies, discussed in this paper did not provide social validation.

**Investigation Limitations**

This investigation has limitations that must be considered when interpreting the results. The researcher was limited in the amount of assessments allowed to implement for screening and pre-test purposes. The school district was strict in the allowance of assessments to be given for research purposes for children already highly tested in special education. Therefore, no assessments were given by the researcher to determine if the participants had autism and no assessments were given to determine the participants’ cognitive ability levels. Although each participant exhibited ASD characteristics as described by their teachers and other observing adults, not all the participants were given the primary label of ASD by their school district. This discrepancy may be considered a limitation, however the description of ASD characteristics may be just as reliable a source if not more reliable than the school districts diagnosis. School districts are notorious for mislabeling children with the easiest fastest label possible in order to provide special education services. Often the first label given stays with that child throughout the years because it is easier than changing the label. The interpretation of results was limited given that the participants could not be compared based on their cognitive levels. Insight may have been gained with the knowledge of each participant’s cognitive levels and how this related to their results within each measure and each condition.

A second limitation was that the readers were only volunteer graduate students with limited time. The graduate students had a heavy graduate course load that included completing in-service practicum hours. Each graduate student who volunteered had to set aside time to be trained and work around their course schedules to implement reading sessions. The graduate students put forth maximum effort under these circumstances. More flexibility and dedication may have been obtained from paid research assistants. Given more time with the readers, the researcher could have conducted a more in-depth training. This may have reduced the variance found within the treatment fidelity of following decision rules and it may have improved their fidelity of expanding upon appropriate spontaneous language.

Next, attention cues were difficult to create as referents for targeted responses to follow-up queries. The targeted responses to follow-up queries were mostly adjectives and verbs.
Adjectives and verbs were difficult to represent with a picture. This may have been why the majority of data sets for this observational measure did not demonstrate experimental control.

Additionally, the lack of classroom observations prior to the start of the interventions limited the researcher in acquiring a complete understanding of the external variables that may have impacted the results of this investigation. Specifically, a direct observation of each classroom’s language and reading instruction may have provided a deeper understanding of the participants’ background knowledge and learning characteristics.

Further, just how the applied nature of this investigation is considered a strength, it is also a weakness because the real-world circumstances led to limited time, limited work space, limited resources (e.g. funding), behavior problems, and schedule problems. These limitations caused instances of deviating from the original plan. For example, in the original plan the intervention was going to be implemented four days a week (e.g. Monday through Thursday) and the fifth day was to be used as a make-up day. Each day would have two reading sessions. The sessions were to be implemented in the morning and afternoon giving adequate break time between the two sessions. Unfortunately, due to limited time and scheduling dilemmas the sessions were completed whenever possible. Often this meant sessions were conducted back to back and sometimes more than two in a day. This may have led to fatigue in both the readers and participants.

**Implications for Practice**

Making storybook reading sessions the most meaningful they can possibly be is the goal of all teachers, especially teachers and therapists of children with language delays because they are always trying to “catch up” their students to proficient levels. In addition to having language delays, children with autism often have difficulty attending (Tsatsanis, 2005). This attentional deficit would make attending to storybook reading sessions difficult. Dialogic reading with attention cues is one practical way to make storybook reading more meaningful and more interesting for children with autism. As evidence of this investigation, it can be used to teach expressive vocabulary skills and it can be used to hold the child’s attention to the story for children with ASD characteristics.

Teachers and therapists can realistically create the materials needed to replicate the dialogic reading technique implemented within this study and use it within their classroom. The materials can all be made using tools and materials typically found in school settings. This
technique may also work well in small group settings for children with different types of developmental disabilities. Teachers can feasibly use the same data collection procedure that was employed in this investigation to monitor their students’ growth. Special education teachers would benefit from using a program that already includes a data collection procedure embedded into the implementation of the intervention given that special education teachers are required to show progress of their students and provide response to interventions (RTI). An additional advantage of this intervention is that it can occur over six to eight weeks, which is one report card period. Often progress cannot be detected in annual standardized exams therefore special education teachers use regular data collection procedures also known as progress monitoring to show improvement.

The interventions implemented in this study are also parent friendly. Parents of children with language delays tend to not engage in conversation during shared-reading sessions (Dale, et al., 1996). Parents of children with ASD or other disabilities would benefit from having a systemized protocol to use when reading to their children that still allows for the experience to be naturalistic and easily implementing in a home setting. Dialogic reading with attention cues can aid parents in teaching their children vocabulary. This would be especially helpful to parents that need guidance in improving their child’s attention to shared-book readings. The AC’s make it simple for parents to target specific vocabulary word repeatedly. It’s like having a mini-lesson plan parents can easily follow at home in the midst of busy daily life responsibilities.

**Implications for Future Research**

External validity in single subject research is increased by systematically replicating the effects of an investigation (Kennedy, 2005). In order to generalize this investigation to children with similar ASD characteristics it would be beneficial to conduct future replication investigations. If future investigations continue to show promise for using DR only and DR + AC with children with ASD then a large group sample comparing the effects of the two interventions within this study would be warranted.

Shared-book reading has positive effects on many emergent literacy skills (Justice & Kaderavek, 2002). Dialogic reading, a form of shared-book reading, enhances the positive effects of shared-book reading by promoting conversations around a story (Zevenbergen & Whitehurst, 2003). This investigation examined one aspect of DR, phase one and one aspect of emergent literacy, expressive vocabulary. Given that DR has more components as does emergent literacy;
future research is warranted to examine each of the respective components separately and as a whole to understand the interplay of DR and emergent literacy skills for children with ASD characteristics. This research could include another measures of emergent literacy such as phonological awareness (Lonigan, Burgess, & Anthony, 2000). Additionally, measures of preverbal language such as joint attention, eye gaze, and gestures (Tager-Flusberg et al., 2005) would further dissect the relationship of emergent literacy and DR.

The participants in this study who displayed greater rates of improvement within the DR only condition, may have been ready for phase two of DR. Attention cues may have been more appropriate for phase two of DR for some participants because this phase would be slightly more difficult and the children would require a bit more scaffolding. Future research studying when to add ACs and who to use ACs with would help educators and researchers tailor DR to the needs of children with disabilities. Children with autism often exhibit an impaired use of symbols (NRC, 2001). Attention cues may help children associate language symbols (e.g. vocabulary) with meaning by acting as a bridge to foster the connection between words and meaning.

This investigation trained graduate students who studied special education and had prior knowledge and experience with dialogic reading. Whitehurst, Epstein, et al. (1994) suggested that the home was a more powerful environment than school to promote language acquisition. Also, Whitehurst et al. (1998) concluded that both parent and teachers can be trained to use dialogic reading sufficiently to improve language use of young children. A future study comparing parent implementation in the home to teacher implementation in school with children with autism would be interesting; particularly because parents of children with language delays are thought to converse less during shared-reading sessions (Dale, et al., 1996).

Little longitudinal data exists on the effects of early literacy interventions and later reading ability of children with ASD and other developmental disabilities. A call for longitudinal studies is needed to measure the effects of DR with and without ACs on both code-focused and especially meaning-focused skills. Code-focused measures could include measures of phoneme-grapheme correspondence (Whitehurst & Lonigan, 2006). Meaning-focused measures could include measures of language comprehension skills such as phonological awareness, phonics, fluency, (Whalon, Al’Otaiba and Delano, 2009) expressive vocabulary, receptive vocabulary, and story recall (Whitehurst, & Lonigan, 2006). Meaning-focused measures are especially important because children with autism tend to struggle with these skills more than code-focused
((Whalon, Al Otaiba, & Delano, 2009) and dialogic reading is known to emphasize these skills (Zevenbergen & Whitehurst, 2003).
CONCLUSION

The outcome of this study suggests that dialogic reading is a promising intervention for children with autism spectrum disorder characteristics. The data presents preliminary evidence that DR can be used to increase the expressive language use of children with ASD. Specifically the data revealed improvements in the participants’ ability to answer labeling and explicating type questions and their appropriate spontaneous verbalizations during a storybook reading session. Additionally, the results were socially validated by the participants’ teachers who reported noticeable improvements in their students’ spontaneous language and new vocabulary use in the classroom. These findings lead to future research inspiration in emergent literacy interventions using dialogic reading techniques for children with autism. Future studies are warranted to determine if the addition of attention cues is beneficial and when attention cues are appropriate to meet the needs of the child. Further studies are also needed to measure the effects dialogic reading and later reading ability of children with ASD.
## APPENDIX A

### STORYBOOK VOCABULARY TEST - LIST OF WORDS

*Marked words were target vocabulary words used during the interventions among all participants*

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<td>122.</td>
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APPENDIX B
HUMAN SUBJECTS COMMITTEE APPROVAL

Office of the Vice President For Research
Human Subjects Committee
Tallahassee, Florida 32306-2742
(850) 644-8673 · FAX (850) 644-4392

APPROVAL MEMORANDUM

Date: 9/15/2009
To: Gina Plattos
Dept.: SPECIAL EDUCATION & REHABILITATION COUNSELING

From: Thomas L. Jacobson, Chair

Re: Use of Human Subjects in Research
The Differential Effects of Two Dialogic Reading Based Interventions on the Expressive Vocabulary Use of Children with Autism

The application that you submitted to this office in regard to the use of human subjects in the research proposal referenced above has been reviewed by the Human Subjects Committee at its meeting on 09/09/2009. Your project was approved by the Committee.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals, which may be required.

If you submitted a proposed consent form with your application, the approved stamped consent form is attached to this approval notice. Only the stamped version of the consent form may be used in recruiting research subjects.

If the project has not been completed by 9/8/2010 you must request a renewal of approval for continuation of the project. As a courtesy, a renewal notice will be sent to you prior to your expiration date; however, it is your responsibility as the Principal Investigator to timely request renewal of your approval from the Committee.

You are advised that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by the Committee. In addition, federal regulations require that the Principal Investigator promptly report, in writing any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the Chair of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Human Research Protection. The Assurance Number is IRB00000446.

Cc: Bruce Menchetti, Advisor
HSC No. 2009.2762
Dear Ms. Pattons,

The Leon County Schools Research Review Board has determined that the findings of your proposed study could be pertinent to our efforts and so we are initially consenting to your request for the research mentioned above. Conditions are:

- Clarification – The emails between you and Leon County Schools personnel, regarding plans for this study, are considered an integral part of this initial consent.
- Principal’s Consent - Initial consent by the Research Review Board does not in itself constitute permission to carry out the research. You may now contact principals of the schools in your study. The principal has the final decision relative to research at each school. It is your responsibility to obtain the unlisted “Principal’s Consent for Research Participation,” signed by the principal(s) of the school(s) to be involved, prior to the start of any research. Return the signed consents to this office.
- Clearance – Leon County Schools is under contract with your university regarding researchers. You are required to contact Mr. Gary Gabel’s office (904) 594-3883 who will work with you to obtain security clearance, including fingerprinting, and proof of health and liability insurance. Mr. Gabel’s office will inform Leon County Schools when your clearance is complete.
- Approval – Once you have Principal’s Consent and we are informed of your clearance, then you will receive approval for this study. At that time, your name will be included in the weekly listing of individuals approved to enter the respective school(s). Notify us when you are finished with data collection so no longer need to be in the school(s).
- Time Period – Your research period is October 2009 through May 2010. Should you desire to extend your data collection efforts after this period of time, you must submit (a) a progress report, (b) preliminary results of your research, and (c) a request for renewed approval for continuation. Any significant changes or amendments to the procedures or design of this study must be approved by resubmitting the request for research to the Research Review Board.
- Submit Results – Leon County Schools is interested in your research party due to the potential benefit of information to the district; therefore, we expect that you will send this office an executive summary with purposes, methods, results and discussion, directly after concluding your study. We will place this information in our on-line research library.

We look forward to receiving your results.

Sincerely,

Paul W. Felch, Director of Testing, Research & Evaluation and Chairman, Research Review Board
G Peggy Youngblood, and principals at DeSoto Trail, Duck Lake, and Roberts

3955 West Pensacola Street • Tallahassee, Florida 32304 • Phone (850) 487-7833
http://research-lcsonline/schools/default.aspx

Building the Future Together

"Leon County Schools does not discriminate against any person on the basis of gender, marital status, sexual orientation, race, religion, national origin, age, or disability."
APPENDIX D
PARENT CONSENT FORM

Dear Parent,

I am a doctoral candidate under the direction of Dr. Bruce Menchetti in the School of Teacher Education at Florida State University. I am conducting a research study to compare two storybook reading interventions designed to improve expressive vocabulary. I would like to invite your child to take part in this research study. In order to participate in this study I will need your permission to review your child’s cumulative folder. If you agree to participate the study will start with a language screening using three assessments. The assessments will be administered by me or my research assistant within the classroom at a time and date indicated by the teacher. The screening will be divided into a few short sessions.

After the initial screening is complete, the first four children who meet the inclusion criteria will be selected as participants (approximately 8 children across Leon County Schools will be screened). Children not selected for the study can be put on a list for future studies. Children selected to participate will then receive individualized storybook reading instruction twice a day, four days a week, for four to six weeks between the months of October and December 2009. The instruction will be 20 minutes long and will take place in the classroom at a time suggested by the teacher. The reader will be trained graduate students working on their degree in special education. The instruction will be based on techniques which may improve expressive vocabulary. During the reading sessions the participants will be video recorded. The video tapes will only be viewed by Dr. Menchetti, and me. All information that links the participant to the data will be stored in a locked filing cabinet and password protected computer.

Parents may be contacted for future involvement in follow-up research activities. Identifier linkage information and data will be destroyed on October 1, 2011.

The anticipated benefits to your child include exposure to a research-based individualized storybook reading instruction. Benefits to your child’s teacher include having a graduate student assigned to the classroom who will be available to participate in classroom activities beyond implementing this reading intervention and the option of attending a complimentary workshop on storybook reading instruction at the completion of the study.

Your child’s participation in this study is voluntary. If, at any time, you choose to withdraw your child from this study there will be no penalty (e.g. it will not affect your child’s education, grades, etc.). Information obtained through the course of the study will remain confidential, to the extent allowed by law. The results of the research study may be published, but your child’s name will not be used. If you have any questions concerning your child’s participation in this study please contact the Chair of the Human Subjects Committee, Institutional Review Board through the Vice President for the FSU Office of Research at (850) 644 - 8633.

Sincerely,

Gina Platts

Please return the bottom portion of this consent form to your child’s teacher. You may decline by not signing and returning the form.

___ Yes, I do give consent for my child ________ to be screened for possible participation in this study and for the researcher to review my child’s cumulative folder. I understand that if my child is eligible to participate he/she will receive three language assessments, storybook reading instruction for approximately 4-6 weeks within his/her classroom, and will be video recorded during the reading sessions.

Parent/Guardian’s Name: ___________________________ Date: ______________________

Parent/Guardian’s Signature: ________________________

205 Stone Building, Florida State University, Tallahassee, Florida 32306-4459
Telephone 850.644.4880, Fax 850.644.8715 • http://www.coe.fsu.edu/cerds

FSU Human Subjects Committee approved on 10/16/09 VOID after 9/8/2010 HSC# 2009.3489
APPENDIX E
TEACHER CONSENT FORM

Dear Teachers,

I am a doctoral candidate under the direction of Dr. Bruce Menchetti in the School of Teacher Education at Florida State University. I am conducting a research study to compare two storybook reading interventions designed to improve expressive vocabulary. I would like to invite you to complete a brief interview. The interview will be to determine your opinion of how the storybook reading interventions impacted the language behaviors of the participating students from your classroom. The interview will be conducted by me. It will take no more than 20 minutes and will be scheduled at your convenience in the month of December. Your responses will be recorded with paper and pencil and kept on file until October 1, 2011. Your responses may be used as data for a follow-up study.

Your participation in this study is voluntary. If, at any time, you choose to withdraw from this study there will be no penalty. Information obtained through the course of the study will remain confidential, to the extent allowed by law. The results of the research study may be published, but your name will not be used. If you have any questions concerning your participation in this study please contact me at [redacted] or Dr. Menchetti at [redacted]. If you have any questions about your rights in this research, or if you feel your child has been placed at risk, you can contact the Chair of Human Subjects Committee, Institutional Review Board through the Vice President for the FSU Office of Research at (850) 644 – 8633.

Sincerely,

Gina Platios

Please return the bottom portion of this consent form to Gina Platios. You may decline by not signing and returning this form.

[Redacted]

Yes, I agree to participate in a brief interview to discuss the effects of the storybook reading intervention with Gina Platios. I understand the interview will take place in December 2009 and last no more than 20 minutes.

Name: ___________________________ Date: ___________________________

Signature: ___________________________

208 Stone Building, Florida State University, Tallahassee, Florida 32306-4459
Telephone 850.644.4880, Fax 850.644.8716 • http://www.coe.fsu.edu/cerd

FSU Human Subjects Committee approved on 9/15/09 VOID after 9/8/2010 HSC# 2009.2762
APPENDIX F
SAMPLE QUERY MAP FOR READINGS TWO THROUGH FOUR
APPENDIX G
PROTOCOL DECISION RULES FOR DR ONLY TREATMENT

Query

- Answers correctly: Praise, repeat, record
- Answers incorrectly or no answer: Verbally model response then ask again
  - Answers correctly: Praise, repeat, record
  - Answers incorrectly or no answer: Record
APPENDIX H
PARTIAL SAMPLE OF A STORY SCRIPT

The Rain Came Down - Reading Sessions 2 – 4 Script

<table>
<thead>
<tr>
<th>Date:</th>
<th>Participant:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reader:</td>
<td>Condition: DR + AC</td>
</tr>
<tr>
<td>Reading session for this book:</td>
<td></td>
</tr>
</tbody>
</table>

**Target Vocabulary words (follow-up)**
- raincoat (rain)
- umbrella (man)
- Windshield Wipers (rain)
- Yelling (mouth)

*answers to queries are highlighted*

**Introduction:** Read – “Now we are going to read this story and talk about it.”

<table>
<thead>
<tr>
<th>Pg</th>
<th>Script</th>
<th>AC Presented</th>
<th>Unprompted Appropriate Spontaneous Verbalization</th>
<th>Unprompted Inappropriate Spontaneous Verbalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cover</td>
<td>Read - The title of this book is The Rain Came Down</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/2</td>
<td>Read – On Saturday morning, the rain came down. It made the chickens squawk.</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/4</td>
<td><strong>SKIP</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5/6</td>
<td>Read – The man yelled at the dog and woke up the baby. “Stop all that yelling!” shouted the man’s wife. Qv – What is he doing (point at the man yelling)? [Decision Rule] Qt – What does he use to yell? <strong>mouth</strong></td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>7/8</td>
<td><strong>SKIP</strong></td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9/10</td>
<td><strong>SKIP</strong></td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11/12</td>
<td>Read – “Jingle – a – jingle,” went his music. “Slappa – de – slap,” went his windshield wipers. And still, the rain came down. Qv – What are those (point to the windshield wipers)? [Decision Rule] Qt – When do you use windshield wipers? <strong>in rain</strong> [Decision Rule]</td>
<td></td>
<td>Yes</td>
<td>Yes</td>
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</table>
APPENDIX I

SAMPLE LIST OF TARGETED VOCABULARY WORDS BY PARTICIPANT AND BOOK

Participant: Chase

<table>
<thead>
<tr>
<th>Book</th>
<th>By Myself</th>
<th>Dot</th>
<th>Moon</th>
<th>Kiss</th>
<th>Rain</th>
<th>Puddle</th>
<th>No Jumping</th>
<th>Daisy</th>
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</thead>
<tbody>
<tr>
<td>Noun1</td>
<td>plant</td>
<td>ladder</td>
<td>fireplace</td>
<td>lily pad</td>
<td>raincoat</td>
<td>sailboat</td>
<td>rose</td>
<td>pond</td>
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<tr>
<td>Noun2</td>
<td>towel</td>
<td>fire hat</td>
<td>rocking chair</td>
<td>water</td>
<td>umbrella</td>
<td>alligator</td>
<td>lamp</td>
<td>snail</td>
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<tr>
<td>Noun3</td>
<td>bowl</td>
<td>boots</td>
<td>firewood</td>
<td>rocks</td>
<td>windshield wipers</td>
<td>cloud</td>
<td>apron</td>
<td>badger</td>
</tr>
<tr>
<td>Verb</td>
<td>bathing</td>
<td>carrying</td>
<td>knitting</td>
<td>looking</td>
<td>yelling</td>
<td>floating</td>
<td>falling</td>
<td>hopping</td>
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APPENDIX J
SAMPLE PROBE

The Rain Came Down

<table>
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<tr>
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</tr>
<tr>
<td>Reader:</td>
</tr>
<tr>
<td>Reading session for this book:</td>
</tr>
<tr>
<td>Probe #:</td>
</tr>
</tbody>
</table>

Introduction: Before we read the story I am going to ask you some questions about the pictures. Do you remember this book called [Title of book here]? We read it [say last time you read it]. Let’s look at the pictures.

1 = correct  
0 = incorrect

<table>
<thead>
<tr>
<th>Pg</th>
<th>Script</th>
<th>Vocabulary Query</th>
<th>Follow-Up Query</th>
<th>Unprompted Appropriate Spontaneous Verbalization</th>
<th>Unprompted Inappropriate Spontaneous Verbalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Q₅ – What is he doing? (point to man <strong>yelling</strong>)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Q₆ – What does he use to yell? <strong>mouth</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Q₇ – What are those? (point to windshield wipers)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Q₈ – When do you use windshield wipers? <strong>in rain</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Q₉ – What is he wearing? (point to raincoat)</td>
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<tr>
<td>16</td>
<td>Q₁₀ – When do you wear a raincoat? <strong>in rain</strong></td>
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<tr>
<td>13</td>
<td>Q₁₁ – What is she doing? (point to woman <strong>yelling</strong>)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Q₁₂ – What does she use to yell? <strong>mouth</strong></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>19</td>
<td>Q₁₃ – What is that? (point to taxi)</td>
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<tr>
<td>19</td>
<td>Q₁₄ – What color is the taxi? <strong>yellow</strong></td>
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<td>Question</td>
<td>Answer</td>
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<tr>
<td>Q₁ – What is that? (point to windshield wiper)</td>
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<tr>
<td>Q₂ – When do you use windshield wipers?</td>
<td>In rain</td>
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<tr>
<td>Q₃ – What is he wearing? (point to raincoat)</td>
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<tr>
<td>Q₄ – When do you wear a raincoat?</td>
<td>In rain</td>
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<td></td>
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<tr>
<td>Q₅ – What is that? (point to taxi)</td>
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</tr>
<tr>
<td>Q₆ – What color is the taxi?</td>
<td>Yellow</td>
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</tbody>
</table>

**Totals**
APPENDIX K
PROTOCOL DECISION RULES FOR DR + AC TREATMENT

Query

- Answers correctly: Praise, repeat, record
- Answers incorrectly or no answer: Show AC, verbally model response then ask again

  - Answers correctly: Praise, repeat, record
  - Answers incorrectly or no answer: Record
APPENDIX L
PROBE QUERY MAP
APPENDIX M
DEFINITION OF TERMS

Attention Cue (AC) – a pictorial cue that helps the child shift and focus attention on the important dimensions of the task stimuli in order to provide a targeted response.

Autism – a pervasive developmental disorder that significantly affects three core domains of development: (1) communication, (2) social interaction, (3) idiosyncratic patterns of behavior.

Emergent Literacy – time period prior to reading printed words when children develop skills that later affect their literacy, such as oral language, phonological awareness, print awareness, and emergent writing.

Follow-up AC – a pictorial cue that represented the targeted response to a follow-up query and emphasized the important features of the visual stimulus.

Follow-up query – a question that asks about the attribute or function of the targeted vocabulary word following a vocabulary query (e.g. what do you do with a scarf?).

Probe – a brief assessment that occurred at the beginning of the second through fourth reading of each book and after the fourth reading. Each probe consisted of the reader asking the participant two vocabulary questions (labeling) and two follow-up questions (explicating) per target word using the storybook pictures directly from the book as cues.

Reading [session] - a 15 minute session of either the DR only treatment or the DR plus AC treatment.

Targeted response – the independent verbal response to a DR vocabulary or follow-up query.

Trial – consisted of four readings of the same book.

Vocabulary query – a question presented verbally to the child asking the child to name the targeted vocabulary word within the story (e.g. What is this?).

Vocabulary AC – a pictorial cue that represented the targeted response to a vocabulary query and emphasized the important features of the visual stimulus.
# APPENDIX N

**BLANK CUMULATIVE NUMBER CORRECT ON PROBES ACROSS TREATMENTS**

Participant:

Cumulative Number Correct on Vocabulary and Follow-Up Queries

<table>
<thead>
<tr>
<th><strong>DR + AC</strong> Treatment Condition – Vocabulary Queries</th>
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<th></th>
<th></th>
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<tbody>
<tr>
<td>Storybook</td>
<td>Probe 1</td>
<td>Probe 2</td>
<td>Probe 3</td>
<td>Probe 4</td>
<td>Trial Total</td>
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<td></td>
<td>Cumulative Total across TX</td>
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<td></td>
<td></td>
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<tr>
<td>1. Rain Came Down</td>
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<tr>
<td>3. Dot the Fire Dog</td>
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<td></td>
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<tr>
<td>5. All By Myself</td>
<td></td>
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<tr>
<td>7. No Jumping on the Bed</td>
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</table>

<table>
<thead>
<tr>
<th><strong>DR + AC</strong> Treatment Condition – Follow-Up Queries</th>
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</thead>
<tbody>
<tr>
<td>Storybook</td>
<td>Probe 1</td>
<td>Probe 2</td>
<td>Probe 3</td>
<td>Probe 4</td>
<td>Trial Total</td>
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<tr>
<td></td>
<td>Cumulative Total across TX</td>
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<tr>
<td>1. Rain Came Down</td>
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<table>
<thead>
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<td>Storybook</td>
<td>Probe 1</td>
<td>Probe 2</td>
<td>Probe 3</td>
<td>Probe 4</td>
<td>Trial Total</td>
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<tr>
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<td>Cumulative Total across TX</td>
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<td></td>
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<tr>
<td>2. Goodnight Moon</td>
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<tr>
<td>4. The Puddle</td>
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<tr>
<td>6. Kiss Kiss</td>
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<td></td>
</tr>
<tr>
<td>8. Oops a Daisy</td>
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<td>Probe 2</td>
<td>Probe 3</td>
<td>Probe 4</td>
<td>Trial Total</td>
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<td></td>
<td>Cumulative Total across TX</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Goodnight Moon</td>
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<td>4. The Puddle</td>
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<td>6. Kiss Kiss</td>
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<td>8. Oops a Daisy</td>
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</table>
Cumulative Number of Appropriate Spontaneous Verbalization across Treatment

**DR + AC – Appropriate Spontaneous Verbalization (Comments/Phrases)**

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<th>R2 + P1</th>
<th>R3 + P2</th>
<th>R4 + P3 + P4</th>
<th>Trial Total</th>
<th>Cumulative Total across TX</th>
</tr>
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<tbody>
<tr>
<td>1. Rain Came Down</td>
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<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>3. Dot the Fire Dog</td>
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</tr>
<tr>
<td>5. All By Myself</td>
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<tr>
<td>7. No Jumping</td>
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**DR ONLY – Appropriate Spontaneous Verbalization (Comments/Phrases)**

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<th>R2 + P1</th>
<th>R3 + P2</th>
<th>R4 + P3 + P4</th>
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<td>2. Goodnight Moon</td>
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<td>6. Kiss Kiss</td>
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<td>8. Oops a Daisy</td>
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</tbody>
</table>
## APPENDIX O

### SAMPLE CUMULATIVE NUMBER CORRECT ON PROBES ACROSS TREATMENTS

Participant: Chase

Cumulative Number Correct on Vocabulary and Follow-Up Queries

<table>
<thead>
<tr>
<th><strong>DR + AC</strong> Treatment Condition – Vocabulary Queries</th>
<th><strong>DR + AC</strong> Treatment Condition – Follow-Up Queries</th>
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<td>1. Rain Came Down</td>
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<tr>
<td>2. Goodnight Moon</td>
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<tr>
<td>3. Dot the Fire Dog</td>
<td>4. The Puddle</td>
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<td>4. The Puddle</td>
<td>6. Kiss Kiss</td>
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<td>8. Oops a Daisy</td>
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<td>6. No Jumping on the Bed</td>
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<th><strong>Probe 1</strong></th>
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<th><strong>Probe 3</strong></th>
<th><strong>Probe 4</strong></th>
<th><strong>Trial Total</strong></th>
<th><strong>Cumulative Total across TX</strong></th>
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<tr>
<td>3. Dot the Fire Dog</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>5</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>5. All By Myself</td>
<td>2</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>21</td>
<td>37</td>
</tr>
<tr>
<td>7. No Jumping on the Bed</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>8</td>
<td>45</td>
</tr>
<tr>
<td>2. Goodnight Moon</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>4. The Puddle</td>
<td>7</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>15</td>
<td>25</td>
</tr>
<tr>
<td>6. Kiss Kiss</td>
<td>2</td>
<td>6</td>
<td>3</td>
<td>6</td>
<td>17</td>
<td>42</td>
</tr>
<tr>
<td>8. Oops a Daisy</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>3</td>
<td>15</td>
<td>57</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Probes</strong></th>
<th><strong>Probe 1</strong></th>
<th><strong>Probe 2</strong></th>
<th><strong>Probe 3</strong></th>
<th><strong>Probe 4</strong></th>
<th><strong>Trial Total</strong></th>
<th><strong>Cumulative Total across TX</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Goodnight Moon</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>4. The Puddle</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>17</td>
<td>23</td>
</tr>
<tr>
<td>6. Kiss Kiss</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>22</td>
<td>45</td>
</tr>
<tr>
<td>8. Oops a Daisy</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>24</td>
<td>69</td>
</tr>
</tbody>
</table>
Cumulative Number of Appropriate Spontaneous Verbalization across Treatment

<table>
<thead>
<tr>
<th>DR + AC – Appropriate Spontaneous Verbalization (Comments/Phrases)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Storybook</strong></td>
</tr>
<tr>
<td>1. Rain Came Down</td>
</tr>
<tr>
<td>3. Dot the Fire Dog</td>
</tr>
<tr>
<td>5. All By Myself</td>
</tr>
<tr>
<td>7. No Jumping</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DR ONLY – Appropriate Spontaneous Verbalization (Comments/Phrases)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Storybook</strong></td>
</tr>
<tr>
<td>2. Goodnight Moon</td>
</tr>
<tr>
<td>4. The Puddle</td>
</tr>
<tr>
<td>6. Kiss Kiss</td>
</tr>
<tr>
<td>8. Oops a Daisy</td>
</tr>
</tbody>
</table>

Behavior Problems

Long time between sessions

Unusual circumstance
APPENDIX P
LIST OF STORYBOOKS

APPENDIX Q
DR ONLY TREATMENT FIDELITY DATA SUMMARY SHEET

<table>
<thead>
<tr>
<th>Participant:</th>
<th>Book:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial:</td>
<td>Reader:</td>
</tr>
<tr>
<td>Session:</td>
<td>Session Date:</td>
</tr>
</tbody>
</table>

**I. Presents correct page/title:**

| a) Number of opportunities = | |
| b) Number of correct responses = | |
| c) Treatment fidelity score = | |

**II. Reads script correctly (non-queries):**

| a) Number of opportunities = | |
| b) Number of correct responses = | |
| c) Treatment fidelity score = | |

**III. Presents queries correctly:**

| a) Number of opportunities = | |
| b) Number of correct responses = | |
| c) Treatment fidelity score = | |

**IV. Follows decision rule correctly:**

| a) Number of opportunities = | |
| b) Number of correct responses = | |
| c) Treatment fidelity score = | |

**V. Expands upon appropriate spontaneous language:**

| a) Number of opportunities = | |
| b) Number of correct responses = | |
| c) Treatment fidelity score = | |

**VI. Overall Treatment Fidelity:**

| a) Number of opportunities = | |
| b) Number of correct responses = | |
| c) Total Treatment fidelity score = | |
APPENDIX R
DR + AC TREATMENT FIDELITY DATA SUMMARY SHEET

<table>
<thead>
<tr>
<th>Participant:</th>
<th>Book:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial:</td>
<td>Reader:</td>
</tr>
<tr>
<td>Session:</td>
<td>Session Date:</td>
</tr>
</tbody>
</table>

**I. Presents correct page/title:**
- a) Number of opportunities =
- b) Number of correct responses =
- c) Total Treatment fidelity score =

**II. Reads script correctly (non-queries):**
- a) Number of opportunities =
- b) Number of correct responses =
- c) Treatment fidelity score =

**III. Presents queries correctly:**
- a) Number of opportunities =
- b) Number of correct responses =
- c) Total Treatment fidelity score =

**IV. Follows decision rule correctly:**
- a) Number of opportunities =
- b) Number of correct responses =
- c) Total Treatment fidelity score =

**V. Presents AC appropriately to participant:**
- a) Number of opportunities =
- b) Number of correct responses =
- c) Total Treatment fidelity score =

**VI. Expands upon appropriate spontaneous language**
- a) Number of opportunities =
- b) Number of correct responses =
- c) Total Treatment fidelity score =

**VII. Overall Treatment Fidelity:**
- a) Number of opportunities =
- b) Number of correct responses =
- c) Total Treatment fidelity score =

*Operational Definition: Correctly = presented in such a way it would elicit desired response from the participant.*
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136


BIOGRAPHICAL SKETCH

EDUCATION
Doctor of Philosophy, Florida State University, Tallahassee, Florida (2011). Major: Special Education


PROFESSIONAL POSITIONS
2006 – 2009. Adjunct Faculty, Department of Special Education, Florida State University
  - Responsible for development, delivery, and evaluation of undergraduate special education course content
  - Responsible for placement of juniors and seniors into educational field sites across Leon County FL
  - Responsible for observation and evaluation of practicum students

2008 – 2009. Graduate Assistant to the Chair of the School of Teacher Education, Florida State University
  - Assisted in the proposal and development for a new Master of Arts in Teacher program for the School of Teacher Education

2007-2008 Graduate Research Assistant to Faculty, School of Teacher Education, Florida State University
  - Collected and analyzed data
  - Assisted with writing and submission of research articles

2006-2008 Graduate Teaching Assistant to Faculty, School of Teacher Education, Florida State University
  - Assisted with development, delivery, and evaluation of undergraduate special education courses

2006 – 2007 Graduate Assistant to the ESE Program Coordinator, School of Teacher Education, Florida State University
  - Assisted with implementation and evaluation of program policies and procedures
2003 – 2006  **Special Education Teacher, Leon County Schools, Tallahassee FL**
- Taught students (k-5) with a range of disabilities including autism in both a self-contained and resource room setting in all academic areas
- Evaluated the needs of children with disabilities using applied behavior analysis and curriculum based assessments.
- Planned, wrote, and carried out Individual Education Plans to enable children to attain maximum achievement and adjustment.
- Trained and managed paraprofessionals and achieved considerable improvements in their productivity.

**UNIVERSITY TEACHING EXPERIENCE**

**Fall 2009**  Instructor *EEX 4070 Including Students with Disabilities in the General Education Curriculum*. Department of Special Education, Florida State University.

**Summer 2009**  Development of *EEX 5089 Adaptations and Accommodations for Students with Disabilities*, in collaboration with Roger Kent Hamilton. Department of Special Education, Florida State University.

**Spring 2009**  Instructor *EEX 4842 Practicum with Students with Low Incidence Disabilities*. Department of Special Education, Florida State University.

**Fall 2008**  Instructor *EEX 4834 Introductory Practicum in Special Education*. Department of Special Education, Florida State University.

**Summer 2008**  Teaching Assistant *EEX 4770 The Study of Human Exceptionality*, assistant to Bruce M. Menchetti. Department of Special Education, Florida State University.

**Spring 2008**  Instructor *EEX 4842 Practicum with Students with Low Incidence Disabilities*. Department of Special Education, Florida State University.

**Fall 2007**  Instructor *EEX 4941 Practicum with Students with High Incidence Disabilities*. Department of Special Education, Florida State University.

**Summer 2007**  Teaching Assistant *EEX 4770 The Study of Human Exceptionality*, assistant to Bruce M. Menchetti. Department of Special Education, Florida State University.

**Spring 2007**  Instructor *EEX 4842 Practicum with Students with Low Incidence Disabilities*. Department of Special Education, Florida State University.

**Fall 2006**  Instructor *EEX 4941 Practicum with Students with High Incidence Disabilities*. Department of Special Education, Florida State University.