THE EFFECTS AND FEASIBILITY OF USING TIERED INSTRUCTION
TO INCREASE CONVERSATIONAL TURN TAKING
FOR PRESCHOOLERS WITH AND WITHOUT DISABILITIES

A dissertation submitted to the
Kent State University College and Graduate School
of Education, Health, and Human Services
in partial fulfillment of the requirements
for the degree of Doctor of Philosophy

By

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May 2013
The purpose of the study was to examine the effectiveness and feasibility of using tiered instruction to increase the frequency of conversational turn taking (CTT) among preschoolers with and without disabilities in an inclusive setting. Three CTT interventions (Universal Design for Learning, Peer Mediated Instruction, and Milieu Teaching) were organized on a hierarchy of intensity and implemented in an additive manner. Using an increasing intensity across participants with a reversal design, child progress was monitored over time and children were moved through tiers based on level of need. A functional relationship between tiered instruction and CTT was found for nine of 13 child participants and the strongest intervention effects were observed at tier one. All but one child participant showed an increase in conversational turn taking from baseline to reinstatement. Teacher fidelity of implementation was monitored at each tier. Her overall average was 90% with the highest percent occurring in tier one. Resulting contributions to the literature include a better understanding of the feasibility of tiered instruction for the inclusive early childhood classroom, the effectiveness of tiered instruction for increasing CTT, and practical considerations for implementation of tiered instruction across tiers and phase change decisions.
ACKNOWLEDGMENTS

I am pleased to acknowledge those who have made the completion of this project possible. First and foremost, I need to thank my family for their patience and understanding. My parents, siblings, children, and husband provided me with endless love and support and always encouraged me to stay focused.

I extend my deepest gratification to the members of my committee: my co-chairs Dr. Kristie Pretti-Frontczak and Dr. Sanna Harjusola-Webb, and also Dr. Richard Cowan and Dr. Christine Balan. I am grateful for their relentless feedback, wisdom, and support. I will never be caught saying “good enough” again.

I need to thank the experts at the LENA Foundation, who provided me with ongoing assistance and problem solving throughout the project. When my computer crashed, when the algorithms weren’t working, when the software wouldn’t load, they were there to help. I wish to acknowledge my research assistants, Benjamin and Kailey, and the many dear friends I made in the doctoral program. No one understands what you need better than the people who are sharing an experience with you. I also extend my gratitude to Sarah and Jessica, who helped me edit and finalize my dissertation.

Most importantly, I need to thank the teachers, children, and families who made my research a reality. A special thank you goes to Brooke for committing her time and helping me work through the kinks during the pilot study. Finally, I could not have done it without my lead teacher, Rachel Bendel. Her passion and dedication to the field of early childhood education will be forever etched in my heart.
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CHAPTER I
LITERATURE SYNTHESIS

Conversational turn taking (CTT) is the verbal initiation and response interchange that takes place between two individuals. Learned and mastered in the early years, the ability to engage in CTT allows individuals to employ the basic human need and right to be full and active participants in classrooms and communities through the life span (DeLuzio & Girolametto, 2011; Mashford-Scott & Church, 2011). In order to learn and master CTT children from all walks of life need exposure to a range of opportunities for interaction with others (Bond & Wasik, 2009). While children who are typically developing learn CTT naturally, through everyday interactions with other children and adults, children with disabilities, often need direct support and instruction to learn how to initiate, respond, and take turns during conversations (Brown, Odom, McConnell, & Rathel, 2008). Teachers have a key role in supporting CTT in educational contexts.

Inclusive early childhood education environments are designed to provide opportunities for children with and without disabilities to interact and practice CTT with one another. Unfortunately, children with disabilities and children who are typically developing do not interact automatically when placed in shared settings. Peers often need varying levels of adult facilitation to learn how to play and interact with children who have a range of deficits in CTT skills. As greater numbers of children with disabilities are being served in inclusive education environments (McLeskey, Landers, Williamson, & Hoppey, 2012), teachers have a growing need for a variety of CTT instructional
supports that differ based on children’s level of need (Mogharreban & Bruns, 2009). Moreover, teachers need a systematic means of monitoring children’s progress to ensure proper levels of CTT instruction are provided to each child.

The use of tiered instruction is one potentially effective strategy for early childhood educators to promote and foster CTT in children with a spectrum of communication capacities. Tiered instruction is a broad pedagogical approach that allows teachers to arrange various interventions on a hierarchy of intensity to match children’s level of need (Horn & Banerjee, 2009). In tiered instruction, each tier represents a level of intensity; children are matched with the tiers based on abilities and learning needs (Satter & Dunn, 2012). Utilizing existing evidence-based strategies for increasing CTT, teachers can utilize tiered instruction to systematically facilitate peer interactions, provide broad and/or direct instruction, and monitor child progress in order to foster learning and mastery of CTT for all, regardless of where their needs fall on the spectrum.

**Conversational Turn Taking: A Social Communication Skill**

Conversational turn taking (CTT) is considered to be one of the most critical social communication skills a young child will learn (Hart & Risley, 1995; Stanton-Chapman & Snell, 2011; Zimmerman et al., 2009). Conversational turn taking leads to acceptance, participation, and a greater opportunity to grow and learn as an equal member of the classroom community (Mashford-Scott & Church, 2011; Ruston & Schwanenflugel, 2010). According to Betty Hart (1995), CTT competence “contributes to breadth of knowledge, analytic and symbolic competencies, self-confidence, and
problem solving, which are among the interlocking attitudes, skills, and knowledge required for entry and success in an increasingly technological world of work” (p 192). A range of play-based and behaviorally-based instructional strategies have been found effective in addressing social communication skills, and specifically, for increasing conversational turn taking among children with diverse learning needs.

**Social Communication**

Social communication is defined as a combined set of social and communication skills required for interacting with others. Very early in life, children begin to engage social communication through pre-linguistic communicative interactions involving nonverbal initiations and responses such as eye gazing and joint attention (e.g. a child notices an adult looking at a book and looks with the adult), gestures (e.g. pointing, reaching), and facial expressions (e.g. smiling, frowning). Over time, social communication becomes more verbal and initiating. Maintaining an interaction becomes more complex. Basic social communication skills including eye contact, imitations, being responsive, initiating and maintaining a topic and, eventually, engaging in CTT (Beckman & Leiber, 1994; Kaczmarek, 2002) are often considered the most important accomplishments of early childhood (Carpenter, Nagell, & Tomasello, 1998; Denham & Weissberg, 2004; Hemmeter, Ostrosky, & Santos, 2003).

Children with adequate social communication skills are more likely to establish reciprocity and positive interactions with other children and form friendships, thus setting the stage for a future of successful socialization experiences (Hadley & Schuele, 1998; Stanton-Chapman, Denning, & Jamison, 2012). In addition, successful participation in
daily routines and activities is nearly impossible without adequate social communication skills (Hadley & Schuele, 1995). Children of all ability levels can utilize social communication skills to cultivate relationships with others that can help them succeed (Stanton-Chapman, Denning, & Jamison, 2008); however, children who lack social communication skills are at greater risk of developing future academic and behavioral difficulties, antisocial behavioral characteristics, and other psychiatric disturbances (Michealson & Mannarino, 1986). For example, childhood depression has been linked to a lack of essential social communication skills (Ghaziuddin, Ghaziuddin, & Greden, 2002; Koenig & Levine, 2011; Segrin, 2000).

By preschool, most children have witnessed various social cues, and through the process of typical developmental sequences, they have acquired basic social communication skills. Then, during preschool, through structured opportunities to interact with others, children who are typically developing master the essential social, communication, and cognitive competencies that support transition from preschool to kindergarten (Stanton-Chapman, Denning, & Jamison, 2012). For children with disabilities, however, typical trajectories of development are derailed and social communication deficits in early childhood may be transformed into restricted activities and interests and engagement in challenging behaviors that interfere with learning later in school (Sigafoos, 2000; Sigafoos, Arthur-Kelly, & Butterfield, 2006). Children with early social communication delays often require extensive support and intervention to gain the essential competencies that come so naturally to their peers (Stanton-Chapman, et al., 2012). Catching social communication delays early and providing systematic
instructional support immediately, helps avoid regression and improve outcomes that can change the course of a child’s life (Fletcher & Vaughn, 2009; Greenwood, et al., 2011).

**Conversational Turn Taking**

A conversational turn typically represents one initiation and response interchange (Brown, Odom, & Holcombe, 1996) and can be defined as the ability to participate as a conversational partner as both a speaker/initiator and listener/respondent (Fey & Leonard, 1983; Kaczmarek, 2002). In order to engage in conversational turn taking (CTT), children need both expressive (e.g. frequency of utterances, use of semantic relationships, requesting) and receptive (e.g. responding to initiations) communication competence (Hay & Fielding-Barnsley, 2009).

Children of all backgrounds, readiness, preferences, and abilities deserve the opportunity to master CTT early in life. CTT is associated with basic social and cognitive competencies (Stanton-Chapman et al., 2012) and the ability to make friends and acquire peer acceptance (Ruston & Schwanenflugel, 2010). Peer acceptance, in turn, leads to future academic motivation (Wentzel, Battle, Russell, & Looney, 2010), adjustment (Ladd, Kochenderfer, & Coleman, 1996), and achievement (Konold, Jamisson, Stanton-Chapman, & Rimm-Kaufman, 2010).

Children with disabilities often lack the verbal CTT skills needed for participation and the establishment of relationships with peers and adults (Craig, 1993; McConnell, 2002). In fact, research has shown that children who lack verbal CTT skills have fewer acquaintances and friends than children with other kinds of disabilities (Raghavendra, Olsson, Sampson, Mcinerney, & Connel, 2012). While it is true that children with
disabilities interact with their peers more frequently in inclusive settings than in segregated ones (Devoney, Guralnick, & Rubin, 1974; Guralnick & Groom, 1988; Kwon, Elicker, & Kontos, 2011; Paul, 1985), in inclusive settings, children who are typically developing rarely choose to interact with children with disabilities in the absence of adult intervention (Devoney et al., 1974; Peterson & Haralick, 1977). As a result, in inclusive early childhood environments, adult intervention is a necessary component to facilitating CTT learning among children with and without disabilities.

**Conversational Turn Taking Instruction**

Interventions that focus on CTT for children with disabilities are a key component of early intervention efforts (Bricker, 1993). In fact, the Division for Early Childhood (DEC) and National Association for the Education of Young Children’s (NAEYC) joint position paper on inclusion specifically states “behaviors that facilitate participation are critical goals of high quality early childhood inclusion” (2009, p. 2).

A review of the literature was conducted to determine what types of CTT interventions exist and how each has been validated through research. Classroom-based interventions designed to promote CTT and related skills were included in the review. Conversational turn-taking interventions used in home settings or for children over the age of 8 were excluded from the review. The interventions reviewed generally fell into two categories: play-based and behaviorally based. The interventions are organized in the following text by the amount of adult mediation required. That is, play based interventions, which require only moderate amounts of adult mediation are reviewed first. Because they require higher levels of adult mediation, behaviorally-based interventions
are reviewed next. They are behaviorally-based given the use of built in three term contingencies mediated by an adult; however, the interventions can range from direct instruction to more naturalistic approaches where the child’s intention and interest is used to begin each teaching episode.

**Play-based interventions.** Many researchers have explored the use of play-based interventions to structure opportunities for CTT. In play-based CTT interventions, adults utilize guided play scenarios as a tool for encouraging interactions between children. Depending on how play-based interventions are carried out, they can range from very child directed (i.e. when children can make choices about what they do and with whom they do it) to very adult directed (i.e. when the teacher organizes and directly facilitates structured opportunities for children to participate) (Grisham-Brown, Hemmeter, & Pretti-Frontczak, 2005). Multiple variations of play-based interventions exist, and the following are described next: Plan, Play, Review (PPR), Play Scripts, and Peer Mediated Instruction (PMI).

**PPR.** Plan, Play, Review is an intervention that uses an adult facilitated planning period, play session, and reporting period to promote the use of various social communication skills. It has been shown to be an effective intervention for preschoolers at risk for language delays (Craig-Unkefer & Kaiser, 2002; Craig-Unkefer & Kaiser 2003) as well as children with developmental disabilities (Stanton-Chapman, Denning, & Jamison, 2008). In 2008, Stanton-Chapman, Kaiser, Vijay, and Chapman showed increased CTT in Head Start children using a plan, play, review approach.
**Play scripts.** Play Scripts are another play-based intervention that has often been used for teaching CTT among preschool children with autism (Ganz & Flores, 2008; Goldstein & Cizar, 1992). In a play script intervention, children are guided to follow scripts that occasion peer interactions (Dunlap & Powell, 2009). Robertson and Weismer (1997) showed improvements in CTT using play scripts for children with specific language impairments. Increased CTT among children with and without disabilities during play have resulted from Plan, Play, Review and Play Script interventions; however, target children have often lacked maintenance or generalization of skills within follow up examinations.

**PMI.** Peer Mediated Instruction is a play-based intervention in which peer models are taught skills to direct toward target children. The focus of the intervention is to increase the social and communicative behaviors of children who are in need by teaching peer models to initiate interactions and/or to respond to the social behaviors of children who need additional support (Odom, Hoyson, Jamieson, & Strain, 1985; McEvoy et al., 1988). Peer Mediated Instruction (PMI) appeared first during the 1970s. At that time, researchers found improvements in social interaction when young, typically developing children, were taught to initiate, at high rates, to children with disabilities, (Ragland, Kerr, & Strain, 1978; Strain, 1977; Strain, Kerr, & Ragland, 1979; Strain, Shores, & Timm, 1977; Tremblay, Strain, Hendrickson, & Shores, 1981; Goldstein, Kaczmarek, Pennington, & Shafer, 1992). Traditionally, children who were typically developing served as peer models and children with disabilities served as target children. Regardless of whether the children have been diagnosed with a disability, today it is...
understood that a peer model is a child who has mastered the target skill while the target child is a child who has not (Harris, 2010). Based on the review of the literature, it appears that the specific methods employed within a PMI “package” are inconsequential to the effectiveness of the intervention, as long as three core components are represented: train the peers, prompt the peers, and reinforce the peers.

To train peer models, researchers have used script training (Doctoroff, 1997; Odom & Strain, 1986), direct instruction lessons focused on a sequential behavior chain (Goldstein, Kaczmarek, Pennington, & Shafer, 1992; Goldstein, English, Shafer, & Kaczmarek, 1997), instruction paired with visual supports (Goldstein & Wickstrom, 1986; Sainato, Goldstein, & Strain, 1992), and modeling combined with practice and feedback (Shafer, Egel, & Neef, 1984). To prompt the peer models, researchers utilized verbal prompts before and during play sessions (e.g. Odom & Strain, 1986), verbal prompts only before play sessions (e.g. Shafer et al., 1984), verbal and visual prompts before and during play sessions (e.g. Goldstein et al., 1992), and verbal and visual prompts only before play sessions (e.g. Sainato et al., 1992). Finally, to reinforce peer models, researchers have used verbal praise (e.g. Shafer et al., 1984), verbal praise combined with a token reinforcement system (e.g. Goldstein & Wickstrom, 1986), or a group contingency (Doctoroff, 1997).

Overall, the research has shown that training preschool children (i.e. peer models) to assist and support children with targeted needs can be a successful endeavor (Odom, 2002). More specifically, studies have shown that PMI will support improvements in CTT at the preschool level (Goldstein & Wickstrom, 1986; Odom & Strain, 1986). Peer
Mediated Instruction has been used to target CTT for children with suspected developmental delays (Doctoroff, 1997), children with moderate developmental disabilities (Goldstein, English, Shafer, & Kaczmarek, 1997), preschoolers with autism, (Golstein, Kaczmarek, Pennington, & Shafer, 1992; Sainato, Goldstein, & Strain, 1992) and children with language delays (Goldstein & Wickstrom, 1986). Increases in CTT among children with and without disabilities have been consistently achieved using PMI and are often maintained after teacher prompting is withdrawn.

**Behaviorally-based interventions.** For some children, it is the pre-requisite abilities involved in CTT (e.g. joint attention, initiations, and responses) that need to be targeted through intervention. In those cases, more structured models of instruction have been used to target those particular skills. In behaviorally-based CTT interventions, a three term contingency (i.e. antecedent, behavior, consequence) is used to elicit conversational turns from children. Multiple variations of behaviorally-based interventions exist. Direct Instruction and Milieu Teaching are described next, followed by descriptions of the components of milieu teaching including Incidental Teaching, Mand Model, and Time Delay.

**Direct instruction.** Discrete Trial Teaching and direct teacher prompting have been used with preschool children with cognitive language delays (Downs, Downs, Fossum, & Rau, 2008) and children who displayed little or no interaction with classmates (Fox, Shores, Lindeman, & Strain, 1986). In both cases, more adult prompting led to increases in child initiations. Milieu Teaching (Mancil, Conroy, & Haydon, 2009) and Enhanced Milieu Teaching (Hancock & Kaiser, 2002) are based on behavior principles,
yet they are defined as naturalistic. Both intervention strategies/protocols are child centered and adult mediated and have been used to effectively increase CTT skills.

**Milieu Teaching.** Milieu Teaching (MT), (Hart and Rogers-Warren, 1978; Rogers-Warren & Warren, 1980) is a naturalistic intervention in which the teacher engages the target child in communicative interactions within the context of typical activities and routines and focuses on an item/object/activity in which the child shows interest (e.g. Kohler, Crillery, Shearer, & Good, 1997). During each interaction, the teacher follows specific sequences and combinations of prompts associated with Incidental Teaching (Hart & Risley, 1968), Mand-Model (Rogers-Warren & Warren, 1980), or Time Delay (Halle, Marshall, & Spradlin, 1979). The teacher includes corrective prompts and modeling as needed and ends each interaction with positive feedback, expansion of the child’s utterance, and/or access to a desired object or activity (Hancock & Kaiser, 2002). The roots of MT can be found in the behavior analysis literature surrounding procedures for teaching the basic responses of functional language (e.g. Guess, Sailor, & Baer, 1976; Hart & Risley, 1968; Schreibman, 1988; Skinner, 1957); however, MT differs from classic implementation of stimulus and reinforcement procedures because it is designed to be a naturalistic intervention which uses basic behavioral principles in the context of child choice and variation (Allen & Cowen, 2008). The adult follows the child’s lead and uses naturally existing opportunities for teaching social interactions and language.

Milieu Teaching was established more than 30 years ago (Rogers-Warren & Warren, 1980) and the underlying principles and procedures have been examined for
even longer (Hart & Risley, 1968). According to Noonan and McCormick (2006) MT is the most thoroughly researched naturalistic instruction procedure. It has shown positive effects for a wide range of young children with disabilities, including, the increase of non-verbal and verbal communication in children with moderate to severe language delays (Kaczmarek, Hepting, & Dzubak, 1996), the use of semantic relationships (e.g. agent-action, adjective-noun) in children with borderline to moderate levels of mental retardation (Warren, Gazdag, Bambara, & Jones, 1994), and improving a variety communication skills in children with autism (Christensen-Sandfort & Whinnery, 2013; Hancock & Kaiser, 2002). Furthermore, the three instructional procedures that make up MT (i.e. Incidental Teaching, Mand Model, and Time Delay) each have a noteworthy research base of their own within the historical literature.

**Incidental teaching.** The first studies of MT involved the use of Incidental Teaching with preschool age children from low-income families to increase CTT for children at risk for language delays (Hart & Risley, 1968, 1974, 1975). Incidental Teaching was conducted by arranging the classroom environment so that desirable materials were placed where children could see but not reach them (antecedent). Access to the materials (natural reinforcer) was made contingent upon the children’s requests paired with specific language targets (e.g. adjective-noun combinations as a target behavior). When children did not produce language targets in response to the environment, teachers presented a series of graduated prompts including time delay, mands, and models. Hart and Risley (1968, 1974, 1975), found that Incidental Teaching
was effective for increasing spontaneous vocabulary several aspects of verbal behavior and the use of compound sentences with both teachers and peers.

In 1983, McGee, Krantz, Mason, and McClannahan modified the Incidental Teaching procedure to determine whether it would also work to increase receptive language skills for non-verbal children with autism. Not only did Incidental Teaching work to improve object identification for the youths, but generalization was also achieved. McGee, Krantz, and McClannahan used Incidental Teaching again in 1985 to determine whether it would be more or less effective than traditional training procedures (i.e. discrete trials). Incidental Teaching was found to promote greater generalization and more spontaneous language for children with autism than traditional training.

**Mand model.** The Mand Model began as an adaptation of Incidental Teaching. Rogers-Warren and Warren (1980) investigated a Mand Model procedure where the teacher provided a variety of materials with which children might wish to play. When a child approached, the teacher would present a mand (i.e. a question or an instruction to verbalize). If the child did not respond or responded minimally, a model was provided to prompt the language target (e.g. vocabulary, complexity). Contingent positive consequences followed child utterances (i.e. praise and access to the preferred item). The researchers found that the children’s rates of verbalization doubled and sometimes tripled from baseline levels and substantial increases in vocabulary and complexity of utterances were observed. In 1984, Warren, McQuarter, and Rogers-Warren used the procedure again to find that using Mand Model also resulted in increases in total verbalization and initiations for preschoolers with language delays.
Gobbi, Cipani, Hudson, and Lapenta-Neudeck (1986) combined Mand Model with a delay condition to determine whether two children with mental retardation could learn to request food and drink. They began with a multiple trial format and transferred the behavior to incidental opportunities during snack time. The children learned to request at a high rate under both conditions and generalization across activities and trainers was maintained over time. Finally, in 1988, McCook used a Mand Model plus a correction procedure to increase requesting behaviors with adults. Both participants acquired the behavior and achieved generalization across conditions and maintenance over time.

*Time delay.* Halle, Marshall, and Spradlin (1979) first applied another adaptation of Incidental Teaching (i.e. Time Delay) to increase verbal initiations by adolescents in an institution. Delays in presenting the desired object paired with focused attention (i.e. eye gaze, raised eyebrows) were used to prompt children to ask for their food trays. Training at breakfast was sufficient to result in generalization to other mealtimes and people. Halle, Baer, and Spradlin (1981) found that teachers were able to use the Time Delay technique to increase child verbal initiations and interestingly, they found that the teachers maintained the technique over time and generalized the technique to novel situations. Two additional studies (Charlop, Schreibman, & Thibodeau, 1985; Igenmay & VanHouten, 1991) also found that Time Delay was effective for increasing spontaneous speech in 5 to 10 year old children with autism.

Given the strong history of research around MT strategies, many of the more recent MT studies have begun to investigate the effectiveness of MT as one component of
larger intervention packages. For example, researchers used MT in combination with environmental arrangement and responsive interaction techniques (Enhanced Milieu Teaching; Hancock & Kaiser, 2002) Discrete Trials (Kasari et al., 2008), Functional Communication Training (Mancil et al., 2009), and a variety of naturalistic strategies (Warren, Yoder, Gazdag, Kim, & Jones, 1993). Researchers are also conducting studies examining the efficacy of MT in comparison to other supported naturalistic interventions such as Responsive Interaction (Yoder et al., 1995) and the Picture Exchange Communication System (Yoder & Stone, 2006). Furthermore, researchers have begun to examine the efficacy of train the trainer models to support the use of MT across children’s natural environments (e.g. Hester, Kaiser, Alpert, & Whiteman, 1995). The expanded research agenda surrounding MT is clearly a sign that over time, MT has proven to be an effective, evidence based strategy for promoting the pre-linguistic and functional communication skills needed for children to be successful conversational turn takers.

**Organizing CTT Instruction by Intensity**

In order to teach CTT in inclusive educational environments, teachers need to utilize a number of different instructional approaches to meet the various needs of a range of children (Mogharreban & Bruns, 2009). For most children who are typically developing, structured and sometimes adult facilitated opportunities to interact with others across the school day can provide them with the experiences they need to master CTT (Hamaguchi, 2010). For others, more targeted, play-based CTT instruction might be necessary (Stanton-Chapman, et al., 2012). And still, some children will require
individualized, intensive, direct instruction to learn CTT (Mancil, et al., 2009). In fact, effectively teaching CTT in the inclusive classroom will require teachers to utilize a variety of interventions, arranging them on a hierarchy of intensity so that interventions can be systematically matched with children based on their level of need. Luckily, a framework for achieving this task already exists. Arranging interventions on a hierarchy of intensity and implementing them to match children’s levels of need is a pedagogical approach known as tiered instruction.

**Tiered Instruction**

Tiered instruction is a systematic means of providing differing levels of instruction to a range of children with varying levels of need. The characteristics of tiered instruction include a hierarchy of interventions organized by level of intensity and a systematic means of determining which children should receive which level of instruction. In the following text, the elements of tiered instruction are described with further detail. While there are currently no models of tiered instruction designed to support conversational turn taking, a synthesis of the research around existing models of tiered instruction are provided for the reader.

**Elements of Tiered Instruction**

A model of tiered instruction is one that encompasses an intervention hierarchy, involving two or more phases or tiers (e.g. Gettinger & Stoiber, 2008; Pearce, 2009). Used to ensure that a classroom is effectively instructed and managed, the first tier is frequently conducted as a universal or class-wide intervention (e.g. Barnett, Daly, Jones, & Lentz, 2004; McMaster, Fuchs, Fuchs, & Compton, 2005). Tier one helps programs
concentrate on accessibility through universal approaches to instruction and environmental arrangement. Tier two is designed to increase children’s opportunities to practice deficient skills; it usually targets small group or embedded interventions that address children’s additional needs (Daugherty, Grisham-Brown, & Hemmeter, 2001; Wolery, 1994). Finally, the third and sometimes fourth tier are based on insufficient responses to universal or targeted instruction and is often a pull out or one to one intervention designed as specialized and individualized (e.g. Benedict, Horner, & Squires, 2007; Kamps & Greenwood, 2005). In most cases, tiers two, three, and above are designed to support the selection and implementation of individual accommodations through specially designed instruction tailored to each child’s unique needs.

The intervention stages or phases of tiered instruction are organized by level of intensity (Denton et al., 2010; Duhon, Mesmer, Atkins, Greguson, & Olinger, 2009). In the past, intensity has been defined by a wide array of constructs and variables, but for the purpose of the study, intervention intensity reflected qualities of teacher time and effort needed for planning and instruction in the classroom environment. Figure 1 represents the hierarchy of intervention intensity associated with tiered instruction. A tier one (i.e. universal) intervention is defined as a strategy that requires low levels of teacher support during the school day, since there is no explicit planning of antecedents and consequences, nor is there direct instruction for target children. A tier two (i.e. targeted) intervention is defined as a strategy that requires moderate levels of teacher support during the school day. Targeted interventions typically include general planning of antecedents and consequences for peers; there is limited or no direct instruction for target children. Finally, a tier three
(i.e. individualized) intervention is defined as a strategy that requires *high* levels of teacher support during the school day, including specific planning of antecedents and consequences, and direct instruction for target children. The DEC/NAEYC joint position statement on inclusion cites tiered instruction as a promising practice for supporting children in inclusive environments:

Tiered models in early childhood hold promise for helping adults organize assessments and interventions by level of intensity. Depending on the individual needs and priorities of young children and families, implementing inclusion involves a range of approaches—from embedded, routines-based teaching to more explicit interventions—to scaffold learning and participation for all children.

(DEC/NAEYC, 2009, p. 2)

**Tiered Instruction Research**

A review of the literature was conducted to determine the different models of tiered instruction and how they are being validated through research. The Academic Search Complete, Education Research Complete, ERIC, Master FILE Premier, Primary Search, Psychology and Behavioral Sciences Collection, Academic Search Premier, Professional Development Collection databases were reviewed using the search terms: tiered instruction, tiered intervention, tiers of intervention, response to intervention, responsiveness to intervention, intervention intensity, early childhood, and preschool. Studies of school set interventions defined as being one or more parts of a model of tiered instruction, with participants who were considered to be in early childhood, were included in the review. Studies that included participants beyond 3rd grade were
excluded. Appendix A provides a table summarizing the review and outlines the variables (i.e. tiers) examined within each study. Because the authors clearly stated which tier or tiers they were researching, it was not necessary to categorize the studies into tiers for the purpose of the review. Seventeen studies were included in the final review.

**Figure 1.** Hierarchy of Intervention Intensity. A depiction of the hierarchy of intervention intensity associated with tiered instruction

**Parts of the whole.** In general, most researchers chose specific portions of tiered instruction to examine independently. For example, the most commonly used approach to examining the effectiveness of tiered instruction is to evaluate the implementation of tier two (i.e. small group) interventions. Seven of the 17 studies reviewed included child
level data to determine whether tier two interventions had an effect on child outcomes (Appendix A). In fact, at least two of the studies were designed to compare two to three different tier two interventions (McMaster et al., 2005; VanDerHeyden, Snyder, Broussard, & Ramsdell, 2008). Most researchers found that tier two interventions were generally effective for producing child progress; however, at least two of the studies noted a small group of non-responders or children for whom the intervention had only small positive effects (Bryant et al., 2008; Denton et al., 2010). The seven studies of tier two interventions included no measure of tier one practices to determine whether quality instruction was in place at the beginning, nor was there any movement into tier three for non-responders. Additional approaches to tiered instruction research included two studies that utilized an examination of tier one only (Benedict, Horner, & Squires, 2007; Stormont, Smith, & Lewis, 2007), two studies that were used to examine the predictability of decision making models and measures used to move children through tiers (Fuchs et al., 2008; Vellutino et al., 2008), and one study that outlined the interaction between two different models of tiered instruction being implemented simultaneously (McIntosh et al., 2006). Three different studies examined both tiers one and two (Koutsoftas, Harmon, & Gray, 2009; Pearce, 2009; Schuele et al., 2008). The authors included clear descriptions of both tiers and used evaluation tools to examine each tier, yet the studies had limitations. For example, Koutsoftas and colleagues (2009) and Pearce (2009) both incorporated measures to evaluate tier one; however, baseline and comparison data were excluded. Based on the results provided, it was unclear whether tier one was effective in either the Koutsoftas or the Pearce study. In another study,
Schuele and colleagues (2008) examined a supplemental tier one (with the regular classroom serving as a comparison) plus an additional 12 week intervention. It was unclear whether the students received tier two as a supplement or as a replacement for the tier one instruction. The authors also reported the neglected use of relevant measures that would have provided a better picture of the child differences between groups.

Finally, two different studies were used to examine three levels of tiered instruction. The first (Gettinger, & Stoiber, 2008) looked at the overall effects of a three part model of tiered instruction designed to improve various early literacy skills. Using a pre/posttest with control group design, the authors found that the intervention group outperformed the control group. One limitation was that the researchers did not examine each component of tiered instruction, so there was no way to determine which portion of the model may have led to changes in child behavior. Furthermore, no fidelity data were reported. The second study in the review that looked at three tiers (O’Connor et al., 2005) followed a group of students who, based on a cutoff score, were moved in and out of tiers over a three year period. The results showed a drop in special education placements from 15% to 8%. Unfortunately, the authors did not include any evidence of intervention fidelity or social validity. It was also too small of a sample size to make any speculations about students who were or were not identified for special education. Moreover, it is important to note that the researchers were responsible for the implementation of the tier two and three interventions – not classroom teachers.

**Intervention targets.** A variety of approaches to researching tiered instruction were cited in the literature; however, the dependent variables appeared to be rather
restricted. In fact, there were only three categories of dependent variables found in the review. The majority of the research (i.e. 12 of 17) includes models of tiered instruction designed to improve children’s literacy skills (Appendix A). Of the remaining models, four were focused on behavior (Benedict et al., 2007; McIntosh et al., 2006; Pearce, 2009; Stormont et al., 2007) and two were focused on math skills (Bryant, et al., 2008; Duhon et al., 2009). The numbers do not add up to 17 because one study was counted twice. The study that was counted twice examined tiered instruction for both literacy and behavior simultaneously (McIntosh et al., 2006). It is necessary for research of tiered instruction to expand to a wider variety of dependent variables. Given the promise of tiered instruction, it will be important to know whether increasing tiers of intensity can be used to support areas like social communication, motor, or adaptive skills; domains that are so critical during early childhood. Specifically, CTT should be targeted using tiered instruction.

Research methods. In general, researchers have found that tiered instruction is an effective approach to supporting learning and progress for all children. Particularly in the area of early literacy, tier two interventions have shown significant effects for children who are at risk for future reading difficulties (e.g. Bryant, Bryant, Gersten, Scammaca, & Chavez, 2008; Denton et al., 2010; Gettinger & Stoiber, 2008). One of the overall strengths of the tiered instruction research is the number of studies conducted using strong research designs. For example, Fuchs, Compton, Fuchs, Bryant, and Davis (2008) conducted a field based, longitudinal, experimental study, Denton and colleagues (2010) conducted an experimental comparison study scaled up in multiple schools,
Kamps and Greenwood (2005) completed a randomized trial across eight urban schools, and O’Connor, Harty, and Fulmer (2005) conducted a longitudinal examination with repeated measurements across time and a historical control group. Furthermore, a number of single subject multiple baseline designs have contributed to the literature (e.g. Duhon et al., 2009; Koutsoftas, Harmon, & Gray, 2009; Stormont, Covington-Smith, & Lewis, 2007).

Preschool, kindergarten, 1st and 2nd grade students are subjects in the majority of the research, indicating a strong focus on the importance of early intervention to support future academic success. In many studies, large populations of children were followed from one grade to the next to determine whether intervention effects would maintain over time. In fact, over 2,500 students in early childhood programs across the United States were cited participants in the reviewed studies.

For the majority of the tiered instruction studies reviewed, the use of large populations and strong research designs, paired with positive results, led to a conclusion of strong or possible research effects. Only four of the 17 studies were categorized as showing weak intervention effects; however, the central focus of each was on a component of tiered instruction rather than on child outcomes. These four studies focused on understanding the decision making model (Burns, Scholin, Kosciolek, & Livingston, 2010), the interaction between two interventions (McIntosh, Horner, Chard, Boland, & Good III, 2006), the methods of identification (McMaster et al., 2005), and the predictability of measures (Vellutino, Scanlon, Zhang, & Schatschneider, 2008).
**Intervention fidelity and feasibility.** The effect of intervention fidelity on children’s response to intervention is an area of great importance (Noell & Gansle, 2006). Intervention fidelity or treatment integrity refers to the degree to which an intervention is implemented the way it was intended. Fidelity is a critical factor in determining the effectiveness of any intervention. Nine of the 17 tiered instruction studies reported good to excellent intervention fidelity (Benedict et al., 2007; Duhon et al., 2009; Fuchs et al., 2008; Koutsoftas, et al., 2009; McIntosh et al., 2006; McMaster et al., 2005; Stormont et al., 2007; VanDerHeyden et al., 2008; Vellutino et al., 2008). Five studies had limited or incomplete intervention fidelity data (Bryant et al., 2008; Denton et al., 2010; Gettinger & Stoiber, 2008; Kamps & Greenwood, 2005; Schuele et al., 2008), and 3 studies did not report fidelity data at all (Burns et al., 2010; O’Connor, et al., 2005; Pearce, 2009).

Feasibility refers to applicability of the intervention to the classroom environment. An intervention is not always considered feasible if outside resources or settings are required for implementation. Conversely, an intervention is much more feasible if the teacher can solely implement the intervention within the context of the ongoing daily classroom activities. Ten of the 17 tiered instruction studies included interventions that were implemented by researchers, research assistants, university students, or hired and trained tutors or interventionists (Appendix A). Furthermore, six of the studies included interventions that were conducted as pull-out interventions in rooms outside of the classroom (Burns et al., 2010; Duhon et al., 2009; Fuchs et al., 2008; McMaster, et al., 2005; Schuele et al., 2008; Vellutino et al., 2008). There were six different studies comprised solely of interventions that were conducted by the classroom
teachers in the classroom setting (Benedict et al., 2007; Denton et al., 2010; Kamps & Greenwood, 2005; McIntosh et al., 2006; Stormont, et al., 2007); however, only three of those studies also reported good to excellent intervention fidelity (Benedict, et al., 2007; McIntosh et al., 2006; Stormont et al., 2007). Two of the three studies that indicated good fidelity and feasibility were examinations of tier one only (Benedict, et al.; Stormont, et al.). The other was a study by McIntosh and colleagues (2006) designed to examine the interaction effects between two models of tiered literacy and behavior instruction already being implemented. In fact, the models had already been in place for 10 years at the start of the study.

**Future directions.** More studies that define, measure, and evaluate tiered instruction are necessary. Researchers have created preliminary evidence for various components of tiered instruction; however, attention also needs to be directed towards examining the efficacy of tiered instruction as a whole (C. R. Greenwood, personal communication, September 27, 2011). Future studies need to include clearly defined tiers, intervention fidelity measures, and reports of child and teacher outcomes. In addition, important intervention targets, such as conversational turn taking (CTT) should be explored. If tiered instruction is effective for supporting children at varying ability levels, it might be a viable solution to teaching CTT to children with a range of needs in inclusive settings. Furthermore, if tiered instruction is to be used in inclusive settings, it will be important to consider the feasibility of tiered instruction for classroom teachers. Focusing on smaller scaled application opposed to school-wide implementation is a first step. A single subject study could provide detailed information about implementation of
tiered instruction before further attempts are made to scale up. In conclusion, future research needs to determine first on a small scale, whether tiered instruction, as a whole package is (a) an applicable teaching strategy for important developmental milestones such as conversational turn taking, and (b) a feasible approach for the inclusive classroom teacher to utilize independently.

**Dissertation Research Proposal**

In the following text, a research study examining a model of tiered instruction is described. Three levels or tiers of CTT intervention are defined for the reader. A description of each instructional strategy is followed by an explanation of how each fits within a model of tiered instruction. After the model of tiered CTT instruction is described, the research questions and rationale are presented.

**Tiered Conversational Turn Taking Instruction**

A model of tiered instruction was developed in response to the need for a systematic approach to increasing conversational turn taking (CTT) in the *inclusive preschool classroom*. The model includes three tiers of instructional support with increasing intensity from tier one to tier three. Universal Design for Learning was selected as a promising tier one approach for increasing access to structured opportunities to engage in CTT (Mogharreban & Bruns, 2009). Based on their empirical evidence of effectiveness for increasing CTT and related prerequisite skills for a range of preschool age children Peer Mediated Instruction and Milieu Teaching were selected as tier two and three interventions. Furthermore, each intervention was chosen based on a match with
the levels of teacher support, planning, and direct instruction associated with levels one, two, and three of tiered instruction (Figure 1).

**Universal design for learning – tier one.** For children who are typically developing, or for those with age level conversational turn taking (CTT) skills, various opportunities to interact with others across the school day can be enough to support mastery of CTT (Hamaguchi, 2010). In the inclusive classroom, however, adult facilitation of structured opportunities is needed to promote interactions among children with various communicative capacity and interest. Universal Design for Learning (UDL) is a framework for structuring learning opportunities for students with differing knowledge, skills, backgrounds, interests and preferences. It is based on principles first introduced in the field of architecture that referred to the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptations or specialized design (Colburn, 2010; Conn-Powers, Cross, Traub, & Hutter-Pishgahi, 2006). Brain imaging technology has allowed researchers to determine three networks in the brain: (a) the recognition network which allows learners to acquire information and knowledge, (b) the affective network which allows learners to establish priorities and focus attention, and (c) the strategic network which allows learners to develop action plans and solve problems (Rose & Meyer, 2006). Positron emission tomography (PET) studies have confirmed that brain activity occurs in roughly the same areas for most individuals performing a given task, but that each individual has a unique signature of brain activity for that task (Meyer & Rose, 2000). UDL aims to maximize access to learning through the provision of flexibility and accommodations within each
network; specifically, to accommodate learner differences within the recognition network, multiple means of representation gives diverse learners various ways to acquire information and knowledge. To support the affective network, providing multiple means of expression offers flexible options for getting interested and staying motivated. Finally, to facilitate the strategic network, multiple means of expression provides learners with alternatives for demonstrating what they know.

Existing research of learner differences and effective teaching practices provides the groundwork for UDL (Rose & Meyer, 2006). The theoretical foundations of UDL make it a promising practice for education; however, research surrounding the practical application of UDL in the early childhood classroom is in its infancy. The theoretical framework of UDL builds from the work of Lev Vygotsky (1978) on apprenticeship learning, scaffolding, and the Zone of Proximal Development (Jimenez, Graph, & Rose, 2007; Rose, 2001) as well as the Ecological Systems Theory of Urie Bronfenbrenner (Darragh, 2007). Furthermore, the UDL methodology closely adheres to effective teaching practices recommended by professional associations such as NAEYC and DEC (McGuire-Schwartz & Arndt, 2007).

Application of UDL in the classroom has been described by a number of authors, yet the wide array of possible applications has made it complicated to systematically define and examine the effectiveness of UDL as an instructional approach. Some authors describe the use of digital media such as assistive technologies or voice recognition software as examples of UDL (Bernacchio & Mullen, 2007; Flores, 2008; Hitchcock & Stall, 2003) while others cite existing and well known instructional practices such as
differentiated instruction and multimodal communication (Colburn, 2010; Jimenez et al., 2007; Michael & Trezek, 2006); however, most descriptions of the approach in the literature are still focused on theory and principal rather than practical application (Conn-Powers et al., 2006; Darragh, 2007; McGuire, Scott, & Shaw, 2006; Meyer & Rose, 2000). One empirical examination (Lieber, Horn, Palmer, & Flemming, 2008) found that preschool children with disabilities made gains in both academic and social outcomes using the Children’s School Success curriculum, which was initially based on the tenets of UDL (i.e. multiple means of representation, engagement, and expression). Two more studies of the same curriculum have indicated similar child gains, however, the research has focused mainly on factors influencing implementation (Lieber et al., 2009) and the association between different forms of implementation and various outcome variables (Odom et al, 2010).

Universal Design for Learning can be qualified as a universal or class-wide intervention (i.e. tier one). It requires low levels of teacher support during the school day, no explicit planning of antecedents and consequences, and little or no direct instruction for target children. No single representation, no single strategy for action, and no single means of engagement will work for all students (Rose, 2001). Given the broad diversity across children in the typical inclusive classroom, promoting access and participation can be achieved only through thoughtful planning and systematic instructional approaches. Universal Design for Learning as a practice for teaching and learning in early childhood is supported by the Center for Applied Special Technology (CAST), the Council for Exceptional Children (CEC), and others considering the needs of all potential learners,
including those with identified special needs (Pisha & Coyne, 2001). According to Orkwis and McLane (1998), choosing methods that are universally designed is critical to supporting participation in the inclusive classroom. Rather than creating a curriculum and then adapting it to meet the individual needs of every child in the classroom, universal design is an instructional approach which, from the start, provides learners with a variety of ways to access and process information and demonstrate what they have learned (Blagojevic, Twomey, & Labas, 2002). At the heart of UDL is the potential for accommodating diverse populations, making it a promising instructional approach for the inclusive preschool classroom (Conn-Powers, et al., 2006; Darragh, 2007).

Peer mediated instruction – tier two. Even with structured opportunities designed to meet the needs of various learners, some children in inclusive settings may still need further support in order to master CTT (Stanton-Chapman, et al., 2010). Peer Mediated Instruction can be qualified as a small group or embedded intervention designed to address children’s additional needs through increased opportunities for practice (i.e. tier two). It requires moderate levels of teacher support during the school day, general planning of antecedents and consequences for peers, and limited direct instruction for target children. Peer Mediated Instruction was born from the inclusive classroom. From the beginning it has been clear that when placed in an inclusive setting, typical preschoolers are more likely to select other typical preschoolers as playmates rather than those with disabilities (Beckman, 1983; Peterson & Haralick, 1977). In the absence of adult intervention, socially competent peers tend to ignore or even reject classmates with disabilities (Sainato et al., 1992). Peer mediated instruction has been one
of the strategies used successfully to increase social interaction between children with and without disabilities in inclusive settings (Goldstein et al., 1992). As a result, both children with and without disabilities show increased CTT skills and participation in classroom activities.

**Milieu teaching – tier three.** When universal opportunities and play-based intervention don’t work, some children will need exposure to structured intervention to learn CTT (Mancil, et al., 2009). Milieu Teaching can be qualified as a pull-out or one to one, individualized and specialized intervention (i.e. tier three). It requires high levels of teacher support during the school day, specific planning of antecedents and consequences, and is fully composed of behaviorally-based intervention for target children. In the past, children with disabilities were taken out of the classroom and taught critical skills in tightly controlled situations. The careful control of teaching situations, however, is conflicting with the nature of an inclusive classroom. Inclusive classrooms are designed to provide children with disabilities the opportunity to participate in the general curriculum alongside their typically developing peers. Naturalistic teaching procedures such as MT provide an alternative method to teaching children with disabilities using structured teaching episodes in the context of everyday classroom activities. Similar to the types of instruction provided in controlled situations, MT includes specific antecedents and consequences; however, it is implemented in a way that allows children to maintain participation and engagement in the natural environment.
Research Questions

The study aimed to answer two broad research questions a) What is the effect of tiered instruction on conversational turn taking for child participants? And b) to What extent can the adult participant implement tiered instruction with fidelity?

The first broad research question asks whether organizing CTT interventions on a hierarchy of intensity will lead to progress for all children. One of the primary aims of any inclusive early childhood classroom is to help all children make progress in relation to their own scope of abilities. That is, minimal progress toward critical outcomes such as CTT would be acceptable for some children, while substantial progress would be expected for others. It was the hope that using tiered instruction to address CTT would allow for all children make adequate progress toward an important goal.

The results associated with the first research question were expected to contribute to the field by exploring areas that had limited support in the literature. Tiered instruction has been almost solely researched, to date, as parts of a whole; where the effects of one or sometimes two tiers of intervention have been measured. It was the hope that researching the effects of tiered instruction holistically would provide insight into the power of additive instructional tiers. Moreover, by choosing such a broad question, additional questions with potential to expand the literature would be embedded. Specifically: (a) What are the effects of tier one instruction, universal design for learning, on CTT for children whose needs did not warrant additional intervention? (b) What are the effects of two additive tiers of instruction, universal design and peer mediated intervention, on CTT for children who did not respond within tier one? And (c) What are the effects of three
additive tiers of instruction, universal design, peer mediated instruction and milieu
teaching, for children who still did not respond within tier two?

The second broad research question was aimed to determine whether tiered
instruction is a feasible approach for a classroom teacher. Given the complexity of tiered
instruction, it was important to ask if a teacher could handle the implementation of
multiple levels of intervention among a myriad of additional classroom responsibilities.
Additionally, it was important to ask the question because fidelity data are critical to
successfully answering the first research question related to the effects of tiered
instruction. If an intervention is not implemented with fidelity, it is nearly impossible to
determine whether changes in behavior are related to the independent variable (Odom,
2009). Moreover, fidelity data are limited in the existing research (Swanson, 2011). By
asking the broad question about the extent of intervention fidelity, the researcher was able
to evaluate each component of tiered instruction for supplemental and supportive data.
Specifically: (a) To what extent can the teacher implement tier one instruction, universal
design for learning, with fidelity? (b) To what extent can the teacher implement two
additive tiers of instruction, universal design and peer mediated instruction, with fidelity?
And (c) To what extent can the teacher implement three additive tiers of instruction with
fidelity?
Chapter II describes the method used to answer two broad research questions a) What are the effects of tiered instruction on conversational turn taking for child participants? And b) To what extent can the adult participant implement tiered instruction with fidelity? The chapter begins with a description of the setting and participants for the study. Next, the measures that were used for the study are outlined and the procedures and design are described. Finally, the data analysis process is provided, including the decision making process used to determine the movement of children through tiers. Chapter II ends with the analysis used to answer the research questions.

Setting

The setting for the study was an inclusive preschool classroom. The classroom was located in a public elementary school in a middle class, suburban area of northeast Ohio. The classroom schedule is outlined in Table 1. During centers, the materials available to the children included activities on the computer or smart board, books, a light table with science materials, a sand or water table, open ended art materials, a writing center with a variety of writing materials, a listening center, a house or dramatic play area, and a block area. The themes and activities in each center varied on a daily basis and children used a choice board to make independent decisions about when and where to play during center time.
### Table 1

*Daily Classroom Activities with Descriptions*

<table>
<thead>
<tr>
<th>Daily Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrival</td>
<td>Put away coats and back backs, take out folder</td>
</tr>
<tr>
<td>Fine Motor</td>
<td>Go to the tables and engage in a fine motor activity (e.g. stringing beads, writing, etc.). During this time the part time aide works with students with intensive needs at a similar activity.</td>
</tr>
<tr>
<td>Circle time (1)</td>
<td>Assign jobs, sing a greeting song, question of the day, exercises</td>
</tr>
<tr>
<td>Small Groups</td>
<td>Break into 2 small groups and rotate. Group one is a story, group two rotates between math, show and share, journals, fine motor/handwriting. During this time, two students do TEACCH at another station</td>
</tr>
<tr>
<td>Circle time (2)</td>
<td>Calendar, weather, daily news, large group learning activity</td>
</tr>
<tr>
<td>Recess or Music</td>
<td>Large motor activities</td>
</tr>
<tr>
<td>Snack</td>
<td>Engage in social conversation and adaptive skills</td>
</tr>
<tr>
<td>Independent Reading</td>
<td>One or two adults joins the children on the carpet for individual book exploration and reading</td>
</tr>
<tr>
<td>Social Skills</td>
<td>Various social skills are taught through puppet shows, role playing, and discussion. Visuals are used to support the lesson.</td>
</tr>
<tr>
<td>Centers</td>
<td>Children are given 60 minutes to explore the classroom materials and engage in independent or shared play activities.</td>
</tr>
<tr>
<td>Circle time (3)</td>
<td>Recall the events of the day and dismissal</td>
</tr>
</tbody>
</table>
Participants

The following text describes the characteristics of the one adult participant and fourteen child participants that were employed for the study. Demographic and descriptive information is included.

Adult Participant

One adult participant (i.e. teacher) was recruited. The adult participant was an inclusive preschool classroom teacher. An inclusive preschool classroom teacher has been defined as an adult who works with young children with and without disabilities; also known as an early childhood educator, interventionist, direct service provider, child care provider, or practitioner. For the purpose of the study, the term teacher was used to describe her role. During baseline, a demographic questionnaire was used to gather demographic information from the teacher (Appendix B). The teacher was a Caucasian female between the ages of 40 and 49 with a master’s degree. In addition to her master’s degree, she held an Ohio preschool teaching certificate and an early childhood intervention specialist license.

At the time of this study, she had 19 years of experience working with young children. She started her career working in daycare centers, a family development center, and had her own home daycare. For the last 11 years, however, she had worked in a public school with children with and at risk for disabilities. Her prior experience with tiered instruction included an experimental response to intervention (RtI) project in which she worked with the children in her classroom on letter recognition. During this project she
monitored their progress weekly using a measure she developed herself. She was also a member of the building RtI team.

**Child Participants**

Fourteen preschool age boys and girls with, without, and/or at risk for disabilities were recruited for the study. A summary of the child participant demographics collected using the child demographic questionnaire (Appendix C) is provided in Table 2.

One of the original 14 child participants moved to another school district shortly after the study began so the total number of child participants was 13. The children ranged from 38 to 66 months of age with an average age of 48 months. Since the disability or diagnosis category was not applicable information for making intervention decisions and disability or diagnosis information was not included for the child descriptions, the researcher remained blind to children’s developmental status in all areas other than social communication. Next, descriptive information about each child’s communicative competence is provided including a determination of delay or risk of delay in age expectations. The baseline assessment information for child participants is summarized in Table 3.

At the start of the study, Quinn was a 52-month-old boy. During baseline, his language interactions with adults consisted mostly of responses to questions and occasional on-topic comments. When asked a question, Quinn would respond almost every time. His language interactions with other children consisted mostly of responses rather than initiations.
### Table 2

**Demographic Characteristics of 13 Child Participants**

<table>
<thead>
<tr>
<th>Demographic Characteristic</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>6</td>
</tr>
<tr>
<td>Female</td>
<td>7</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>12</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>1</td>
</tr>
<tr>
<td><strong>Receiving Special Education Services</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>7</td>
</tr>
<tr>
<td>No</td>
<td>6</td>
</tr>
<tr>
<td><strong>Primary Caregiver</strong></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td>7</td>
</tr>
<tr>
<td>Mother and Father</td>
<td>5</td>
</tr>
<tr>
<td>Grandparents</td>
<td>1</td>
</tr>
<tr>
<td><strong>Education of Primary Caregiver</strong></td>
<td></td>
</tr>
<tr>
<td>High School Diploma</td>
<td>3</td>
</tr>
<tr>
<td>Associate’s Degree</td>
<td>2</td>
</tr>
<tr>
<td>Bachelor’s Degree</td>
<td>4</td>
</tr>
<tr>
<td>Master’s Degree</td>
<td>4</td>
</tr>
<tr>
<td><strong>Family Income</strong></td>
<td></td>
</tr>
<tr>
<td>20 to 40,000</td>
<td>1</td>
</tr>
<tr>
<td>40 to 60,000</td>
<td>1</td>
</tr>
<tr>
<td>60 to 80,000</td>
<td>1</td>
</tr>
<tr>
<td>80,000 to 100,000</td>
<td>7</td>
</tr>
<tr>
<td>100,000 +</td>
<td>3</td>
</tr>
<tr>
<td><strong>Number of siblings</strong></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>2</td>
</tr>
<tr>
<td>One</td>
<td>7</td>
</tr>
<tr>
<td>Two</td>
<td>2</td>
</tr>
<tr>
<td>Three</td>
<td>2</td>
</tr>
</tbody>
</table>
Table 3

Descriptive Assessment Information for Child Participants

<table>
<thead>
<tr>
<th>Child</th>
<th>Chronological Age in Months</th>
<th>PLS-4 Age Equivalent in Months</th>
<th>PLS-4 Percentile Rank</th>
<th>AEPS Social communication Area Goal Score</th>
<th>*AEPS Social communication Cutoff Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quinn</td>
<td>52</td>
<td>37</td>
<td>4</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Nancy</td>
<td>66</td>
<td>39</td>
<td>3</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Debbie</td>
<td>56</td>
<td>61</td>
<td>55</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>Tyler</td>
<td>56</td>
<td>72</td>
<td>91</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Candace</td>
<td>54</td>
<td>72</td>
<td>88</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Timothy</td>
<td>63</td>
<td>60</td>
<td>32</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Heather</td>
<td>41</td>
<td>50</td>
<td>95</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Lisa</td>
<td>50</td>
<td>23</td>
<td>1</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Hannah</td>
<td>48</td>
<td>58</td>
<td>77</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Nicholas</td>
<td>38</td>
<td>21</td>
<td>1</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Victor</td>
<td>51</td>
<td>45</td>
<td>21</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Patrick</td>
<td>52</td>
<td>48</td>
<td>32</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>George</td>
<td>51</td>
<td>55</td>
<td>70</td>
<td>7</td>
<td>10</td>
</tr>
</tbody>
</table>

Note. PLS-4 = Preschool Language Scale – Fourth Edition; AEPS = Assessment, Evaluation, and Programming System; *Cutoff scores based on child’s chronological age. If the child’s area goal score is at or below the cutoff score he/she is considered to be delayed in the area.

During unstructured playtime, Quinn would often play the role of “monster” or “dinosaur” and interact with peers using gestures and vocalizations. According to the combined Preschool Language Scale 4th Edition (PLS-4) and Assessment, Evaluation, and Programming System Social communication Area (AEPS-SC) results, Quinn’s overall communicative competence was delayed for his age.

At the start of the study, Nancy was a 66-month-old girl. During baseline, her language interactions with adults consisted mostly of gestures. She did not interact vocally with adults and communicated using gestures (i.e. pointing) or using her body to act out words (i.e. flapping hands to communicate “bird”). Her language interactions
with other children typically included gestures, but she gestured less often with peers than she did with adults. Nancy attempted to play with other children, but her lack of language made it difficult for her to form relationships with peers. According to the combined PLS-4 and AEPS-SC results, Nancy’s overall communicative competence was delayed for her age.

At the start of the study, Debbie was a 56-month-old girl. During baseline, her language interactions with adults consisted mostly of initiations and responses. She would often respond to questions asked to the group and would contribute original comments and questions. Her language interactions with other children typically included initiations and responses. Debbie had more initiations when interacting with peers than she did with adults. According to the combined PLS-4 and AEPS-SC results, Debbie was at risk for a delay in overall communicative competence.

At the start of the study, Tyler was a 56-month-old boy. During baseline, his language interactions with adults consisted mostly of initiations. Tyler often contributed on-topic comments and answered questions asked by adults. He was very observant and made many comments about his environment. His language interactions with other children typically included initiations and responses to questions. Tyler was often the “leader” during unstructured playtime and other peers followed his choices of what games to play or what to pretend. According to the combined PLS-4 and AEPS-SC results, Tyler was at risk for a delay in overall communicative competence.

At the start of the study, Candace was a 54-month-old girl. During baseline, her language interactions with adults consisted mostly of initiations and responses. Candace
was able to hold conversations with adults by asking contingent, on-topic questions and answering questions asked of her. Her language interactions with other children typically included initiations and responses. Candace had a small group of peers that she typically chose to converse with during unstructured play time. She was able to vocalize her wants, needs and feelings with this group of children as appropriate. According to the combined PLS-4 and AEPS-SC results, Candace’s overall communicative competence was at or above age expectations.

At the start of the study, Timothy was a 63-month-old boy. During baseline, his language interactions with adults consisted mostly of responses. When asked a question by an adult, Timothy would usually answer using one, two, or three word phrases. He did not use language to interact with adults and mostly spoke when he was asked to. His language interactions with other children typically included responses. Timothy’s language use was less frequent with peers, but he did answer questions when they were asked of him. According to the combined PLS-4 and AEPS-SC results, Timothy’s overall communicative competence was delayed for his age.

At the start of the study, Heather was a 41-month-old girl. During baseline, her language interactions with adults consisted mostly of initiations and responses. Heather answered questions from adults in complete sentences and often contributed on-topic comments or observations during conversations. Her language interactions with other children typically included initiations and responses. Heather used language to communicate wants and needs during unstructured playtime, and often used her language to invite other children to play with her. According to the combined PLS-4 and AEPS-
SC results, Heather’s overall communicative competence was at or above age expectations.

At the start of the study, Lisa was a 50-month-old girl. During baseline, her language interactions with adults consisted mostly of gestures. Lisa had a small vocabulary of a few essential words that communicated her wants and needs. Lisa often used pointing in order to indicate her answers to questions from adults. Her language interactions with other children were rare and often involved non-verbal attentiveness such as looking towards the speaker. Lisa did not engage in conversation with other children and did not respond with language when asked a question by a peer. According to the combined PLS-4 and AEPS-SC results, Lisa’s overall communicative competence was delayed for her age.

At the start of the study, Hannah was a 48-month-old girl. During baseline, her language interactions with adults consisted mostly of initiations and responses. Hannah answered questions in complete sentences and often included details in her responses. She was very comfortable with starting conversations with adults and continuing them by asking contingent questions. Her language interactions with other children typically included initiations and responses. Hannah used language to obtain information from others as well as create pretend play scenarios. According to the combined PLS-4 and AEPS-SC results, Hannah’s overall communicative competence was at or above age expectations.

At the start of the study, Nicholas was a 38-month-old boy. During baseline, his language interactions with adults consisted mostly of gestures and imitations. Nicholas
used pointing to indicate choices or to answer a question from an adult. His verbal language was typically imitations or non-related utterances. The vocalizations would not pertain to the activities in which he was engaged or the environment he was in at the time. His most effective method of quickly communicating with adults was screaming or crying. His language interactions with other children typically included imitations. Nicholas would not direct language towards his peers, although he would vocalize using non-related utterances while other peers were conversing (i.e. during unstructured play time). According to the combined PLS-4 and AEPS-SC results, Nicholas’s overall communicative competence was delayed for his age.

At the start of the study, Victor was a 51-month-old boy. During baseline, his language interactions with adults consisted mostly of responses. Victor rarely initiated conversations or expressed his observations or thoughts without being asked. When asked a question, he would usually respond using one or two word phrases. His language interactions with other children typically included responses. Victor rarely communicated with his peers and only spoke if another child asked him a question. He did not utilize gestures when communicating with peers and usually remained fairly quiet and solitary during unstructured play. According to the combined PLS-4 and AEPS-SC results, Victor’s overall communicative competence was delayed for his age.

At the start of the study, Patrick was a 52-month-old boy. During baseline, his language interactions with adults consisted mostly of initiations and responses. When asked a question by an adult, Patrick would answer with one to two word phrases. His initiations were often observations of concrete items in the environment (i.e. seeing a
boat in a book and saying “boat!”) and not observations of feelings or emotions. His language interactions with other children typically included responses. Patrick was much less likely to initiate conversation in a group of peers. He answered questions that other children asked and would initiate orders (i.e. “stop!” “No!”), but would not initiate conversations using contingent questions and comments. According to the combined PLS-4 and AEPS-SC results, Victor’s overall communicative competence was delayed for his age.

At the start of the study, George was a 51-month-old boy. During baseline, his language interactions with adults consisted mostly of responses. When asked a question by an adult, George would respond using one or two words. He did not use language to interact with adults and mostly spoke when he was asked. His language interactions with other children typically included responses. George did not interact much with other children during unstructured playtime, and his vocalizations were usually limited to sounds made during pretend play (i.e. driving a toy car and saying “brrrrr” to indicate the car is running). According to the combined PLS-4 and AEPS-SC results, George was at risk for a delay in overall communicative competence.

**Measures**

The following text provides a description of the measures that were used to map the developmental levels of child participants, collect CTT data, and examine the fidelity of tiered instruction throughout the study. The description of each measure in text includes (a) what information the measure is designed to collect (b) how the measure is typically administered/scored (c) the technical adequacy of the measure, and (d) how the
measure was used. Table 4 is a summary of the measures including the purpose for administration, the number of times each was administered, when they were administered and by whom. The measures are organized in alphabetical order both in text and in the table.

**Assessment, Evaluation, and Programming System**

The Assessment, Evaluation, and Programming System (AEPS; Bricker, 2002) is a criterion-referenced measure used to assist professionals in identifying and monitoring children’s educational targets and individualized interventions. The AEPS is designed to measure fine motor, gross motor, adaptive, cognitive, social communication, and social skills. The measure yields area and total raw scores as well as area and total percent scores that are neither age equivalents, nor a reflection of any type of standardized score. Area goal scores can also be calculated for more information about children’s strengths and weaknesses in a given area.

The AEPS allows three methods of collecting information: Observation, Direct Test, and Report (i.e., information gained from another person or source). Items on the measure are scored with a numerical ranking. When the child consistently meets the criterion, the item is scored a 2. When the child inconsistently meets the criterion, the item is scored a 1, and when a child does not meet the criterion, the item is scored a 0. For each area, an Area Raw Score (ARS) is computed by adding all of the items on which the child received a score of 2 or 1. This number is divided by the ARS to yield an Area Percent Score (APS).
Table 4

*Summary of Study Measures*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Purpose</th>
<th>Times Administered</th>
<th>When</th>
<th>Administrator(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment, Evaluation, Programming System</td>
<td>Area Goal Scores used to describe social communication strengths and weaknesses of child participants; Area Raw Scores used to monitor child progress and make intervention decisions</td>
<td>3</td>
<td>Baseline, after first intervention phase, after second intervention phase</td>
<td>Researcher, research assistants</td>
</tr>
<tr>
<td>Social communication Area</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment, Evaluation, and Programming System</td>
<td>Family input used to assist in scoring AEPS Social communication Area</td>
<td>1</td>
<td>Baseline</td>
<td>Family member(s)</td>
</tr>
<tr>
<td>Family Report (Bricker, 2002) Social communication Area</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child interest survey</td>
<td>Information about the play preferences of child participants used to individualize intervention strategies</td>
<td>1</td>
<td>Baseline</td>
<td>Family member(s) or Teacher</td>
</tr>
<tr>
<td>Measure</td>
<td>Purpose</td>
<td>Times Administered</td>
<td>When</td>
<td>Administrator(s)</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>--------------------</td>
<td>-----------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Language Environment Analysis System (LENA</td>
<td>Conversational turn counts used to monitor child progress and make</td>
<td>320*</td>
<td>4 children per day, 4 days per</td>
<td>Teacher, researcher, research assistants</td>
</tr>
<tr>
<td>Foundation, 2009)</td>
<td>intervention decisions</td>
<td></td>
<td>week, 20 weeks</td>
<td></td>
</tr>
<tr>
<td>Preschool Language Scale, Fourth Edition</td>
<td>Age equivalencies used to describe receptive and expressive</td>
<td>1</td>
<td>Baseline</td>
<td>Researcher, research assistants</td>
</tr>
<tr>
<td>(PLS-4; Zimmerman, Steiner, &amp; Pond, 2002)</td>
<td>communication abilities of child participants in relation to children</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>of the same age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reinforcement Inventory</td>
<td>List of possible reinforcement for child participants used to</td>
<td>1</td>
<td>Baseline</td>
<td>Family member(s) or Teacher</td>
</tr>
<tr>
<td></td>
<td>individualize intervention strategies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tier one UDL measure</td>
<td>Percentage of procedures observed used to ensure fidelity of implementation</td>
<td>12</td>
<td>Intermittently</td>
<td>Researcher, research assistants</td>
</tr>
<tr>
<td>Measure</td>
<td>Purpose</td>
<td>Times Administered</td>
<td>When</td>
<td>Administrator(s)</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>-------------------</td>
<td>---------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Tier two PMI measure</td>
<td>Percentage of procedures observed used to ensure fidelity of implementation</td>
<td>9</td>
<td>Intermittently</td>
<td>Researcher, research assistants</td>
</tr>
<tr>
<td>Tier three MT measure</td>
<td>Percentage of correct teaching episodes used to ensure fidelity of implementation</td>
<td>12</td>
<td>Intermittently</td>
<td>Researcher, research assistants</td>
</tr>
</tbody>
</table>

*Note. * = Approximate calculation
Overall, the AEPS is a well-researched assessment with evidence of reliability, validity, and utility (e.g. Bricker, 2002; Bricker, Yovanoff, Capt, & Allen, 2003; Gao, 2007; Macy, Bricker, & Squires, 2005; Noh, 2005). The AEPS test-retest stability coefficients range from adequate to good for all areas except the Gross Motor and Adaptive Areas (Slentz, 1986). The inter-observer agreement shows percent agreement between two independent coders ranging from 0.86 to 0.95 for each of the individual areas (Hsia, 1993). Concurrent validity data has been collected using the McCarthy Scales of Children’s Abilities (McCarthy, 1972) and the Uniform Performance Assessment System (Haring et al., 1981) suggesting the AEPS is a valid measure of children’s skills and abilities (Slentz, 1986). In particular, the Social and Social communication Areas show high degrees of consistency with total group correlations at 0.83 for the Social Area and 0.95 for the Social communication Area (Hsia, 1993).

For the study, the results of the AEPS measure were used to describe child participants during the baseline phase and then re-administered at each phase change to make decisions about child progress. The AEPS was chosen because it was designed to provide accurate developmental information about children with disabilities. The AEPS is also an appropriate tool for evaluating children who are typically developing, making it a logical measure for an inclusive preschool setting. Furthermore, the AEPS provides more descriptive information than standard measures such as the PLS-4 and the BDI-2. The intent of using the AEPS during baseline was to provide a richer description of the child participants. For the purpose of the study, only the Social communication Area of the AEPS was administered (Appendix D is a copy of the Social communication protocol).
Each child participant’s Area Goal Score was compared to a cutoff score to provide information about which children were delayed and which children were developing at an age appropriate level.

In order to examine children’s progress over time and to support decision making about children’s movement through intervention tiers, the Social communication area of the AEPS was re-administered at each phase change. At the first phase change, each child’s Area Raw Score was compared to their Area Raw Score from the baseline administration. The information was considered alongside the data collected using LENA to determine whether the child was making adequate progress or if he/she needed to receive more intensive instruction (i.e. proceed to the next phase). Likewise, at the second phase change, children’s scores were compared to those from the first phase change to determine movement through tiers.

**AEPS Family Report**

The AEPS Family Report (Bricker, 2002) is a questionnaire designed to elicit information from families. The family report is divided into two major sections. Section one is composed of a series of open-ended questions about the child’s daily activities, family activities, and community activities. Section two is composed of a series of parent-friendly items that parallel the developmental areas and items of the AEPS measure. Families respond to the open-ended questions in section one, then provide scores for the items in section two with a Y (yes), S (sometimes), or N (not yet) indicating their child’s ability to perform each task. Information from section two of the family report can be
converted to numerical scores by assigning a 2 to Y responses, a 1 to S responses, and a 0 to N.

The family report is designed only to elicit information from families; it is not a test. Thus, the measure does not have psychometric properties to report. A lack of technical adequacy was not a concern when deciding to include the family report. When the family assigns a score to the items in section 2, the information is considered during the administration of the measure but it does not serve as a replacement for professional observation and scoring procedures.

The Social communication Area of section two was used to collect information about each child’s social communication skills (Appendix E). The information obtained from section two of the family report was used to support the scoring process of the Social communication Area of the AEPS measure. Specifically, if the family assigned a Y response to an item and the behavior was observed in the classroom setting, the item was assigned a score of two (consistently meets criterion). If the behavior was not observed in the classroom setting, the item was assigned a score of one (inconsistently meets criterion). If the family assigned an S response, the item was assigned a score of one (inconsistently meets criterion) regardless of whether it was observed in the classroom setting or not. If the family assigned an N response to an item and the behavior was observed in the classroom setting, the item was assigned a score of one. If the behavior was not observed in the classroom setting, the item was assigned a score of zero.
Child Interest Survey

The child interest survey, adapted from Wolfberg’s (2003) *Play Questionnaire* and *Play Preference Inventory* is a checklist designed to elicit information about the interests and preferences of the child participants. The survey includes five categories of interest (i.e. play fascinations, materials, activities, themes, and play with others). A copy of the child interest survey can be found in Appendix F. Each category within the survey includes a checklist and space for comments.

There are four options for gathering information for the interest survey (a) child observation (b) child interview, (c) parent interview, and (d) teacher interview. A combination of observation and interviews across individuals yields the most comprehensive results. To complete the survey, the administrator places a check mark next to the items or activities in which the child is most often interested/engaged. The form includes space for comments so the administrator can include items, activities, or situations not covered by the survey. The child interest survey is not a test and therefore, does not have psychometric properties to report.

The child interest survey was completed by the family for every child participant. Administration of the measure by family members took the place of a parent interview. All but one family completed the survey. The teacher completed the survey for the one child participant whose family did not respond. The results were used to (a) determine children’s preferred activities and materials within the classroom environment and (b) to align the intervention scenarios with the children’s preferred activities and materials. The child interest survey was chosen as a support for the independent variable because when
children’s interests are considered and integrated with classroom activities, children are
more engaged and motivated to learn. The survey was only completed once during the
baseline phase, but the information was considered within and throughout the study to
support the design of individualized interventions for children as they move through
subsequent phases of the instructional model.

**Language Environment Analysis (LENA) System**

The Language Environment Analysis (LENA) System (LENA Foundation, 2009) is
an automatic vocalization measure that uses automatic speech recognition technology (i.e.
audio recording) to capture every utterance of a child and the individuals surrounding
him/her. A Digital Language Processor (DLP) is used to record and store audio which is
then transferred to a computer using the LENA software. The LENA software provides
output in both audio and statistical data.

After information is collected using the DLP, the LENA software is used to send
audio data to the LENA Foundation site in Colorado. Audio data is analyzed and
processed into communication frequencies (i.e. numbers) which are then coded in order to
identify the voices of children and adults as well as non-human sounds (Gilkerson, Coulter,
& Richards, 2008). The standard reports that are returned from the Foundation site,
through the software, include an analysis of the language environment, the number of child
vocalizations, the number of adult vocalizations, and the number of conversational turns
between adults and children. The LENA system includes an Advanced Data Extraction
(ADEX) Tool that can be used to create further data sets, including the number of
conversational turns between the target child and other children.
The LENA system has high rates of inter-observer agreement; the LENA system and human-transcribed segments were identified with agreement 82% of the time. The segments used for the inter-observer agreement study included a mixture of home and classroom settings but were not separated out to determine reliability in classroom settings alone. Variation in estimates was sometimes found to differ up to 40%; however, this variation decreases logarithmically as a function of time. Variability begins to plateau after approximately one continuous hour of recording and ultimately the error steadies at a rate of variability of roughly 5% (Xu, Yapanel, & Gray, 2009). Due to the nature of LENA data, a report of test-retest reliability or content validity is difficult. Professionals using the system for disability identification purposes or to determine age-equivalents can find concurrent validity data showing agreement with the PLS-4 (Zimmerman, Steiner, & Pond, 2002) and the Receptive-Expressive Emergent Language Test, Third Edition (REEL-3; Bzoch, League & Brown, 2003) expressive language scores.

For the study, LENA was used to monitor the number of conversational turns that target children produced with adults (adult to child and/or child to adult) and with peers (child to child). Conversational turn taking (CTT) was the dependent variable. The LENA system was chosen to measure CTT because it provides comprehensive information about social-communicative interactions with limited need for personnel support. Every child participant was recorded one day per week during baseline. After baseline, the frequency of recordings varied depending on the needs of each target child. The length of each recording was 2 to 2.5 hours (i.e. the duration of the school day). The conversational turn
counts were used to monitor child progress and to make intervention decisions (i.e. children’s movement through intervention tiers).

**Preschool Language Scale – 4**

The Preschool Language Scale – 4 (PLS-4; Zimmerman, Steiner, & Pond, 2002) is a standardized and norm referenced measure. The PLS-4 is designed to assess receptive and expressive language skills and behaviors considered language precursors in children from birth through 6 years. The measure yields standard test scores (i.e. percentile ranks and age equivalents) for auditory comprehension, expressive communication, and total language. A PLS-4 protocol can be found in Appendix G.

Administration of the PLS-4 begins with the examiner testing items approximately one year below a child’s chronological age or expected language age. An administrator scores each item by entering a check for each correct response, a minus for each incorrect response, and an “NR” if the child has no response. A few items are open-ended, requiring a written response. Behaviors are elicited as responses to pictures, objects, or verbal stimuli, or a combination. After the basal is established, testing continues until a ceiling is achieved.

The test-retest stability coefficients for the PLS-4 range from 0.82 to 0.95 for the subscale scores and from 0.90 to 0.97 for the Total Language Score (Zimmerman, et al., 2002). Across administrations, the percentage of agreement was reported at 99%, and the correlation between expressive communication scores was 0.99 indicating a high level of inter-observer agreement. The skills included in the PLS-4 measure are well documented in the literature as important markers in child development suggesting high content
validity. Finally, the PLS-4 showed high levels of agreement with the Denver II (Frankenburg, Dodds, & Archer, 1992) and the PLS-3 (Zimmerman, Steiner, & Pond, 1992) to provide evidence of concurrent validity.

For the study, the PLS-4 was used to gather information about each child participant’s auditory comprehension and expressive communication skills during the baseline phase. Single subject research requires a comprehensive description of study participants during baseline (Wolery & Ezell, 1993). The PLS-4 was chosen because it provides auditory comprehension and expressive communication age equivalents. Age equivalents are a standard format for describing child development. The scores from the PLS-4 were used to provide descriptive information about the receptive and expressive communication abilities of each of the child participants in relation to children of the same age.

**Reinforcement Inventory**

The reinforcement inventory, developed by the researcher, is designed to elicit information about what items and activities are most reinforcing to the child participants. The reinforcement inventory differs from the interest survey because it includes items that are not typical in a classroom setting (e.g. food items or games). The reinforcement inventory, which takes the form of a checklist, has four categories—food items, toys, classroom activities/games, and social interactions. There is also a series of open-ended questions at the end of the inventory. To review a copy of the reinforcement inventory, see Appendix H. The reinforcement inventory is not a test and therefore, does not have psychometric properties to report.
Administration of the reinforcement inventory is similar to that of the interest survey. There are four options for gathering information (a) child observation, (b) child interview, (c) parent interview, and (d) teacher interview. A parent interview is most likely to yield accurate information about the child’s likes/dislikes. To complete the inventory, the administrator places a check mark next to the items or activities in which the child is most often interested. There are spaces under each category for the administrator to include items or activities not listed within the checklist. The open-ended questions at the end of the survey also serve the purpose of providing information the inventory does not include.

The results of the child interest survey were used to (a) determine children’s preferred activities and materials within the classroom environment, and (b) design a schedule of reinforcement that continued to be motivating for them. All children are different and are motivated by multiple and varied objects. The reinforcement inventory was chosen because it provided information about motivating and reinforcing each of the child participants. While the reinforcement inventory was only completed once during the baseline phase, the information was considered within and throughout the study to individualize reinforcement for children as they moved through subsequent phases of the instructional model.

**Tier One UDL Fidelity Measure**

The tier one intervention, Universal Design for Learning (UDL) is defined and described in detail in the procedures section. The UDL measure is designed to collect information regarding the impact of adult participant in implementing each component of
the tier one intervention as intended. The UDL measure, a checklist, examines the components of a universally designed activity. The checklist contains three sections (a) multiple means of representation, (b) multiple means of engagement, and (c) multiple means of expression. The UDL measure can be found in Appendix I.

Administration of the UDL fidelity measure began with an observation of the universally designed instructional activity. A check mark was placed next to the items that were observed. A box for administrator notes was next to each section, and provided examples or evidence of the observed activity. An overall fidelity score was assigned after adding check marks and dividing by the total possible amount. The final score was reported as a percentage of procedures observed.

**Tier Two PMI Fidelity Measure**

Peer Mediated Instruction (PMI) tier two intervention, is defined and described in detail in the procedures section. The PMI measure is designed to examine the procedural implementation of the components of PMI. The measure includes a table of procedural steps and timeline associated with the intervention. The PMI measure can be found in Appendix J.

Administration of the PMI fidelity measure began with an observation of the intervention (approximately 5-10 minutes). The administrator circled the procedures observed. After adding up the circles and dividing by the total possible for the given session, an overall fidelity score was assigned. The final score is reported as a percentage of procedures observed.
**Tier Three MT Fidelity Measure**

Tier three is comprised of Milieu Teaching (MT), which is defined and described in detail in the procedures section. The MT measure was designed to collect information regarding whether the adult participant was implementing each component of the intervention as intended. The MT measure is used to code verbal interactions between the teacher and target child to examine conversational sequences for correct or incorrect procedures. The MT measure can be found in Appendix K.

Administration of the MT measure began with an observation of a five-minute play scenario between the teacher and the target child. The administrator coded every adult initiation or response as a (a) mand or request (b) time-delay, (c) model or expansion, or (d) praise or reinforcement. Every child initiation or response was coded as (a) an initiation, (b) a response, or (c) no response. See Table 5 for operational definitions of each category of verbal behavior.

After the observation was complete, the administrator scored the measure by adding up the total number of teaching episodes. Each episode was then compared to the sequences that characterize milieu teaching to determine whether each episode was correct or incorrect. In general, a correct teaching episode begins with a child initiation or teacher request, includes a model, expansion or time delay, and ends with praise or reinforcement. If a child initiates and the teacher does not respond before providing reinforcement, an incorrect teaching episode would be recorded. An overall fidelity score is assigned by dividing the total number of correct episodes by the number of incorrect teaching episodes. The final score is reported as a percentage of correct teaching episodes observed.
### Table 5

*Definitions for the Milieu Teaching Fidelity Measure*

<table>
<thead>
<tr>
<th>Verbal Behavior</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mand or Request</td>
<td>A mand or request is when the teacher initially prompts the child for communication. Often takes the form of a question</td>
</tr>
<tr>
<td>Time delay</td>
<td>A time delay is an intentional pause in the teachers’ communication meant to provide the child with an extended opportunity to respond to her mand or request</td>
</tr>
<tr>
<td>Model or Expansion</td>
<td>A model or expansion is when the teacher (a) repeats the child’s language and elaborates with the intention of eliciting a child response OR (b) asks a follow up question to the original mand or request, again with the intention of eliciting a child response.</td>
</tr>
<tr>
<td>Praise or Reinforcement</td>
<td>Reinforcement or praise includes (a) when the teacher verbally commends the child for responding (e.g. good job, thanks for telling me); (b) when the teacher repeats the child’s language in an affirming way (e.g. the child says star wars and the teacher says something like “oh… star wars, I see”; (b) when the teacher gives the child access to something he/she has asked for</td>
</tr>
<tr>
<td>Initiation</td>
<td>An initiation is when the child requests something or comments on something without being prompted by the teacher</td>
</tr>
<tr>
<td>Response</td>
<td>A response is when the child is saying something in reply to the teacher. A response can be in reply to a mand or expansion and it can also be a comment immediately after the teacher reinforces the child</td>
</tr>
<tr>
<td>No Response</td>
<td>No response is when the child does not say anything in response to teacher mands, requests, expansions, time delays, or reinforcement</td>
</tr>
</tbody>
</table>
Procedures

The following describes the general procedures used for the study including (a) recruitment and consent, (b) training study personnel, and (c) administration of the baseline measures. Included in the training study personnel section is a table that outlines the training materials designed for each phase.

Recruitment and Consent

To begin, the researcher contacted the classroom teacher. The classroom teacher was selected based on four inclusion criteria including (a) the teacher is the lead teacher in an inclusive preschool classroom, (b) the classroom roster included six to eight children who are typically developing and six to eight children with identified disabilities, (c) the teacher expressed an interest in implementing research-based interventions with training and support, and (d) the teacher believed the families in the community were willing to contribute (e.g. believed consent forms and family questionnaires would be completed and returned in a timely manner). The researcher used contacts through school and work to find teachers who meet the inclusion criteria. The selected teacher was approached by the researcher and informed of all study procedures before being asked to consent to participation. Appendix L includes the teacher consent form. After the teacher was recruited and agreed to participate, the children in the teacher’s classroom were invited to take part in the study. The invitation to children was achieved through distribution of the parent/guardian consent form (Appendix M) and the audio/video/photo consent form (Appendix N). Initially, the classroom teacher contacted the parents. The researcher attended the preschool information night at the start of the school year and shared
information about the study with the families, giving them the opportunity to ask questions and discuss the project before making a final decision about participation. Before any researcher/child interactions took place, all the parent/guardian consent forms were returned.

Research assistants were recruited through e-mail postings, flyers, and personal communications with university personnel. Graduate and/or undergraduate students who volunteered were asked to participate in data collection and were provided the option of receiving university credit for an individual investigation. The research assistants were given a timeline of general study procedures and invited to attend the first of four project trainings before the start of the study. Two graduate students and two undergraduate students were recruited.

**Training Study Personnel**

The adult participant (i.e. teacher) and research assistants were asked to attend four project trainings throughout the study. The first project training took place before the study began. During the first training participants reviewed the study purpose and background and discussed data collection during baseline. To ensure scoring integrity for the baseline measures, the training included video observations and scoring activities. To protect the purity of the baseline, no information regarding the intervention was shared during the initial training meeting.

The second project training took place at the end of baseline and focused on the first intervention phase, including procedures for implementation and data collection methods. Likewise, the third project training focused on the second intervention phase and the fourth
focused on the third intervention phase. Appendix O includes the training materials developed for each phase of training. Videos were used for training are not included in the appendices; however, they are embedded in the PowerPoint presentations and can be found online.

Additional training conducted throughout the study took place during or after school hours as needed. For example, fidelity of implementation measures and inter-observer agreement rates at times, indicated a need for “booster sessions” to provide verbal feedback. Specifically, if the results of any of the fidelity of implementation measures fell below 80%, the researcher worked with the teacher to clear up misunderstandings about implementation procedures. Informal conversations took place approximately once per week. On most occasions, email communication with the teacher was sufficient for providing feedback on implementation. Additionally, inter-observer agreement on the fidelity of implementation measures was conducted intermittently. When inter-observer agreement rates on any of the fidelity of implementation measures fell below 80% agreement, a second attempt at scoring was conducted. If agreement was not achieved after two attempts, the researcher worked with the independent raters to clear up misunderstandings about scoring procedures. In addition, the researcher provided ongoing support for the classroom teacher and research assistants throughout the study and scheduled support meetings whenever anyone had questions related to data collection methods, fidelity of implementation, or general study procedures. Many of the additional training sessions were brief and took place over the phone or via e-mail.
Administration of Baseline Measures

After parent/guardian consent was obtained, the researcher, research assistants, teacher and parents/guardians, collected the information needed to generate a developmental profile for each child participant. The researcher and research assistants administered the PLS-4 and AEPS. Each measure was administered in the classroom environment at a time that was convenient for the classroom teacher and during a portion of the school day that did not disrupt normal classroom activities or instruction. The AEPS Family Report, child interest survey, and reinforcement inventory were sent home with the child participants at the same time as consent forms. Families were asked to complete the measures and return them to school with their child. The results of the measures were used for describing the developmental functioning of the child participants during the baseline phase, particularly in the area of social communication.

Design

In the following text, an increasing intensity design is explained and illustrated. Also, CTT and tiered instruction are operationally defined and a description of the procedures for the baseline and intervention phases is provided. Finally, the data analysis procedures associated with (a) determining movement through tiers (b) answering research question one, and (c) answering research question two are described.

Increasing Intensity Design

Each phase was implemented in a progressive and additive manner within an increasing intensity across participants with a reversal, single subject research design. Increasing intensity designs are based on sequential intervention trials ordered on a
continuum that builds in intensity (Barnett, Daly, Jones, & Lentz, 2004). The increasing intensity across participants with a reversal design for the study was a series of designs including: A-B-A-B, A-B-BC-A-BC, and A-B-BC-BCD-A-BCD where phase A was baseline, phase B was intervention one (Universal Design for Learning; UDL), phase BC was intervention two (UDL and Peer mediated instruction; PMI), and phase BCD was intervention three (UDL, PMI and Milieu Teaching; MT).

A withdrawal to baseline (A) was introduced to strengthen the experimental control of the design; however, the real strength of the increasing intensity design lies in its application to practice. The design is based on a response to intervention premise, where child response to each intervention phase determines movement to subsequent phases. See Figure 2 for a hypothetical graph depicting theoretical data results for an increasing intensity across participants with a reversal, single subject research design.

**Dependent Variable**

Conversational turn taking was the dependent variable; a social communication skill well documented to support child development and learning (Bedrosian, Wanska, Sykes, Smith, & Dalton, 1988; Girolametto, 1988; Hart & Risley, 1995; MacDonald, & Carroll, 1992; Schwartz, 2009). For the purpose of the study, a conversational turn was defined as a vocal sound such as a coo, squeal, babble, word approximation, word, phrase, or sentence initiated by the target child with a subsequent response by an adult or a peer within five seconds, or a vocal sound such as a coo, squeal, babble, word approximation,
Figure 2. Increasing Intensity across Participants with a Reversal Design. A hypothetical depiction of the frequency of CTT across baseline (A) and phases B, BC, BCD, a withdrawal to A, and reinstatement to last effective intervention for three child participants (tiers one, two, and three respectively).
word, phrase, or sentence initiated by an adult or peer with a subsequent response by the target child within five seconds. A peer was any child other than the target child. An adult was any male or female adult (i.e. not just the teacher). The target child always wore the digital language processor.

Table 6

*Turn Taking Examples and Conversational Turn Counts*

<table>
<thead>
<tr>
<th>Turn Taking Examples</th>
<th>Conversational Turn Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target child, &lt;5s, Adult</td>
<td>1</td>
</tr>
<tr>
<td>Target child, &lt;5s, Peer</td>
<td>1</td>
</tr>
<tr>
<td>Adult, &lt;5s, Target child</td>
<td>1</td>
</tr>
<tr>
<td>Peer, &lt;5s, Target child</td>
<td>1</td>
</tr>
<tr>
<td>Target child, &lt;5s, Adult, &lt;5s, Target child</td>
<td>1</td>
</tr>
<tr>
<td>Target child, &lt;5s, Peer, &lt;5s, Target child</td>
<td>1</td>
</tr>
<tr>
<td>Adult, &lt;5s, Target child, &lt;5s, Adult</td>
<td>1</td>
</tr>
<tr>
<td>Peer, &lt;5s, Target child, &lt;5s, Peer</td>
<td>1</td>
</tr>
<tr>
<td>Target child, &lt;5s, Adult, &lt;5s, Target child, &lt;5s, Adult</td>
<td>2</td>
</tr>
<tr>
<td>Target child, &lt;5s, Peer, &lt;5s, Target child, &lt;5s, Peer</td>
<td>2</td>
</tr>
<tr>
<td>Adult, &lt;5s, Target child, &lt;5s, Adult, &lt;5s, Target Child</td>
<td>2</td>
</tr>
<tr>
<td>Peer, &lt;5s, Target child, &lt;5s, Peer, &lt;5s, Target child</td>
<td>2</td>
</tr>
</tbody>
</table>

*Note.* <5s = less than 5 seconds

Conversational turns did not include non-verbal communication (e.g. eye gaze, pointing, and gestures) unless it was paired with a vocalization. Turns were in pairs, so if the target child vocalized and within 5 seconds an adult or peer responded a count of 1 was
recorded. If the target child vocalized back within five seconds it was still a count of 1.

Table 6 provides turn taking examples and the turn counts associated with each example. Turns were not contingent on the intentions of the speaker, however, proximity did matter. For example, if the target child vocalized (e.g. I’m thirsty) and an adult responded with a vocalization that was off topic (e.g. I like your shirt), as long as the adult was “near and clear,” it counted as a turn. Additionally, if the intention of the target child was to initiate with the adult but a peer responded, it still counted as a turn.

**Independent Variable**

Tiered instruction was the independent variable; and for the purpose of the study it was defined as (1) an approach to teaching where the level of instruction is matched to each child’s level of need (2) including a package of three evidence-based intervention strategies that increase in intensity from tier one to three (a) Universal Design for Learning (UDL), (b) Peer Mediated Instruction (PMI), and (c) Milieu Teaching (MT). In accordance with an increasing intensity design, the intervention strategies were chosen based on a hierarchy of intensity. Each child received different components of the intervention package based on his/her level of need. Thus, the purpose was to examine the effectiveness of tiered instruction rather than to examine the individual components of the intervention package. Operational definitions of each intervention strategy are described further within the intervention phase explanations in the following text.

**Baseline**

During the baseline phase, the teacher was instructed to conduct class as usual. The children engaged in typical daily activities and classroom routines. The duration of the
baseline phase was used to (a) complete the baseline measures, (b) establish stable dependent variable data for each child participant, and (c) ensure the intervention components were not already in place. Stability was established for baseline by dividing the mean in half, and adding the quotient to the mean to establish the upper boundary, and subtracting the quotient from the mean to establish the lower boundary. If no data points were outside the upper and lower boundaries, the data were considered stable.

**Data collection during baseline.** Each child participant’s conversational turns were counted on a weekly basis during the baseline phase. When the children arrived at school, the teacher and/or the full time classroom aide was responsible for placing four LENA Digital Language Processors (DLPs) into a specially designed vest that was worn by each child. Figure 3 includes a picture of the DLP and vest. Four children wore the DLP each morning. The reason for collecting four recordings per day was to yield one recording per child per week. The recording schedule was flexible to accommodate child absences. If a child was absent on the day he/she was scheduled to wear the DLP, another child would take his/her place. The teacher and/or full time classroom aide were also responsible for transferring the LENA data onto a laptop computer kept in the classroom environment. The LENA data transfer consisted of taking the recorder off the child, plugging it into the USB connector, clicking on the child’s name, and then clicking on “assign DLP.” The LENA system would then upload the data from the DLP. The researcher provided assistance as needed until the process was completed accurately and independently by the teacher and/or classroom aide.
As shown in Table 4, each of the fidelity measures was administered once during the baseline phase. The purpose was to ensure an absence of the intervention procedures during baseline. Live observations were used to examine the classroom activities for evidence of intervention components. Each of the fidelity measures produced a percentage of procedures observed and/or a percentage of correctly implemented teaching episodes. If the measures resulted in a percentage under 20% it was assumed that the interventions were not occurring during the baseline phase. If the percentage of procedures observed were above 20%, the teacher would stop and the measures would be re-administered until the results include a percentage below 20%. During the baseline phase, the intervention fidelity percentage for tier one (UDL) was 17%; the intervention fidelity percentage for tier two (PMI) was 0%, and the intervention fidelity for tier three (MT) was 0% indicating that the intervention procedures were not in place during baseline. The baseline phase continued for five weeks.
**Intervention Phases**

After baseline, three successive and additive intervention phases were put in place. The first intervention phase was Universal Design for Learning (UDL). The second intervention phase was UDL plus Peer Mediated Instruction (UDL+PMI). And the third intervention phase was UDL plus PMI plus Milieu Teaching (UDL+PMI+MT). The implementation of each intervention phase is described next.

**UDL.** Universal Design for Learning was the first intervention phase. Universal Design for Learning was implemented as a class-wide intervention designed to provide opportunities for all children to engage in conversational turn taking (CTT) in ways that aligned with their learning styles and preferences. The UDL intervention included three major components 1) multiple means of representation 2) multiple means of engagement, and 3) multiple means of expression. Keeping the three components in mind, the teacher developed a daily lesson plan to use during circle time. The UDL lesson plan provided the teacher a framework for giving children multiple opportunities to see, hear, and practice CTT within the context of the typically occurring daily instruction. Appendix P includes a blank lesson plan form and the example lesson plan form provided to the teacher. During circle time each day, the teacher implemented the lesson. The teacher represented CTT in multiple and varied ways (i.e. multiple means of representation), elicited child engagement with CTT in multiple ways (i.e. multiple means of engagement), and encouraged and accepted multiple conversational turns for a variety of reasons (i.e. multiple means of expression). At the start of the intervention, the teacher incorporated her UDL lesson at the end of the school day. After a few weeks, she felt that the children were fidgeting and
unfocused so she moved the UDL lesson to her initial circle time at the start of the day. The circle time lesson was used to observe and report on the teacher’s use of UDL in the classroom. Phase B was continued for 15 weeks.

**UDL+PMI.** The second intervention phase was only implemented for children who were not making adequate progress during the UDL phase. The second intervention phase included the addition of PMI, a small group intervention designed to increase opportunities for some children to engage in additional CTT with peers. Adequate progress was defined by the child’s (a) average number of conversational turns, and (b) scores on the social communication area of the AEPS. The data analysis section contains more information about the decision making process around moving children through intervention tiers. The children who continued to the second intervention phase received PMI and served as the tier two *target children*. The children who remained in UDL (i.e. those making adequate progress) were used as candidates to serve as the *peer models*. All children (target children and peer models) continued to receive UDL for the duration of UDL+PMI.

Peer Mediated Instruction began with the teacher and researcher working together to match the target children with peer models based on interest and ability levels. The child interest survey (Appendix F), which was administered during baseline, was used to determine child interests and to pair children with potential play partners. A review of the children’s conversational turn counts provided a sense of children’s ability levels. The goal was to pair the target children with the highest level of need with the peer models who have the highest level of ability.
Based on the data analysis, four children were moved into tier two. Subsequently, four children were chosen to serve as peer models. Table 7 shows the mean levels and shared interests of the selected target children and their peer models. After the selection and matching of peers, the peer mediated instruction phase adhered to three major elements 1) train the peer models, 2) prompt the peer models, and 3) reinforce the peer models.

Table 7

*Mean Levels and Shared Interests of Peer Models and Target Children*

<table>
<thead>
<tr>
<th>Peer Model</th>
<th>Mean Level*</th>
<th>Shared interest</th>
<th>Target Child</th>
<th>Mean Level*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tyler</td>
<td>496.4</td>
<td>Action figures</td>
<td>George</td>
<td>155</td>
</tr>
<tr>
<td>Candace</td>
<td>489.6</td>
<td>Art and/or Sensory activities</td>
<td>Victor</td>
<td>209.4</td>
</tr>
<tr>
<td>Nancy</td>
<td>378.8</td>
<td>Playing games</td>
<td>Nicholas</td>
<td>315.2</td>
</tr>
<tr>
<td>Hannah</td>
<td>360</td>
<td>Pretend play</td>
<td>Heather</td>
<td>272</td>
</tr>
</tbody>
</table>

*Note.* *Mean levels are derived from the average number of conversational turns produced per session during the initial intervention phase (UDL)*

*Train the peer models.* The peer model training took place in the classroom environment as a small group discussion. The teacher chose to do the peer model training right after snack time while the other children were engaged in independent reading. The independent reading time took place right before “free play” time. During free play, children were given time to explore the environment and engage in play activities of their own choosing. The peer models were prompted to engage in conversational turn taking (CTT) during preferred play activities with the target children during free play; therefore the teacher conducted the training right before free play.
The first day of peer model training began when the teacher showed a card to the peer models. The card included five steps of PMI depicted in writing and in pictures (Appendix Q). The card, was entitled “Talk to your Friend” included the following five steps: 1) Look at your friend, 2) Say your friend’s name, 3) Talk to your friend, 4) Listen to your friend, and 5) Take another turn. The teacher showed the card to the peer models and talked about each of the 5 steps. The teacher gave examples and explanations to the peer models to help them understand what each step meant. For example, the teacher might have said that it was important to “say your friend’s name” before beginning a conversation so he/she knows to listen. In another example, the teacher may have explained that “take another turn” meant to talk again. Next, the teacher conducted a puppet show for the peer models. One puppet served as the target child and another puppet served as the peer model. The teacher provided one example of CTT, using the appropriate steps. She then provided one example of not taking conversational turns; in this instance, the steps were not followed. Afterwards, the peer models had the opportunity to ask questions and give explanations as to why the second example was not conversational turn taking.

The second day of peer model training was a repeat of the first day. The teacher showed the peer models the card, talked about the 5 steps, and performed a puppet show with good and bad examples. Next, the teacher asked two peer models to role-play the intervention. The teacher provided as much support as needed during this activity.

The third day of peer model training was a repeat of the second day. The teacher showed the peer models the card, talked about the 5 steps, performed a puppet show with good and bad examples, and asked two peer models to role play the intervention. Then the
teacher had the children work together in pairs to engage in a “turn and talk” activity. A “turn and talk” activity occurred when each pair of children took turns talking with one another. Each child had a turn to practice the steps of the intervention. The fourth day of the training followed the sequence of day three (i.e. show the card, talk about the components, perform a puppet show, role play with two children, and turn and talk).

Each Monday for the remainder of the intervention, the teacher provided “booster” training for the peer models; however, the components of the training were faded over time to decrease the peer models’ dependence on the teacher. Specifically, during week two the puppet show was eliminated, during week three the role-play was eliminated, and during weeks 4 and beyond the turn and talk was eliminated. After week three the Monday trainings consisted only of the teacher showing the peer models the card and briefly talking about the 5 steps. An exception to the rule was when a peer model was absent. If the any of the peer models were absent on a Monday, the teacher would conduct the training for that child on the day the peer model returned to school; in these instances, the teacher conducted more than one training session.

**Prompt the peer models.** The teacher prompted the peer models during “free play” by handing them a prompt card. She would then say, “It’s time to talk to your friend.” During the first day of intervention, the teacher followed the peer model and provided as much modeling, prompting, and assistance as needed.

In subsequent sessions, the teacher followed a prompting schedule designed to fade the amount of prompts provided over time. The prompting schedule included three levels of prompts (a) unlimited support where the teacher could use any level of physical, verbal,
or visual prompts to support the peer models, (b) specific verbal prompts only where the teacher was limited to a selection of verbal prompts (i.e. look at your friend, say your friend’s name, talk to your friend, listen to your friend, take another turn), and (c) visual prompts only where the teacher was limited to nonverbal prompts such as eye gaze, facial expressions, and gestures. Over time, the goal was to have the teacher simply show the prompt card to a peer model and the peer model would know to engage in peer-mediated instruction independently. Figure 4 is a summary of the training and prompting procedures implemented by the adult participant by days across 10 weeks of peer mediated instruction.

**Reinforce the peer models.** During the baseline phase, in order to determine the items or activities that were most reinforcing for the child, families completed a reinforcement inventory (Appendix H) for each child participant. Each peer model had a reinforcement card (i.e. a token board) assigned to them (Appendix R). The reinforcement cards were placed in the classroom where the peer models could see them and each card was be labeled with the name of a peer model. Each peer model was reinforced with a star on the reinforcement card every time he/she completed the five steps of the intervention. There were four spaces on each card; when a peer model earned four stars he/she would get a special reward.

The procedures for reinforcement were as follows: Immediately after the peer model completed the five steps the teacher would verbally praise the peer model and give the peer model a star. The peer model would then place the star on his/her reinforcement card. The peer model would then place the star on his/her reinforcement card. The teacher
would remind the peer model that he/she could try again tomorrow to earn another star and remind the peer model what his “special reward” would be once he earned four stars.

<table>
<thead>
<tr>
<th>Procedures</th>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Weeks 4-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Show the card</td>
<td>X X X X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Talk about steps</td>
<td>X X X X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Puppet show</td>
<td>X X X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Role play</td>
<td>X X X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn and talk</td>
<td>X X X</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Unlimited support</td>
<td></td>
<td>X X X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Verbal prompts</td>
<td></td>
<td>X X X</td>
<td>X X X</td>
<td>X</td>
</tr>
<tr>
<td>Visual prompts</td>
<td></td>
<td></td>
<td></td>
<td>X X X X</td>
</tr>
</tbody>
</table>

*Figure 4.* Peer Mediated Instruction Training and Prompting Procedures. A visual of the training and prompting procedures implemented by the adult participant by days across 10 weeks of peer mediated instruction; M=Monday; T=Tuesday; W=Wednesday; R=Thursday; X indicates the procedure was performed on the given day.

The reinforcement provided by the teacher was contingent upon the child’s completion of the five steps. If the peer model failed to complete the five steps, he/she was not reinforced and the teacher would not be penalized on the fidelity of implementation measure for not providing reinforcement. When each peer model earned his/her fourth star, the teacher provided the reinforcement immediately. Each week, the teacher rotated the reinforcement to prevent satiation. The teacher was given the freedom to determine
reinforcements. The teacher would review the reinforcement index and/or ask the peer model what he/she wanted. The teacher had a prize box in the classroom full of small toys, stickers and games. The peer models continued to choose the prize box as reinforcement for the duration of the study.

Around week five, the peer models began to lose interest. The teacher reported that the peer models would roll their eyes when she showed them the card and sometimes engaged in unnatural conversation behaviors (e.g. talking like robots, repeating the target child’s name over and over, rambling on and on, or saying things like “ok fine, what do I talk about?”). The teacher was concerned that the prompting became uncomfortable for the peer models and reported that many of them were not earning their stars because they were not completing all five steps of the intervention. On most occasions, the step the peer models did not complete was to say the target child’s name before talking to them. The teacher thought that the prompting became unnatural because the children were sometimes already talking or playing before she was able to prompt them with the card.

The researcher and teacher decided to make two changes to the intervention after week five. First, the prompt cards were placed on a table or surface close to where the children were asked to play together rather than having the teacher hand the card to the peer models and possibly interrupt an ongoing conversation. Second, the teacher reinforced the peer models for talking with their partners, regardless of whether they followed all five steps. The purpose of making the changes was first to make the intervention more natural and comfortable for the children and second to increase motivation for the peer models by increasing the frequency of reinforcement. Moreover, it was less time consuming for the
teacher because if the children were already talking all she had to do was show them the star and give them a thumbs up or smile and she could move on to another pair of children. The teacher did not report any more problems after the changes were made. The UDL+PMI phase was in place for 10 weeks.

**UDL+PMI+MT.** During the fourth phase, the children who were not making adequate progress during UDL+PMI received MT, a naturalistic but intensive communication intervention designed to elicit frequent conversational turns from individual children. Adequate progress was defined by the child’s (a) average number of conversational turns and (b) scores on the social communication area of the AEPS. The data analysis section contains more information about the decision making process around moving children through intervention tiers. Two children were selected to move to tier three and receive MT. The children who received MT continued to receive UDL in addition to PMI during UDL+PMI+MT and will be referred to as tier 3 target children. Following the same structure used during UDL and UDL+PMI, fidelity of implementation was monitored weekly during UDL+PMI+MT

Implementation of the Milieu Teaching intervention consisted of the teacher engaging each of the tier 3 target children in daily, one to one, 5 minute play sessions. The goal of the 5 minute play sessions was to elicit as many conversational turns as possible. During the play session the teacher followed the target child’s lead by beginning each communicative interaction within the context of a typical routine and focused on an item/object/activity in which the target child showed interest. During each interaction the teacher followed specific sequences and combinations of prompts
associated with Incidental Teaching (Hart & Risley, 1975), Mand Model (Warren, McQuarter, & Rogers-Warren, 1984), or Time Delay (Halle, Baer, & Spradlin, 1981). The teacher included corrective prompts and modeling as needed and ended each interaction with positive feedback, expansion of the child’s utterance, and/or access to a desired object (Hancock & Kaiser, 2002). Table 8 provides an overview of the sequences of prompts associated with the components of MT. The UDL+PMI+MT phase was in place for four weeks.

**Withdrawal to baseline.** A withdrawal to baseline was introduced for all child participants at week 21. Typically, a withdrawal would not be a necessary part of an increasing intensity across participants with a reversal, single subject research design. An increasing intensity design is used to show a participant’s response to increasing levels of intervention. Typically, once the response is at the level desired, either the intervention could stay at that level or a decreasing intensity design could be implemented to fade supports. For the purpose of the study, a withdrawal phase was included to strengthen the experimental control associated with an increasing intensity design.

The teacher was asked to stop all components of the tiered instruction model and to continue the regular daily routine. The withdrawal phase was used to determine whether a decrease in conversational turns would take place in the absence of tiered instruction. Specifically, the UDL activity, the PMI sessions, and the MT sessions were all removed from the daily schedule for three weeks. A fidelity check was administered to ensure no more than 20% of the components of tiered instruction were being implemented during the withdrawal phase.
Table 8

*Milieu Teaching Strategies and Sequences of Prompts*

<table>
<thead>
<tr>
<th>Milieu Teaching Strategy</th>
<th>Sequence of Prompts</th>
</tr>
</thead>
</table>
| Incidental Teaching      | 1. The child initiates an interaction or request for an object or activity  
2. The teacher then requests an expansion  
3. If the child does not expand, the teacher models the expansion  
4. Correct responses are reinforced with access to the desired object/activity |
| Mand Model               | 1. The teacher initiates the interaction  
2. The teacher provides a mand (request) for a child response  
3. If the child fails to respond, the teacher provides a model  
4. Correct responses are reinforced with social praise, attention, or access to a desired object or activity |
| Time Delay               | 1. The child or teacher may initiate the interaction  
2. The teacher inserts a time-delay before the delivery of a response or reinforcement |

**Reinstatement phase.** During the reinstatement phase, all children received the level of intervention they were getting directly before the withdrawal to baseline. The teacher reinstated the UDL lesson plan on a daily basis for everyone. The peer models and tier two target children engaged in PMI during free play, and the tier three target children additionally engaged in one on one 5 minute MT sessions with the teacher. The purpose of the reinstatement phase was not just to establish experimental control, but also to ensure the child participants were not left without any intervention at the end of the study. Data were collected for two weeks after the intervention was reinstated.
Data collection during intervention phases. The data collection schedule was set on a variable schedule. That is, CTT was counted using the LENA Digital Language Processor (DLP) with increasing intensity as children moved from one tier to the next. As the intensity of the intervention increased for some children, the amount of data collection also increased. Specifically, for children who remained in tier one (UDL), conversational turns were counted once a week during baseline and up to the first intervention change (i.e. from UDL to UDL+PMI), and then once every other week for the duration of the study. For children who proceeded to tier two (UDL+PMI) conversational turns were counted once a week throughout the study. Finally, for children who moved to tier three (UDL+PMI+MT) conversational turns were counted once a week across baseline and the first two intervention phases and then twice a week while participating in UDL+PMI+MT. For all children, conversational turns were counted weekly during the withdrawal phase and three data points were collected for each child during the two week reinstatement phase. The number of data collection sessions conducted for children in tiers one to three are summarized in Table 9.

The length of each recording was between 2 and 2½ hours in length (the duration of the school day), which means that the data represent more than just the time during which the intervention was delivered. Each intervention was implemented during select times of the day (i.e. 15 minutes for UDL, 10 minutes for PMI, and 5 minutes for MT) and the interventions were not implemented back to back. That is, there were windows of time in between each intervention. Universal Design for Learning was implemented at the start of the school day. Peer Mediated Instruction and Milieu Teaching were conducted at
various times during the middle and sometimes toward the end of the school day.

According to technical reports provided by the LENA foundation, inter-observer agreement between the LENA system and human-transcribed segments increases logarithmically as a function of time (Xu, Yapanel, & Gray, 2009). That is, the error rates plateau and steady after approximately one continuous hour of recording. In order to collect data only during the time during which the intervention was delivered, the DLP would have needed to be turned on and off multiple times in the day, never allowing for a continuous hour of recording. Moreover, the DLP cannot be stopped and started without transferring the data to the computer each time. The only plausible solution was to leave the recorders on the children for the duration of the school day, which assured the full hour of recording and avoided potential disruptions to daily classroom instruction and routines. The fallback of collecting data across the day; however, was a possible threat to the internal validity of the study and an underestimation of the intervention effects.

*Fidelity of implementation.* Fidelity of implementation was monitored across all intervention phases using the fidelity of implementation measures. Each week, one video recording of each intervention strategy was uploaded to KSUtube;¹ the researcher and research assistants could then watch the videos and score the corresponding fidelity of implementation measure. A research assistant collected most recordings. The length of the recordings varied according to the length of the interventions (i.e. approximately 15

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¹ a video sharing website, owned and protected by Kent State University on which Kent State students can upload, share, and view videos
minutes for UDL, 5 minutes per child for PMI and MT). The teacher was fully aware when each video was being made.

Table 9

*Number of Data Collection Sessions across Intervention Phases*

<table>
<thead>
<tr>
<th>Children</th>
<th>Data collection sessions*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
</tr>
<tr>
<td>Tier 1</td>
<td>1 per week</td>
</tr>
<tr>
<td>Tier 2</td>
<td>1 per week</td>
</tr>
<tr>
<td>Tier 3</td>
<td>1 per week</td>
</tr>
</tbody>
</table>

*Note.* All data collections sessions lasted between 2 and 2.5 hours (i.e. the full preschool day for the children). Variability in session length depended on how quickly the teacher was able to get the recorder on the child and how soon before dismissal it was removed.

The fidelity of implementation measures were completed online using Google Forms, a flexible online form and survey development interface with built-in reporting. Fidelity continued to be monitored during the withdrawal and reinstatement phases. The researcher conducted live baseline and withdrawal fidelity checks. Fidelity was considered achieved when the percentage of procedures observed were at or above 80% on any given observation. If fidelity of implementation fell below 80% on any given observation, the researcher organized an opportunity for individualized feedback and support for the teacher. The goal of the opportunity for individualized feedback and support was to maintain adequate intervention fidelity throughout the study.
Inter-observer agreement. Inter-observer agreement of the fidelity of implementation was completed using the online videos and fidelity of implementation measures. Fidelity was considered adequate if the total percentage scores for each rating showed a variability of no more than 20% (i.e. 80% agreement). If the ratings showed a variability of more than 20%, both raters would re-score the videos until reliability was achieved. Inter-observer agreement for the tier one fidelity of implementation measure ranged from 83% to 100% with an average of 86.4% across five observations. For the tier two fidelity of implementation measure, interobserver agreement was 100% across seven observations. Inter-observer agreement for the tier three fidelity of implementation measure ranged from 85% to 99% with an average of 92% across six observations.

Data Analysis

The study included major decisions for determining when to move children from one tier to another as well as for answering the two primary research questions. To illustrate this process, the data analysis methods and specific criteria associated with determining (a) the movement of children through tiers (b) the effects of tiered instruction on CTT (i.e. research question one), and (c) the extent to which the teacher was able to implement tiered instruction with fidelity (i.e. research question two) are described next.

A. Movement of children through tiers. In order to determine how and when children progressed through each tier of instruction, a process of data analysis and decision making took place at three separate phase changes. Three criteria were used in the decision making process: (1) a statistical analysis of CTT (2) a visual analysis of CTT
and (3) an AEPS score comparison. In the following text, the processes used to determine movement from baseline to UDL, from UDL to UDL+PMI and from UDL+PMI to UDL+PMI+MT are described in detail.

**Baseline to UDL.** The decision to move child participants from baseline to UDL was determined based on a visual analysis of baseline data. At the end of week five, all 13 child participants showed stable baseline data and 11 of 13 child participants showed a neutral or descending trend. Additionally, each child had at least five data points indicating the standard for experimental control in single subject research had been met (Horner & Greenwood, 2012). At that point, a decision was made to begin implementation of tier one instruction: UDL for all child participants.

**UDL to UDL+PMI.** The decision to move child participants from UDL to UDL+PMI was determined at the end of week 10 based on three criterion determining child progress (a) Each child’s mean level of CTT (b) a visual analysis (VA) of their graphed data, and (c) their AEPS Social Communication Area Percent Score. A description of each criterion and how child participants performed on each criterion is provided next. The descriptions of criteria are followed by a summary of which children (based on the three criteria) were moved to the next phase of instruction.

**Criteria 1: Statistical analysis of CTT.** First, each child’s mean level of CTT between weeks 5 and 10 was compared to the class mean level of CTT during baseline. Comparing the participants’ mean levels to a norm for typical development was not an option. The average number of conversational turns per hour or during a regular preschool day for children ages 3 to 5 was not available in the existing research. A group
of LENA researchers did find an average number of conversational turns per hour for children ages 26-48 months (Gilkerson & Richards, 2008); however, this age range was not fitting for the classroom used for the study. Furthermore, the bulk of the LENA research was conducted in home settings where children are typically engaged in more individual interactions with adults than they would be in a classroom setting. Given that 50% or more of the children in the classroom were children who had been diagnosed with disabilities, it seemed logical to consider a child at risk if his/her average score was below the mean. For the purpose of the study, if the child’s average number of conversational turns across the phase was at or above the norm (i.e. the class mean during baseline) his/her average was considered a positive finding. If the child’s average was below the norm, it was considered a negative finding. The class mean during baseline was 318.1 conversational turns per session. The child participants’ mean level of CTT used as the first criterion in making phase change decisions from UDL to UDL+PMI and from UDL+PMI to UDL+PMI+MT is displayed in Table 10. Column one represents the mean level of conversational turns across 5 weeks (between weeks 5 and 10). Column two represents the mean level of conversational turns across 6 weeks (between weeks 10 and 16).

Between weeks five and 10, seven of the 13 child participants had a mean level of CTT above the class mean during baseline. Each child’s mean level of CTT was the first of three criterion that were considered in determining whether they would remain in tier one (UDL) or move to tier two (UDL+PMI). Timothy, Lisa, Victor, Heather, and George
all had mean levels of CTT that were below the class mean during baseline, thus increasing the possibility of a more intensive level of instruction.

**Criteria 2: Visual analysis of CTT.** Second, at week 10, a between phase visual analysis (VA) of the frequency of CTT was conducted. Specifically, a systematic evaluation of change in trend, change in mean, change in level, and percent overlap was evaluated (Gischlar, Hojnoski, & Missal, 2009). If the child had positive findings on 50% or more of the analyses, it was considered a positive finding overall (i.e. the child was making adequate progress). If the child had positive findings on less than 50% of the analyses, it was considered a negative finding (i.e. the child was not making adequate progress). The results of the between phase visual analyses used as the second criterion in making phase change decisions at each phase change are displayed in Table 11.

According to the visual analysis conducted at the end of week 10, four of the 13 child participants made progress from baseline to UDL. Each child’s frequency of CTT between phases was the second of three criterion that were considered in determining whether they would remain in tier one (UDL) or move to tier two (UDL+PMI). Tyler, Candace, Hannah, Patrick, Quinn, Nicholas, Victor, Heather, and George all showed inadequate progress on the between phase analysis at week 10 – increasing the possibility they might need a more intensive level of instruction.

**Criteria 3: AEPS score comparison.** Third, each child’s Assessment, Evaluation, and Programming System (AEPS) Social Communication Area Percent Score at the end of week 10 was compared to his/her own AEPS Social Communication Area Percent Score during baseline. Any amount of increased score was considered progress and was
considered a positive finding. If the child’s score did not increase it was considered a negative finding. The AEPS Social Communication Area Percent Scores used as the third criterion in decision making during baseline and at each phase change are displayed in Table 12.

An AEPS Social Communication Area Percent Score was not collected for children whose mean level of CTT and visual analysis both resulted in positive findings or for children whose mean level of CTT during intervention was more than one standard deviation above the class mean during baseline. Thus, at the end of week 10, AEPS Social Communication Area Percent Scores were collected for nine of 13 child participants. All 9 child participants showed an increase in their AEPS Social Communication Area Percent Score from baseline to the end of UDL. Each child’s AEPS Social Communication Area Percent Score was the third of three criterion that were considered in determining whether they would remain in tier one (UDL) or move to tier two (UDL+PMI).

Decision to move children to next tier. Child participants were moved to subsequent tiers if two of the three criteria of child progress, showed negative results. For example, if the child’s mean level of CTT between weeks 5 and 10 was below the class mean level of CTT during baseline and the between phase analysis resulted in two or more negative findings, he/she moved to the next phase regardless of his/her AEPS Social Communication Area Percent Score. Table 13 outlines how the three criteria for child progress were combined to make the final decision around which child participants would move to the next phase of instruction.
Based on the three outlined criteria, four child participants were moved from UDL to UDL+PMI. Even though all 13 child participants showed progress on the AEPS Social Communication Area Percent Score, Nicholas, Victor, Heather, and George all had mean levels of CTT between weeks 5 and 10 that were below the class mean during baseline. Additionally, all four of them had negative findings associated with the visual analysis of their frequency of CTT from baseline to UDL.

**UDL+PMI to UDL+PMI+MT.** The decision to move child participants from UDL+PMI to UDL+PMI+MT was determined at the end of week 16 based on the same 3 criteria and measures of progress used during the previous phase change. Each of the four child participants’ mean level of CTT between weeks 10 and 16 was compared to the class mean level of CTT during baseline, a between phase visual analysis (VA) of the frequency of CTT was conducted, and each child’s AEPS Social Communication Area Percent Score was compared to his/her score at the previous phase change. Child participants were moved from PMI to MT if two of the three measures of child progress showed negative results. Tables 10, 11, & 12 include the findings for each child’s mean level of conversational turn taking, visual analysis, and AEPS Social communication Area Percent Score at 16 weeks.

**Criteria 1: Statistical analysis of CTT.** The child participants’ mean level of CTT at each phase change is displayed in Table 10. Between weeks 10 and 16, two of the four child participants who received tier two instruction, had a mean level of CTT above the class mean during baseline. Each child’s mean level of CTT was the first of three criterion that were considered in determining whether he/she would remain in tier two
(UDL+PMI) or move to tier three (UDL+PMI+MT). Heather and George both had mean levels of CTT that were below the class mean during baseline, thus increasing the possibility they might need a more intensive level of instruction.

Table 10

Child Participants’ Mean Level of CTT at Phase Changes

<table>
<thead>
<tr>
<th>Child Participant</th>
<th>Mean Level of CTT at Phase Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>From UDL</td>
</tr>
<tr>
<td>Tyler*</td>
<td>496.4</td>
</tr>
<tr>
<td>Candace*</td>
<td>489.6</td>
</tr>
<tr>
<td>Hannah</td>
<td>360.0</td>
</tr>
<tr>
<td>Patrick</td>
<td>328.8</td>
</tr>
<tr>
<td>Quinn</td>
<td>347.0</td>
</tr>
<tr>
<td>Debbie</td>
<td>343.2</td>
</tr>
<tr>
<td>Timothy</td>
<td>208.2</td>
</tr>
<tr>
<td>Lisa</td>
<td>227.4</td>
</tr>
<tr>
<td>Nancy</td>
<td>378.8</td>
</tr>
<tr>
<td>Nicholas</td>
<td>315.2</td>
</tr>
<tr>
<td>Victor</td>
<td>209.4</td>
</tr>
<tr>
<td>Heather</td>
<td>272.0</td>
</tr>
<tr>
<td>George</td>
<td>155.0</td>
</tr>
</tbody>
</table>

*Mean level of CTT at first phase change was more than 1 standard deviation above the class mean level of CTT during baseline.

Criteria 2: Visual analysis of CTT. The results of the between phase visual analyses at each phase change are displayed in Table 11. At week 16, only one of the four child participants who received tier two instruction made progress from UDL to UDL+PMI according to the visual analysis. Each child’s frequency of CTT between phases was the second of three criterion that were considered in determining whether they would remain in tier two (UDL+PMI) or move to tier three (UDL+PMI+MT). Nicholas, Heather, and George all showed inadequate progress on the between phase
analysis at week 16 – increasing the possibility they might need a more intensive level of instruction.

Table 11

*Change in Mean, Trend, Level and Overlap at Phase Changes*

<table>
<thead>
<tr>
<th>Child</th>
<th>From UDL To UDL+PMI</th>
<th>From UDL+PMI To UDL+PMI+MT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tyler</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Candace</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hannah</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Patrick</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Quinn</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Debbie</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Timothy</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Lisa</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Nancy</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Nicholas</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Victor</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Heather</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>George</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>

Note. (+) = a positive finding indicating evidence of intervention effects. (-) = a negative finding indicating no evidence of intervention effects.

*Criteria 3: AEPS score comparison.* The AEPS Social Communication Area Percent Scores during baseline and at each phase change are displayed in Table 12. All four child participants showed an increase in their AEPS Social Communication Area Percent Score from week 10 to week 16. Each child’s AEPS Social Communication Area Percent Score was the third of three criterion that were considered in determining whether they would remain in tier one (UDL) or move to tier two (UDL+PMI).
Table 12

*AEPS Social Communication Area Percent Scores*

<table>
<thead>
<tr>
<th>Child Participant</th>
<th>During Baseline</th>
<th>From UDL To UDL+PMI</th>
<th>From UDL+PMI To UDL+PMI+MT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tyler</td>
<td>81.60</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Candace</td>
<td>83.70</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Hannah</td>
<td>79.60</td>
<td>95.90</td>
<td></td>
</tr>
<tr>
<td>Patrick</td>
<td>59.18</td>
<td>63.98</td>
<td></td>
</tr>
<tr>
<td>Quinn</td>
<td>70.40</td>
<td>82.70</td>
<td></td>
</tr>
<tr>
<td>Debbie</td>
<td>78.57</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Timothy</td>
<td>58.16</td>
<td>68.37</td>
<td></td>
</tr>
<tr>
<td>Lisa</td>
<td>01.02</td>
<td>10.20</td>
<td></td>
</tr>
<tr>
<td>Nancy</td>
<td>48.98</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Nicholas</td>
<td>40.80</td>
<td>55.10</td>
<td>60.20</td>
</tr>
<tr>
<td>Victor</td>
<td>41.84</td>
<td>53.10</td>
<td>65.31</td>
</tr>
<tr>
<td>Heather</td>
<td>81.60</td>
<td>91.84</td>
<td>92.86</td>
</tr>
<tr>
<td>George</td>
<td>52.04</td>
<td>68.37</td>
<td>74.49</td>
</tr>
</tbody>
</table>

*Note. N/A= not applicable because no AEPS Social Communication Area Percent Score was collected for that child at that phase change.*

*Decision to move children to next tier.* Table 13 outlines how the three criteria for child progress were combined to make the final decision around which child participants would move to the next phase of instruction. Based on the three outlined criteria, two child participants were moved from UDL+PMI to UDL+PMI+MT. Even though all 4 child participants showed progress on the AEPS Social Communication Area Percent Score, Heather and George had mean levels of CTT between weeks 10 and 16 that were below the class mean during baseline. Both of them had negative findings associated with the visual analysis of their frequency of CTT from UDL to UDL+PMI.
Table 13

*Overall Findings Attributed to Movement through Tiers*

<table>
<thead>
<tr>
<th>Child</th>
<th>CTT</th>
<th>VA</th>
<th>AEPS</th>
<th>Moved to Tier 2</th>
<th>CTT</th>
<th>VA</th>
<th>AEPS</th>
<th>Moved to Tier 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Candace</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tyler</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nancy</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debbie</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lisa</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patrick</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quinn</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timothy</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nicholas</td>
<td>no</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Victor</td>
<td>no</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>George</td>
<td>no</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Heather</td>
<td>no</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*Note. CTT = Conversational Turn Taking; VA = Visual Analysis; AEPS = Assessment, Evaluation, and Programming System Social Communication Area; yes = evidence of child progress was found using the specified criterion; no = evidence of child progress was not found using the specified criterion. *Average conversational turns were more than 1 standard deviation above the mean.*

**B. The effects of tiered instruction on CTT.** The effects of tiered instruction on CTT were examined for each instructional tier (i.e. (a) What are the effects of tier one instruction, universal design for learning, on CTT for children whose needs do not warrant additional intervention? (b) What are the effects of two additive tiers of instruction, universal design and peer mediated intervention, on CTT for children who do not respond within tier one? And (c) What are the effects of three additive tiers of
instruction, universal design, peer mediated instruction and milieu teaching, for children who do not respond within tier two?).

A visual analysis of graphed data was used to determine the effects of tiered instruction on CTT. The integration of information from multiple visual comparisons is standard in single subject research for determining if a functional relationship exists between the independent and dependent variables (Horner et al., 2005; Kazdin, 1982; Parsonson & Baer, 1978). As recommended by Gischlar and colleagues (2009) a systematic evaluation of trend direction and variability or range of data points was conducted for a within phase analysis across each of the phases. In addition, change in trend, change in mean, change in level and data overlap was evaluated for a between phase analysis across all phases (Kazdin, 1982).

**Functional relationship.** For each participant, the evaluation of within and between analyses of trend, variability, level, and data overlap were combined to reach a conclusion regarding the existence of a functional relationship (Horner, & Greenwood, 2012). The effect of tiered instruction on CTT was summarized as a percentage of positive findings. That is, for each criteria evaluated (e.g. variability, trend) a rating of positive or negative was assigned; positive indicating the presence of an intervention effect and negative indicating no intervention effect. Child participants with less than 50% positive findings were categorized as showing no functional relationship between tiered instruction and CTT. Child participants who had 50% or more positive findings were categorized as displaying a functional relationship with weak (50-70%), moderate (70-90%), or strong (90-100%) intervention effects.
The process of using a percentage of positive findings for determining whether or not a functional relationship existed and further to categorize the strength of the intervention effects was developed by the researcher. No specific criteria currently exist in the research for using any particular number as a cutoff score for determining the strength of evidence, however, a systematic evaluation across participants generated a consistent data set that can be easily interpreted by others. Given the complexity of the design, ease of interpretation was a factor in selecting the data analysis procedures. The specific ranges selected for determining weak, moderate, or strong intervention effects were selected to align with existing interpretations of effect size estimations (e.g. Scruggs & Mastropieri, 2001; Wendt, 2009; Wolery, Busick, Reichow, & Barton, 2010).

**Effect size.** Including a statistical analysis of effect size poses challenges for single subject research (Maggin et al., 2011). For example, standardized mean difference and nonparametric approaches tend to lack accountability for level, trend, and variability (Faith, Allison, & Gorman, 1996; Wolery, Busick, Reichow, & Barton, 2010), and parametric approaches generally do not control for autocorrelation (Manolov & Solanas, 2008). The development of an appropriate effect size measure for single subject research is in progress (e.g. Horner, Swamainathan, Sugai, & Smolkowski, 2009; Maggin et al., 2011; Wolery et al., 2010); however, before a measure is ready for use with single subject research designs, further validation and field testing is required (Maggin et al., 2011; Maggin, O’Keefe, & Johnson, 2011).

Nonetheless, researchers increasingly recognize the need to include effect sizes in reports of single subject research for the purpose of identifying evidence-based practices,
a task given to the What Works Clearinghouse (WWC) by the US Department of Education. The WWC panel recommends that multiple effect size metrics be calculated for studies classified as having strong or moderate evidence (Kratochwill et al., 2010; Maggin, Briesch, & Chafouleas, 2012). Strong evidence is defined by WWC (2010) as three demonstrations of intervention effect and no demonstrations of non-effect. Moderate evidence is defined as three demonstrations of intervention effect paired with demonstrations of non-effect. If less than three demonstrations of effect are found, then WWC (2010) would define the study as having no evidence and would not recommend the inclusion of effect sizes.

Rakap and Snyder (2012) have specifically examined the use of effect sizes for single subject research, and they also suggest that a combination of methods be used to determine magnitude of effect. In addition, they found that percentage of data exceeding the median trend (PEM-T) was the only measure that accounts for baseline trend and typically performed well (i.e. showed agreement with visual analysis) when paired with additional measures. They also recommended the use of percent of all non-overlapping data (PAND); however, given the nature of the data in the current study, PAND was an unfair estimation of effect size indicating a large improvement when no such improvement was observed.

Multiple effect size analyses were conducted to provide an additional measure of the effects of tiered instruction on conversational turn taking. Specifically, percentage of non-overlapping data (PND), percentage of data exceeding the median (PEM), and percentage of data exceeding the median trend (PEM-T) were utilized. Table 14 includes
a description of how the effect size analyses were conducted and interpreted and citations for each.

**C. The extent of implementation fidelity.** Three separate measures of intervention fidelity were used to determine the extent to which the teacher could implement tiered instruction with fidelity (i.e. research question #2). Researchers (e.g. Odom, 2009; O’Donnell, 2008) have tried to classify fidelity measures as evaluating either the structure (i.e. quantity) or the process (i.e. quality) of intervention procedures; however, when the fidelity measures were developed, no particular taxonomy was utilized. With an emphasis on adherence to the prescribed procedures (i.e. process), the fidelity percentages were calculated by dividing the number of correct procedures observed by the total number of procedures possible within each observation. To determine the overall percentage of intervention fidelity, the percentages from all observations were added together and averaged. Fidelity was considered achieved for all observations above 80%. A consensus on the acceptable measurement of fidelity of implementation has yet to emerge in the literature, however 80% is a commonly used standard in single subject research (Odom, 2009; Schulte, Easton, & Parker, 2009; Smith, Daunic, & Taylor, 2007).

The same process was conducted for each instructional tier in order to determine (a) to what extent can the teacher implement tier one instruction, universal design for learning, with fidelity? (b) To what extent can the teacher implement two additive tiers of instruction, universal design and peer mediated instruction, with fidelity? And (c) to what extent can the teacher implement three additive tiers of instruction with fidelity?
Table 14

Effect Size Analyses and Interpretations

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Analysis</th>
<th>Interpretation</th>
<th>Citations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PND</strong></td>
<td>(1) Locate the highest data point in baseline</td>
<td>&lt; 0.50 = no effect</td>
<td>Scruggs &amp; Mastropieri, 2001; Scruggs, Mastropieri, &amp; Casto (1987); Scruggs, Mastropieri, Cook, &amp; Escobar (1986)</td>
</tr>
<tr>
<td></td>
<td>(2) Draw a horizontal line from this data point into the intervention phase</td>
<td>0.50 - 0.70 = weak</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3) Compute the percentage of intervention phase data points above the line</td>
<td>0.70 – 0.90 = moderate</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt; 0.90 = strong</td>
<td></td>
</tr>
<tr>
<td><strong>PEM</strong></td>
<td>(1) Locate median point or point between the two median points in baseline</td>
<td>&lt; 0.70 weak or no effect</td>
<td>Ma (2006); Wendt (2009)</td>
</tr>
<tr>
<td></td>
<td>(2) Draw a horizontal middle line passing through the median of baseline into the intervention phase</td>
<td>0.70 – 0.90 = moderate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3) Compute the percentage of intervention phase data points above the middle line</td>
<td>&gt; 0.90 = strong</td>
<td></td>
</tr>
<tr>
<td><strong>PEM-T</strong></td>
<td>(1) Calculate the split middle line of trend in the baseline phase</td>
<td>&lt; 0.70 weak or no effect</td>
<td>White &amp; Haring (1980); Wolery, Busick, Reichow, &amp; Barton (2010)</td>
</tr>
<tr>
<td></td>
<td>(2) Draw the baseline trend line and extend through the intervention phase</td>
<td>0.70 – 0.90 = moderate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3) Compute the percentage of intervention phase data points exceeding the trend line</td>
<td>&gt; 0.90 = strong</td>
<td></td>
</tr>
</tbody>
</table>

*Note. PND = percent of non-overlapping data; PEM = percent of data exceeding the median; PEM-T = percent of data exceeding the median trend*
Summary

A detailed illustration of the study method was provided in Chapter II. First, the inclusive classroom and the characteristics of the adult and child participants were described in detail. Next, the measures that were used for describing child functioning in the area of social communication during the initial baseline phase, collecting data on the frequency of conversational turn taking, and for supporting and measuring the teacher’s implementation of tiered instruction were provided. Also in Chapter II, the general study procedures for recruitment and consent, training study personnel and administration of baseline measures were discussed. An increasing intensity across participants with a reversal, single subject research design was defined and illustrated followed by descriptions of CTT and the hierarchy of interventions used for tiered instruction. A detailed description of the intervention phases and the data collection methods used during the baseline, intervention, withdrawal, and reinstatement phases was included. Finally, an explanation of the decision making process used to determine child movement through tiers was provided through comprehensive text and tables and the data analysis method used to answer the research questions was defended.

The results are presented in Chapter III. The answers to two broad research questions (i.e. (a) What are the effects of tiered instruction on conversational turn taking for child participants? and (b) To what extent can the adult participant implement tiered instruction with fidelity?) are provided along with detailed information regarding the findings related to the embedded research questions at each instructional tier.
CHAPTER III

RESULTS

The effects of tiered instruction on conversational turn taking for 13 children with and without disabilities in an inclusive preschool classroom were examined. In Chapter III, a summary of the delivery of the tiered instruction intervention and the frequency of children’s conversational turns across phases is provided first. Next, the results are presented first for tier one (UDL), followed by tier two (UDL+PMI) and then tier three (UDL+PMI+MT). The chapter concludes with a summary of the overall changes in CTT as a result of tiered instruction.

Delivery of Tiered Instruction and Frequency of CTT across Phases

The teacher delivered three different instructional practices from least to most intensive. All child participants received tier one instruction (UDL). Children who did not show progress, during the delivery of UDL, however, received tier two instruction (UDL+PMI). Further, child participants who did not show progress during UDL and PMI received the most intense instruction in tier three (i.e. UDL+PMI+MT). Thirteen children participated in the study. Nine of the 13 child participants received only tier one instruction (UDL) for the duration of the study (15 weeks). Two of the child participants received tier one instruction (UDL) for 5 weeks followed by tier two instruction (UDL+PMI) for 10 weeks. Two of the child participants received tier one instruction
(UDL) for 5 weeks, tier two instruction (UDL+PMI) for 5 weeks, and tier three instruction (UDL+PMI+MT) for 5 weeks. The frequency of CTT for all 13 children across baseline, intervention, withdrawal, and reinstatement is presented in Figures 4 and 5.

**Tier One: UDL**

Nine of the 13 child participants received only tier one instruction (UDL) for the duration of the study (15 weeks). The frequency of CTT for all 13 children across baseline, intervention, withdrawal, and reinstatement is presented in Figures 4 and 5. For each participant, the evaluation of within and between analyses of trend, variability, level, and data overlap were combined to reach a conclusion regarding the existence of a functional relationship (Horner & Greenwood, 2012). The effect of tiered instruction on conversational turn taking (CTT) was summarized as a percentage of positive findings (calculated by adding up the number of positive findings and dividing them by the total number of visual analyses completed).

**Positive Findings**

A functional relationship between UDL and CTT was found for seven of the nine tier one participants. The strongest intervention effects were seen for Debbie, Lisa, and Timothy with percent of positive findings equaling 82%, 76%, and 76% respectively. Weak effects were observed for Candace, Nancy, and Patrick all with positive findings equaling 65% of the total visual analysis criteria. Weak effects were also observed for Tyler whose positive findings were at 59%.
Figure 4. Frequency of Conversational Turn Taking for Children One through Six
Figure 5. Frequency of Conversational Turn Taking for Children Seven through 13
A functional relationship between UDL and CTT was not found for Hannah and Quinn whose total positive findings equaled 41% and 47% respectively.

According to the WWC standards for single case design research, at least three demonstrations of intervention effect accompanied by at least one demonstration of non-effect indicates moderate evidence (Kratochwill et al., 2010). When moderate evidence exists, the WWC recommends conducting effect size estimations. Based on the WWC criteria, at tier one, moderate evidence exists; therefore, effect size estimations were conducted. The percent of non-overlapping data (PND) across tier one participants was 0.32 from baseline to intervention and 0.33 from withdrawal to reinstatement. The percent of data exceeding the median (PEM) was 0.57 from baseline to intervention and 0.54 from withdrawal to reinstatement. The percent of data exceeding the median trend (PEM-T) was 0.50 from baseline to intervention and 0.54 from withdrawal to reinstatement. In general, the effect size estimations indicate weak intervention effects at tier one. Table 19 includes a summary of the effect size estimations across instructional tiers and intervention phases.

**Baseline to Intervention**

The results of the within and between phase visual analysis of graphed data for the baseline and intervention phases for tier one child participants are presented next. Furthermore, the baseline and intervention phase results from the Tier One Universal Design for Learning Fidelity Measure are reported followed by a description of the fidelity of implementation noted within the daily self-monitoring checklists completed by the teacher.
**Within phases.** A systematic evaluation of trend direction and variability or range of data points was conducted for a *within* phase analysis across each of the phases. During baseline, five of the nine tier one participants had descending trends and all nine tier one participants showed stable data indicating all data points were within 50% of the mean. Mean levels during baseline for tier one participants ranged from 147.2 conversational turns to 548.2 conversational turns (Table 15).

During intervention, eight of the nine tier one participants had ascending trends and seven children showed stable data (all points within 50% of the mean). Mean levels during intervention for tier one participants ranged from 232 conversational turns to 491.8 conversational turns (Table 15). The two children who had variable data during intervention were Nancy and Timothy.

Shortly after the implementation of UDL, Nancy, a child with selective mutism, started talking. Her frequency of conversational turns skyrocketed to higher levels than any of her classmates (787 conversational turns during Week 11) and then slowly decreased over time (down to 202 conversational turns during Week 19). Timothy had a spike in his conversational turns (383) during Week 11.

**Between phases.** The change in trend, change in mean, change in level and data overlap was evaluated for a *between* phase analysis across all phases. From baseline to intervention, four of the nine child participants had a change in trend from a descending trend in baseline to an ascending trend during intervention indicating intervention effects. A positive change in mean was observed for six of the nine child participants. The mean levels of CTT across phases, including change scores for each of the child participants
are presented in Table 15. Positive change scores from baseline to intervention for the six ranged from 1.1 to 300.3 conversational turns (Table 15). Tyler, Candace, and Hannah all had negative changes in the mean dropping 67.5, 16.2, and 46.1 conversational turns from baseline to intervention respectively. An immediate change in level was only observed for Tyler from 572 turns in the final data point in baseline to 489 turns in the first data point in intervention. An evaluation of data overlap from baseline to intervention revealed that five of the nine tier one child participants had 100% overlap and two of the nine had 80% overlap. Nancy and Debbie showed the greatest intervention effects with only 40% overlap.

Table 15

<table>
<thead>
<tr>
<th>Child Participant</th>
<th>Baseline</th>
<th>UDL</th>
<th>UDL+PMI</th>
<th>UDL+PMI+MT</th>
<th>Change Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tyler*</td>
<td>548.2</td>
<td>480.7</td>
<td></td>
<td>-67.5</td>
<td></td>
</tr>
<tr>
<td>Candace*</td>
<td>508.0</td>
<td>491.8</td>
<td></td>
<td>-16.2</td>
<td></td>
</tr>
<tr>
<td>Hannah*</td>
<td>431.6</td>
<td>385.5</td>
<td></td>
<td>-46.1</td>
<td></td>
</tr>
<tr>
<td>Patrick</td>
<td>351.6</td>
<td>352.7</td>
<td></td>
<td>1.1</td>
<td></td>
</tr>
<tr>
<td>Quinn</td>
<td>321.4</td>
<td>356.4</td>
<td></td>
<td>35.0</td>
<td></td>
</tr>
<tr>
<td>Debbie</td>
<td>297.2</td>
<td>400.3</td>
<td></td>
<td>103.1</td>
<td></td>
</tr>
<tr>
<td>Timothy</td>
<td>214.2</td>
<td>233.0</td>
<td></td>
<td>18.8</td>
<td></td>
</tr>
<tr>
<td>Lisa</td>
<td>197.4</td>
<td>232.0</td>
<td></td>
<td>34.6</td>
<td></td>
</tr>
<tr>
<td>Nancy</td>
<td>147.2</td>
<td>447.5</td>
<td></td>
<td>300.3</td>
<td></td>
</tr>
<tr>
<td>Nicholas*</td>
<td>361.4</td>
<td>315.2</td>
<td>354.4</td>
<td>-7.0</td>
<td></td>
</tr>
<tr>
<td>Victor</td>
<td>272.0</td>
<td>209.4</td>
<td>333.0</td>
<td>61.0</td>
<td></td>
</tr>
<tr>
<td>Heather</td>
<td>312.2</td>
<td>261.3</td>
<td>293.7</td>
<td>339.1</td>
<td>26.9</td>
</tr>
<tr>
<td>George</td>
<td>154.0</td>
<td>155.0</td>
<td>219.3</td>
<td>252.0</td>
<td>98.0</td>
</tr>
</tbody>
</table>

Note. Change Score = the difference between baseline and the last effective instructional condition; *mean level of conversational turn taking did not increase from baseline to intervention

**Fidelity of implementation.** The Tier One Universal Design for Learning (UDL) Fidelity Measure was used to examine the components of a universally designed activity
including multiple means of representation, engagement, and expression. The score was reported as a percentage of procedures observed. According to the Tier One UDL Fidelity Measure, the teacher was implementing only 17% of the UDL procedures during baseline. During intervention, the percentage of procedures observed ranged from 83% to 100% with an overall average of 95% across observations. Table 16 provides a summary of the fidelity observation results across intervention conditions.

Table 16

<table>
<thead>
<tr>
<th>Percent Fidelity across Weeks of UDL, PMI, and MT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>8</td>
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<td>18</td>
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<tr>
<td>19</td>
</tr>
<tr>
<td>20</td>
</tr>
<tr>
<td>Overall</td>
</tr>
</tbody>
</table>

Note. UDL=Universal Design for Learning; PMI=Peer Mediated Instruction; MT=Milieu Teaching; Overall percentages are rounded to the nearest percent.

Self-monitoring. Throughout the UDL intervention, the teacher completed a daily self-monitoring checklist with four key questions about intervention implementation (See Appendix S). For the majority of the UDL intervention, the teacher
replied yes to all four questions. Two exceptions included one day during Week 10 and one day during Week 14. On both occasions, the teacher indicated within the comments that she was unable to use multiple means of representation because the computer was turned off or out of order. According to the fidelity check; however, the teacher did use multiple means of representation at least once during the week because she achieved 100% fidelity during Weeks 10 and 14.

**Withdrawal to Reinstatement**

The results of the within and between phase visual analysis of graphed data for the withdrawal and reinstatement phases for tier one child participants are presented next. Furthermore, the withdrawal and reinstatement phase results from the Tier One Universal Design for Learning Fidelity Measure are reported followed by a description of the fidelity of implementation noted within the daily self-monitoring checklists completed by the teacher.

**Within phases.** During the withdrawal phase, seven of the nine tier one child participants showed a descending trend and all nine had stable data (i.e., all data points were within 50% of mean levels ranging from 222.7 to 539.7 conversational turns). The mean levels of conversational turns during withdrawal and reinstatement phases for all child participants across instructional tiers are presented in Table 17. The two children whose data revealed ascending trends during withdrawal were Hannah and Quinn.

During the reinstatement phase, eight of the nine child participants showed an ascending trend in data and all nine were stable. Mean levels during reinstatement for
tier one participants ranged from 220.3 to 682.7 conversational turns (Table 17). Only Patrick had a descending trend during the reinstatement phase.

Table 17

Mean Level of CTT during Withdrawal and Reinstatement

<table>
<thead>
<tr>
<th>Child Participant</th>
<th>Withdrawal</th>
<th>Reinstatement</th>
<th>Change Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tyler</td>
<td>539.7</td>
<td>682.7</td>
<td>143.0</td>
</tr>
<tr>
<td>Candace</td>
<td>514.0</td>
<td>557.0</td>
<td>43.0</td>
</tr>
<tr>
<td>Hannah</td>
<td>392.3</td>
<td>459.7</td>
<td>67.4</td>
</tr>
<tr>
<td>Patrick</td>
<td>376.0</td>
<td>305.0</td>
<td>-71.0</td>
</tr>
<tr>
<td>Quinn</td>
<td>396.3</td>
<td>365.0</td>
<td>-31.3</td>
</tr>
<tr>
<td>Debbie</td>
<td>399.3</td>
<td>487.0</td>
<td>87.7</td>
</tr>
<tr>
<td>Timothy</td>
<td>231.3</td>
<td>335.0</td>
<td>103.7</td>
</tr>
<tr>
<td>Lisa</td>
<td>222.7</td>
<td>220.3</td>
<td>-2.4</td>
</tr>
<tr>
<td>Nancy</td>
<td>478.7</td>
<td>330.0</td>
<td>-148.7</td>
</tr>
<tr>
<td>Nicholas</td>
<td>369.7</td>
<td>298.3</td>
<td>-71.4</td>
</tr>
<tr>
<td>Victor</td>
<td>236.0</td>
<td>301.0</td>
<td>65.0</td>
</tr>
<tr>
<td>Heather</td>
<td>305.7</td>
<td>277.3</td>
<td>-28.4</td>
</tr>
<tr>
<td>George</td>
<td>191.0</td>
<td>234.7</td>
<td>43.7</td>
</tr>
</tbody>
</table>

Note. Change Score = the difference between the mean level during withdrawal and mean level during reinstatement; Reinstatement = reintroduction of the last intervention phase for each child (i.e., UDL for the first nine child participants, UDL+PMI for Nicholas and Victor, and UDL+PMI+MT for Heather and George)

**Between phases.** From withdrawal to reinstatement, six of the nine child participants had a change in trend from a descending trend in baseline to an ascending trend during intervention indicating intervention effects. A positive change in mean was observed for five of the nine participants. Positive change scores ranged from 43 to 143 (see Table 17). Patrick, Quinn, Lisa, and Nancy had negative changes in mean dropping 71, 31.3, 2.4, and 148.7 conversational turns from withdrawal to reinstatement respectively. An immediate change in level was observed for Tyler, Debbie, and Nancy,
however, the change in level for Nancy was in a negative direction changing from 495 turns in the last data point in withdrawal to 297 turns in the first data point during reinstatement. From withdrawal to reinstatement, a systematic evaluation of data overlap revealed that four of the nine tier one participants had 67% overlap and Candace had 100%. Hannah and Timothy both had only 33% overlap between withdrawal and reinstatement and Tyler and Nancy both had 0% overlap.

**Fidelity of implementation.** According to the Tier One UDL Fidelity Measure, the teacher was implementing only 17% of the UDL procedures during withdrawal. During reinstatement, 100% of procedures were observed. Table 18 provides a summary of the fidelity observation results during the withdrawal and reinstatement phases.

Table 18

**Percent Fidelity across Withdrawal and Reinstatement**

<table>
<thead>
<tr>
<th>Phase</th>
<th>UDL</th>
<th>PMI</th>
<th>MT</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Withdrawal</td>
<td>17</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Reinstatement</td>
<td>100</td>
<td>100</td>
<td>92</td>
<td>97</td>
</tr>
</tbody>
</table>

*Note.* Overall percentages are rounded to the nearest percent.

**Self-monitoring.** During withdrawal, the teacher did not complete the daily self-monitoring checklist because she was not intentionally implementing any of the intervention conditions. During the reinstatement phase, the teacher circled yes to all questions each day indicating her belief that she was implementing the UDL intervention with integrity for the duration of the reinstatement phase. No comments or questions
related to the UDL intervention were included on the daily self-monitoring checklists for the reinstatement phase.

**Tier Two: UDL+PMI**

Two of the child participants received tier one instruction (UDL) for 5 weeks followed by tier two instruction (UDL+PMI) for 10 weeks. The frequency of CTT for all 13 children across baseline, intervention, withdrawal, and reinstatement is presented in Figures 4 and 5. The tier two participants included Nicholas and Victor. A functional relationship between the intervention and CTT was found for Victor whose positive findings equaled 58% of the total visual analysis criteria. A functional relationship between UDL+PMI and CTT was not found for Nicholas whose positive findings accounted for only 42% of the visual analysis criteria evaluated.

According to the WWC standards for single case design research, at least three demonstrations of intervention effect accompanied by at least one demonstration of non-effect indicates moderate evidence (Kratochwill et al., 2010). When moderate evidence exists, the WWC recommends conducting effect size estimations. Based on the WWC criteria, at tier two, moderate evidence exists; therefore, effect size estimations were conducted. The percent of non-overlapping data (PND) across tier two participants was 0.11 from baseline to intervention and 0.50 from withdrawal to reinstatement. The percent of data exceeding the median (PEM) was 0.61 from baseline to intervention and 0.50 from withdrawal to reinstatement. The percent of data exceeding the median trend (PEM-T) was 0.50 from baseline to intervention and 0.33 from withdrawal to reinstatement. In general, the effect size estimations indicate weak intervention effects at
tier two. Table 19 includes a summary of the effect size estimations across instructional
tiers and intervention phases.

Table 19

*Effect Size Estimations*

<table>
<thead>
<tr>
<th>Effect Size Estimations</th>
<th>Baseline to Intervention</th>
<th>Withdrawal to Reinstatement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tier 1</td>
<td>Tier 2</td>
</tr>
<tr>
<td>PND</td>
<td>0.32</td>
<td>0.11</td>
</tr>
<tr>
<td>PEM</td>
<td>0.57</td>
<td>0.61</td>
</tr>
<tr>
<td>PEM-T</td>
<td>0.50</td>
<td>0.50</td>
</tr>
</tbody>
</table>

*Note.* PND = percent of non-overlapping data; PEM = percent of data exceeding the median; PEM-T = percent of data exceeding the median trend

**Baseline to Intervention**

The results of the within and between phase visual analysis of graphed data for
the baseline and intervention phases for tier two child participants are presented next.
Furthermore, the baseline and intervention phase results from the Tier Two Peer
Mediated Instruction Fidelity Measure are reported followed by a description of the
fidelity of implementation noted within the daily self-monitoring checklists completed by
the teacher.

**Within phases.** During baseline, Nicholas had an ascending trend in data and
Victor had a descending trend. Both tier two child participants had stable data during
baseline indicating all data points were within 50% of the mean. Nicholas and Victor’s
mean levels during baseline were 361.4 and 272 respectively (see Table 15). During
intervention, Nicholas showed an ascending trend across both the UDL and UDL+PMI intervention conditions. Victor had an ascending trend during the UDL condition and a descending trend during the UDL+PMI condition. During intervention Victor’s data were stable across conditions. Victor’s mean level during UDL was 209.4 conversational turns and his mean level during UDL+PMI was 333. During intervention, Nicholas’ data were variable. Nicholas had a single variable data point during UDL+PMI when his conversational turns increased from 400 daily conversational turns in Week 18 to 586 daily conversational turns in Week 19.

**Between phases.** From baseline to intervention, both Nicholas and Victor had a change in trend indicating initial intervention effects. Nicholas’ trend remained ascending across both UDL and UDL+PMI conditions. Victor’s trend changed from ascending to descending across intervention conditions; however, his change in mean went from 272 conversational turns during baseline to 333 conversational turns during UDL+PMI resulting in a change score of 61 turns. Nicholas had a negative change in mean from baseline to intervention starting at 361.4 conversational turns during baseline and ending with 354.4 conversational turns during UDL+PMI resulting in a negative change score of 7 turns. Neither of the child participants showed an immediate change in level from baseline to intervention, however, Victor showed a change in level across conditions from 168 turns at the last data point during UDL to 446 turns at the first data point during UDL+PMI. A systematic evaluation of data overlap revealed that Nicholas and Victor both had 60% overlap from baseline to intervention.
**Fidelity of implementation.** The Tier Two Peer Mediated Instruction (PMI) Fidelity Measure is a table outlining the training, prompting, and reinforcement procedures to be implemented by days across weeks. The score is reported as a percentage of procedures observed. According to the Tier Two PMI Fidelity Measure, the teacher was implementing 0% of the PMI procedures during baseline. During intervention the percentage of procedures observed ranged from 67% to 100% with an overall average of 87% across observations. Table 16 provides a summary of the fidelity observation results across intervention conditions. On two occasions the intervention fidelity percentage was below 80%. During Week 13, the teacher achieved only 73% fidelity. Then, during Week 17 the teacher achieved only 67% fidelity. Week 17 was the first week that the tier three intervention was added to the daily schedule. The teacher’s fidelity was low again due to her incorrect use of prompts.

**Self-monitoring.** Throughout the UDL+PMI intervention, the teacher completed a daily self-monitoring checklist with four key questions about intervention implementation (See Appendix S). For the majority of the UDL+PMI intervention, the teacher replied yes to all four questions. Two exceptions were noted during Week 14. On both occasions, the teacher indicated in the comments that she used the incorrect prompting procedure. On the first day she used too little prompts and on the second day she used too many. Additional comments throughout the PMI intervention included notes about which children were reinforced on the given day and which children were absent.
Withdrawal to Reinstatement

The results of the within and between phase visual analysis of graphed data for the withdrawal and reinstatement phases for tier two child participants are presented next. Furthermore, the withdrawal and reinstatement phase results from the Tier Two Peer Mediated Instruction Fidelity Measure are reported followed by a description of the fidelity of implementation noted within the daily self-monitoring checklists completed by the teacher.

Within phases. During the withdrawal phase, both Nicholas and Victor had ascending trends. Both Nicholas and Victor also had stable data indicating all points were within 50% of their mean levels (369.7 for Nicholas and 236 for Victor). During reinstatement, both tier two child participants showed descending trends and stable data (within 50% of the mean of 298.3 for Nicholas and 301 for Victor).

Between phases. From withdrawal to reinstatement, both Nicholas and Victor had a change in trend from ascending to descending. Only Victor’s data showed a positive change in mean from 236 conversational turns during withdrawal to 301 during reinstatement resulting in a change score of 65 turns (see Table 17). Neither child showed a change in level from withdrawal to reinstatement. The evaluation of data overlap revealed that Nicholas had 33% overlap between withdrawal and reinstatement while Victor had 0% overlapping data points.

Fidelity of implementation. According to the Tier Two PMI Fidelity Measure, the teacher was implementing 0% of the PMI procedures during withdrawal. During reinstatement, the percentage of procedures observed was 100%. Table 18 provides a
summary of the fidelity observation results during the withdrawal and reinstatement phases.

**Self-monitoring.** During withdrawal, the teacher did not complete the daily self-monitoring checklist because she was not intentionally implementing any of the intervention conditions. During the reinstatement phase of the UDL+PMI intervention, the teacher circled yes to all questions each day indicating her belief that she was implementing PMI with integrity.

**Tier Three: UDL+PMI+MT**

The frequency of CTT for all 13 children across baseline, intervention, withdrawal, and reinstatement is presented in Figures 4 and 5. The tier three participants included George and Heather. Two of the child participants received tier one instruction (UDL) for 5 weeks, tier two instruction (UDL+PMI) for 5 weeks, and tier three instruction (UDL+PMI+MT) for 5 weeks. A functional relationship between UDL+PMI+MT and CTT was found for both George and Heather; however, the intervention effects were weak in both instances. Both tier three participants had positive findings that accounted for 52% of the total visual analyses.

According to the WWC standards for single case design research, when three instances of basic intervention effect cannot be found, no evidence exists. When no evidence exists, then it is recommended that effect size estimations not be included in the results (Kratochwill et al., 2010). Based on the WWC criteria, at tier three, no evidence exists; therefore, effect size estimations were not included.
Baseline to Intervention

The results of the within and between phase visual analysis of graphed data for the baseline and intervention phases for tier three child participants are presented next. Furthermore, the baseline and intervention phase results from the Tier Three Milieu Teaching Fidelity Measure are reported followed by a description of the fidelity of implementation noted within the daily self-monitoring checklists completed by the teacher.

Within phases. During baseline, both Heather and George had ascending trends and stable data indicating all data points were within 50% of their mean levels during baseline (312.2 for Heather and 154 for George). During intervention, Heather had an ascending trend during the UDL condition, a descending trend during the UDL+PMI condition, and then another ascending trend during the UDL+PMI+MT condition. Heather had stable data throughout intervention conditions with a mean level of 272 during UDL, 293.7 during UDL+PMI, and 339.1 during UDL+PMI+MT. George showed a descending trend during the UDL condition and then ascending trends during UDL+PMI and UDL+PMI+MT. George’s data were stable through the first two conditions with mean levels of 155 during UDL and 219.3 during UDL+PMI; however, during the UDL+PMI+MT condition George had a single data point that was unusually high (i.e. 409 conversational turns when his mean for the phase was 252) resulting in variable data for the UDL+PMI+MT condition (a negative finding).

Between phases. The change in trend, change in mean, change in level and data overlap was evaluated for a between phase analysis across all phases. From baseline to
intervention, Heather did not have an initial change in an ascending trend; however, she did have a change in trend from a descending trend during the UDL+PMI condition to an ascending trend during the UDL+PMI+MT condition. George showed an initial change in trend that went from ascending during baseline to descending during intervention. George then showed another change in trend from a descending trend during the UDL condition to an ascending trend during the UDL+PMI condition. Heather and George both had positive changes in mean from baseline to intervention resulting in change scores of 26.9 and 98 respectively (see Table 15). Neither Heather nor George had an immediate change in level from baseline to intervention. In fact, the only immediate change in level observed across the tier three participants’ data was for Heather changing from 228 turns at the end of UDL+PMI condition to 327 turns at the start of the UDL+PMI+MT condition. A systematic evaluation of data overlap revealed that Heather had 80% overlap from baseline to UDL, 60% overlap from UDL to UDL+PMI, and 100% overlap from UDL+PMI to UDL+PMI+MT. George had 80% overlap from baseline to UDL, 80% overlap from UDL to UDL+PMI, and 83% overlap from UDL+PMI to UDL+PMI+MT.

**Fidelity of implementation.** The Tier Three Milieu Teaching (MT) Fidelity Measure is a form that allows an examiner to code each verbal interaction within a conversational sequence between a teacher and target child. The score is reported as a percentage of correct teaching episodes. According to the Tier Three MT Fidelity Measure, the teacher was implementing 0% correct teaching episodes during baseline. During intervention, the percentage of correct teaching episodes observed ranged from
40% to 100% with an overall average of 83% across observations (Table 16). At least once each week, the teacher received a fidelity score below 80%. Her lowest score (40%) during Week 18 was due to a lack of correct prompting and reinforcement. For example, the teacher would often prompt the target child then neglect reinforcement before prompting again.

**Self-monitoring.** Throughout the UDL+PMI+MT condition, the teacher completed the daily monitoring checklist (Appendix S) by circling yes or no to four key questions about implementation and including any questions or comments at the bottom of the page. For the majority of the UDL+PMI+MT condition, the teacher responded yes to all four questions; however, on three occasions (i.e. once during Week 17, once during Week 18, and once during Week 19) she responded no to the question about the use of time delays.

**Withdrawal to Reinstatement**

The results of the within and between phase visual analysis of graphed data for the withdrawal and reinstatement phases for tier three child participants are presented next. Furthermore, the withdrawal and reinstatement phase results from the Tier Three Milieu Teaching Fidelity Measure are reported followed by a description of the fidelity of implementation noted within the daily self-monitoring checklists completed by the teacher.

**Within phases.** During the withdrawal phase, both Heather and George had ascending trends and stable data. Heather’s mean level during withdrawal was 305.7 conversational turns and George’s was 191. During the reinstatement phase, the tier three
participants both had stable data (around the mean of 277.3 for Heather and 234.7 for George); however, Heather had a descending trend and George had an ascending trend.

**Between phases.** From withdrawal to reinstatement, Heather showed a change in trend from descending to ascending indicating reverse intervention effects. George did not have a change in an ascending trend from withdrawal to reinstatement; however, he did show change in mean from 191 conversational turns during withdrawal to 234.7 conversational turns during reinstatement resulting in a change score of 43.7 (Table 17). Heather had a negative change in mean from withdrawal to reinstatement resulting in a negative change score of 28.4 turns. Neither tier three participant showed an immediate change in level. Both Heather and George had 67% data overlap from withdrawal to reinstatement.

**Fidelity of implementation.** According to the Tier Three MT Fidelity Measure, the teacher was implementing 0% correct teaching episodes during baseline. During reinstatement, the percentage of correct teaching episodes observed was 92%. Table 18 provides a summary of the fidelity observation results during the withdrawal and reinstatement phases.

**Self-monitoring.** During the withdrawal phase, the teacher did not complete the daily self-monitoring checklist because she was not intentionally implementing any of the intervention conditions. During the reinstatement phase, the teacher circled yes to all questions each day indicating her belief that she was implementing the MT intervention with integrity for the duration of the reinstatement phase. No comments or questions
related to the MT intervention were included on the daily self-monitoring checklists for the reinstatement phase.

**Overall Changes in CTT**

The visual analysis and effect size estimations indicate tiered instruction may be only moderately effective for increasing the frequency of CTT in young children with and without disabilities; however, the worth of the intervention may be impacted by the overall changes in CTT among individual child participants. First, nine of the 13 child participants increased CTT from baseline to various phases of the tiered intervention. Specifically, of those nine children who increased conversational turn taking, six received tier one instruction (UDL), one received tier two instruction (UDL+PMI), and two received tier three instruction (UDL+PMI+MT). Table 20 shows the mean level of conversational turns during baseline and reinstatement for the four child participants who did not show an increase in conversational turns from baseline to intervention.

**Table 20**

*Mean Level of Conversational Turns during Baseline and Reinstatement*

<table>
<thead>
<tr>
<th>Child Participant</th>
<th>Baseline</th>
<th>Reinstatement</th>
<th>Change Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tyler</td>
<td>548.2</td>
<td>682.7</td>
<td>134.5</td>
</tr>
<tr>
<td>Candace</td>
<td>508.0</td>
<td>557.0</td>
<td>49.0</td>
</tr>
<tr>
<td>Hannah</td>
<td>431.6</td>
<td>459.7</td>
<td>28.1</td>
</tr>
<tr>
<td>Nicholas</td>
<td>361.4</td>
<td>298.3</td>
<td>-63.1</td>
</tr>
</tbody>
</table>

*Note.* Change Score = the difference between the mean level during baseline and mean level during reinstatement.

The four child participants who did not show an increase in conversational turns from baseline to intervention (i.e. Tyler, Candace, Hannah, & Nicholas) all had baseline
levels between 361 and 548 conversational turns per session, well above the class average
during baseline (316.6). Moreover, when accounting for the withdrawal and
reinstatement phases, Tyler, Candace, and Hannah all showed an increase in CTT from
the start to the end of the study. Only one child participant (Nicholas) did not show an
increase in conversational turn taking throughout the course of the study.

Summary

The findings associated with two broad research questions were presented in
Chapter III. The results were presented by instructional tier in order to examine the
embedded research questions summarized at the end of Chapter I. A discussion of the
results is presented in Chapter IV. Justification for the findings and consideration of the
contributions and implications are offered. Also included are reflections on the future
direction of research around tiered instruction and CTT interventions.
CHAPTER IV

DISCUSSION

Explanations of the study findings are presented in chapter 4 including an overview of the possible threats to internal and external validity. Additionally, chapter 4 includes a discussion of how the study findings relate to previous research and the contributions made to the literature as a result. Lastly, the implications and considerations for practice and future directions for research are explored.

Explanation of Findings

The findings associated with two broad research questions, and six embedded research questions are discussed in the following paragraphs. First, the effects of tiered instruction on conversational turn taking (CTT) are explained. The first three embedded research questions are then addressed by discussing the effects of each instructional tier on CTT. Next, the implementation fidelity findings are explained. The embedded research questions related to fidelity are then addressed by discussing the findings separately for each instructional tier.

The Effects of Tiered Instruction

None of the child participants showed substantial or immediate changes in conversational turn taking as a result of tiered instruction; however, progress over time was observed for all but one child. The goal of tiered instruction is to ensure that every child, regardless of ability level, makes progress toward a targeted skill. In this case, an increase in CTT for all children was an expected result of tiered instruction. Child progress was monitored across pre-determined points in time and intervention was
adjusted accordingly. Specifically, when non-responders were identified, additional tiers of intervention were implemented. At each tier, the intervention increased in intensity. In Chapter I, intensity was defined as the level of teacher time and effort needed for planning and classroom instruction.

The lack of substantial and immediate changes in the frequency of CTT could be related to a mismatch between the needs of the children and the skill that was being taught. That is, maybe for some children, before CTT could be successfully increased, mastery of prerequisite skills was needed. As stated in Chapter I, in order to engage in CTT, children need both expressive (e.g. frequency of utterances, use of semantic relationships, requesting) and receptive (e.g. responding to initiations) communication competence (Hay & Fielding-Barnsley, 2009). Perhaps children who did not respond did not need increasingly intense CTT instruction, but rather a change in the target skill. Changing the target skill was not possible because the intervention was being altered at each phase of the study. Manipulating both the dependent and independent variable would have eliminated experimental control and made it impossible to determine which change affected child behavior.

**The effects of tier one: UDL.** The majority of child participants (69%) made enough progress when exposed to UDL not to warrant adding another tier of intervention and therefore remained “tier one participants” for the duration of the study. It was expected that UDL, as a tier one instructional approach, would be effective for most children in an inclusive classroom. Response to Intervention literature (i.e. a tiered model of instruction) indicates that through tier one service delivery, approximately 80%
of students are expected to reach competency (Johnson, Mellard, Fuchs, & McKnight, 2006; Kashima, Schleich, & Spradlin, 2009). What is unique about this finding is that in the inclusive early childhood setting, approximately 50% of the students have already been identified with disabilities. According to the U.S. Department of Education, National Center for Education Statistics (2012), the average number of children ages 3-21 receiving services for disabilities is 13.1 percent of the total school population. If 80% of students reach competency through tier one service delivery when 13.1% of students have disabilities, then technically only 54% of students should reach competency when 50% of students have disabilities. Perhaps UDL is especially effective for the inclusive classroom because it is designed to address the needs of children with differing characteristics of knowledge, skills, backgrounds, interests, and preferences; and in an inclusive classroom, children with and without disabilities represent a wide range of those characteristics.

The reversal effect observed for the children who had the highest frequencies of CTT during baseline was unexpected. That is, when UDL was introduced, their CTT decreased. When UDL was withdrawn, their CTT increased. One hypothesis is that before intervention, children with high levels of CTT had a tendency to dominate the classroom conversation. Perhaps when the UDL activity was introduced, those children were essentially forced to share talking time by engaging in opportunities for CTT that were more equally distributed among the children. Even though UDL had a reversal effect for the children with high frequencies of CTT during baseline, each still made progress over time.
The effects of tier two: UDL+PMI. After the initial phase change, a total of four child participants did not make adequate progress in tier one (i.e. based on their mean levels of CTT, AEPS scores, and visual analyses) and thus were moved to the UDL+PMI phase (tier two). Two of those children (i.e. Nicholas and Victor) remained in tier two for the remainder of the study.

Tier two instruction (UDL+PMI) was effective for Victor. Based on the observational data collected during baseline, Victor was a child whose communicative interactions typically included only responses. He rarely initiated conversations, but he would watch his peers and he would respond to them if they asked him a question. For Victor, UDL and PMI increased his use of CTT by structuring opportunities for him to interact more with his peers. Furthermore, tier two was likely effective for Victor because the peer model assigned to him remained engaged and compliant throughout the study, a critical factor in producing positive results within a PMI intervention (DiSalvo & Oswald, 2002; Harris, 2010).

Tier two instruction (UDL+PMI) was not as effective for Nicholas. Even though a functional relationship was not found, Nicholas remained in tier two because at the second phase change, his mean level, AEPS score, and visual analysis did not warrant adding another tier of intervention. Two explanations for the weak intervention effects are warranted.

First, it is possible that changes made to PMI part way through implementation may have had an impact on Nicholas’ response to the intervention. Specifically, after week 5, the teacher began to reward peer models for simply attempting to talk with the
target child, regardless of whether the peer models used the five steps or whether they successfully elicited a response from the target child. The possible effects of this change are illustrated by Victor’s graphed data which reveal an obvious increase in CTT with the introduction of PMI and then, after week five, an obvious decrease. Victor’s data were not replicated across the other child participants involved in the PMI intervention, indicating not every child was affected by the change in the same way. In fact, Victor’s data show another increase in CTT at the end of UDL+PMI. One speculation is that allowing more freedom in the application of PMI initially stunted the peer models’ ability to carry out PMI, but then eventually, that freedom allowed the peer models to personalize the intervention making it more comfortable for both the peer model and the target child.

The second possible explanation is that the personal characteristics of Nicholas and his peer model may have affected the intervention effects. Nicholas was often non-responsive to his peer model. Because of that, his peer model would often prompt him by saying hello over and over again in a robotic like voice. Given the peer model was still reinforced for attempting to talk with him, it was difficult to remediate her behavior through discussion or training. Also, no action was taken to provide Nicholas with a new or different peer model.

**The effects of tier three: UDL+PMI+MT.** At the second phase change, two child participants, George and Heather, did not make adequate progress in tier two (i.e. based on their combined mean levels, AEPS scores, and visual analyses) and thus were
moved to the UDL+PMI+MT phase (tier three). Only weak intervention effects were found at tier three.

The weak intervention effects at tier three may have had something to do with a mismatch between the intervention and the needs of the children. Sometimes children who perform poorly when provided with both large group and small group opportunities geared toward improving a target skill will not show progress because they are lacking the pre-requisite skills needed for success (Jackson et al., 2009; Vanderheyden, 2011). At the start of the study, George was a child who rarely used language to interact with either adults or peers. Perhaps George needed more instruction in the prerequisite skills needed for successful CTT such as approaching others, maintaining a topic of conversation, or responding when prompted.

Heather, on the other hand, used complete sentences during baseline to interact with both adults and peers. Based on observations, she was competent in both initiations and responses. Heather was subjected to the same decision making process as her peers and based on those results she continued to qualify for additional tiers of intervention. It is possible that Heather was not making progress because she was maintaining age level expectations. Additional tiers of intervention did not increase her skills because she had already mastered the skills the interventions were designed to increase.

Another speculation about why weak intervention effects were found for Heather and George is related to the data collection process. Typically, in turn taking research the production of language is recorded during small windows during which an intervention is being implemented. That is, CTT would be recorded during a pre-determined amount of
time (e.g. 10 minutes) first during baseline, and then, after the intervention was being implemented. In the current investigation, the LENA recording system was used to count conversational turns across the day, which included a wide variety of activities, people, settings, etc… So, the data show that the number of conversational turns increased with the introduction of intervention, not just during the time of the intervention, but across the day (i.e. generalized across settings and people). In fact, the percent of each recording that intervention was being implemented was 11% at tier one, 19% at tier two, and 22% at tier three. Essentially, measuring CTT in this way watered down the visible effect sizes. If conversational turns were only counted during small portions of the day (e.g. the five minutes during which there was no milieu teaching, and then milieu teaching), similar to past turn taking research, the results may have shown stronger intervention effects, not just at tier three, but across tiers.

**Fidelity of Implementation**

Past implementation research has indicated that fidelity of implementation may be related to various characteristics of the teacher (e.g. Lieber et al., 2009). The current study may also indicate a connection between the fidelity score and the experience and attitude of the teacher, however, it was not a relationship that was experimentally tested or controlled. The teacher was an experienced special educator with previous knowledge of data based decision making, systematic and consistent data collection, and evidence-based interventions. Moreover, the teacher indicated through personal communications that she was motivated and committed to positive outcomes for the project and for the
children in her class. Even so, the high level of fidelity was not expected given the complexity of tiered instruction.

The decrease in fidelity percentages from tier one to tier three was also unexpected but logical given the increasing intensity of intervention from tier one to tier three. The model of tiered instruction the teacher was asked to implement was additive in nature. As each tier was added, the teacher’s responsibilities across the day increased. In addition, at each instructional tier, the interventions became more specific and scripted, requiring the use of specific and planned antecedents and consequences. In conclusion, as the teacher’s workload increased, her fidelity slowly decreased.

**Fidelity at tier one: UDL.** Universal Design for Learning was operationally defined so that the teacher was able to implement each component. Her level of comfort with each component may have affected her fidelity. For example, the teacher was consistently accurate using multiple means of expression (allowing the children to show what they learned in multiple ways). In special education, it is often necessary for teachers to allow children to express themselves in multiple ways given students with disabilities often rely on only verbal or non-verbal means of communication. Asking the teacher to use multiple means of expression was, perhaps, something she was comfortable and familiar with. Conversely, using multiple means of representation and engagement appeared to remove the teacher from her comfort zone. Asking her to “sing” the directions to an activity or to provide multiple materials and choices for children were things that she may have been less comfortable doing. For example, the teacher indicated
on more than one occasion that she feared giving too many choices would lead to her losing control of the group.

There were other factors that may have led to high fidelity within tier one. Given this was the first study to operationalize UDL, the teacher and researcher worked closely together to gain an understanding of what each component of the intervention could really look like in action and how it would or would not be effective with a group of very young children. Once initial misunderstandings were clarified, the teacher was able to continue the intervention with consistency throughout the study. Perhaps the opportunity to share in these conversations about the rationale behind the procedures led to a mature understanding of the intervention. In addition, the teacher also had multiple opportunities (i.e. every day for 15 weeks) to practice and master implementation. Having so much time to practice could have also led to a high overall average of fidelity for tier one.

**Fidelity at tier two: UDL+PMI.** For the first five weeks of PMI, the teacher provided reinforcement to the peer models only when they successfully executed all five steps. A few weeks into the intervention, however, the teacher felt the peer models were resisting the steps and she felt uncomfortable prompting them to do something they did not want to do. The teacher wanted the peer models to be at ease, and she thought that if their conversations felt more natural the resistance would cease. At the five week mark, the intervention was modified so that the peer models were reinforced for any attempt to talk with the target children. The change was put in place to make the teacher and the peer models more comfortable with the intervention. It is possible that the change had consequences for intervention integrity; however, the overall fidelity percentage
remained high. The change may have led to less integrity in relation to the peer models’ implementation of the five steps, but it also may have led to a higher comfort level for the teacher. The teacher’s comfort level may have been a factor in why she was able to achieve good fidelity with little support from the researcher.

Any time the teacher’s fidelity fell below 80%, it was due to her incorrect use of prompts. A systematic process of fading prompts was used to increase the independence of the peer models and to decrease the amount of teacher support needed for implementation over time. Utilizing the correct level of prompts required the teacher to remember which level of prompts was to be used on each day. The teacher indicated that she sometimes forgot which level of prompts she was supposed to be using during each phase of the intervention. It seems that as the teacher’s workload increased, it became more difficult for her to remember the details of each intervention.

**Fidelity at tier three: UDL+PMI+MT.** The teacher was trained on clearly defined and detailed procedures for Milieu Teaching. She was also provided with specific and individualized observational feedback. The teacher made mistakes initially, but was able to correct her mistakes and maintain good fidelity, on average, across the intervention. Perhaps when an intervention has very clearly defined steps and procedures it makes it easier to follow with integrity. On the other hand, the more specific procedures are involved, the easier it would be to make a mistake.

While her average fidelity was good overall, MT was the intervention in which the teacher achieved the lowest percentage. One possible explanation for the lower score at tier three is a mismatch between the teacher’s style and the intervention. Andrews
(2010) found that teachers tend to choose interventions based more on their personalities and educational backgrounds than on the needs of students. This might indicate that a teacher who usually chooses play based interventions might be uncomfortable when asked to use structured, specific directives. In this case, the teacher explained that when she used incorrect procedures, it was because she felt it was an unnatural flow of conversation to prompt and reinforce a child for each utterance. Perhaps her feeling was a result of her lack of experience with MT. Her fidelity got better with practice but maybe it was still somewhat inconsistent because it was the first time she had really utilized a behaviorally based, naturalistic communication intervention (i.e. one consisting of systematic antecedents and consequences). Immediate feedback and support from the researcher was needed more during the MT phase than during the tier one and two interventions.

**Threats**

Threats are the variables or explanations that decrease the strength of either the internal or external validity of a study. Internal validity is the extent to which the independent variable, and not other extraneous variables, produced the observed effect on the dependent variable. External validity is the extent to which the results can be generalized. The threats to internal and external validity are discussed next.

**Internal.** Instrumentation was one of the possible threats to internal validity. First, it is possible the LENA system could have miscounted conversational turns in the classroom setting, counting other children’s utterances as turns for the target child. In Chapter II it was stated that the reliability of the Language Environment Analysis
(LENA) software used to measure CTT has been tested in both home and classroom settings (Xu, Yapanell, & Gray, 2009); however, the reliability data were not separated out to determine reliability in classroom settings alone. Moreover, a majority of the LENA data has been collected using child participants under the age of 3 years old (Gilkerson & Richards, 2008). It is still unclear whether LENA is consistently reliable with preschool age children, particularly in the classroom setting.

Because the LENA recording system cannot be stopped and started within a single recording and because a single recording needs to be at least an hour in length in order to be reliable, the data collected using the LENA system represent more than just the intervention. At the most intensive tier, the amount of time each child was receiving intervention only accounted for approximately 22% of the full recording time. For example, each recording was between 2 and 2 and ½ hours in length. If a recording was 2 hours and 15 minutes in length (135 minutes), during that time a child in tier three would have received UDL for 15 minutes, PMI for 10 minutes, and MT for 5 minutes. The total intervention time across the day would have been 30 minutes, which accounts for only 22% of the 135-minute recording. An additional measure of CTT focused specifically on the intervention windows would yield a more sensitive estimation of the effects of tiered instruction on CTT. Specifically, a human transcriber could go back to the audio files and determine whether CTT was significantly increased during just the intervention windows versus across the day.

Second, the Assessment, Evaluation, and Programming System’s (AEPS) Social Communication Area was utilized as a tertiary measure of progress over time along with
the class mean levels and the visual analysis of graphed data. The AEPS is not specifically designed to measure CTT, but the overall developmental area of social communication. Because the measure did not examine CTT specifically, it may have been an unfair addition to the decision making around whether or not children were increasing conversational turn taking. Moreover, the scoring rules used to structure the use of the assessment for study purposes may have led to false positives (i.e. categorizing children as making adequate progress when in fact, they were not making much progress at all). Specifically, area raw scores were used to determine progress. Even a single point increase was considered progress. A measure of “adequate” progress may have been more appropriate. The use of area goal scores may have been more sensitive to slow achievers; however, categorizing more children as non-responders, especially in an inclusive setting where at least 50% of the children are already receiving special education services, may have led to a distribution of children across tiers too much for the teacher to handle. For example, eliminating more false positives may have meant the teacher would have had to engage more than half the class in a tier two intervention.

The final possible threat related to instrumentation concerns the fidelity of implementation measures. The fidelity of implementation measures were developed and field-tested by the researcher; they were not validated measures. Therefore, it is uncertain whether they were truly accurate measures of the delivery of the independent variable. Given that each fidelity measure examined a percentage of correct procedures, there may have been additional or different procedures, frequency requirements, or quality variables that were unaccounted for.
Another possible threat to internal validity was diffusion, which is when the control group inadvertently receives some or all of the intervention. In single subject research, the target children serve as their own control group during baseline and withdrawal phases when they are receiving no intervention (Kazdin, 1982). In this case, during the baseline and withdrawal phases, the UDL fidelity measure was used to ensure that UDL was not being used within a single activity; however, there is no concrete assurance that UDL was not being used across the day. In fact, it is possible the teacher was using UDL across the day during baseline and withdrawal during times at which she was not being observed. Given her years of experience working with young children with and without disabilities, the teacher often used a wide variety of tactile, visual, and auditory supports among a range of classroom activities and opportunities to support children with a wide array of needs. If UDL was in fact being implemented across the day that would mean the control group (in this case, the target children during withdrawal and reinstatement) was inadvertently receiving some of the intervention.

External. The situation and the participants were both unique to the study and therefore, were variables that may have affected the extent to which the results can be generalized. For example, it is possible the results would look very different for children with disabilities in a self-contained setting, head start setting, or home based setting. Settings with higher teacher to child ratios and/or lower ratios of children with disabilities to children who are typically developing may have had a different impact on the conversational atmosphere and thus, the effects of tiered instruction on CTT. In addition, a teacher with less experience and education may not have been able to implement tiered
instruction with fidelity. It was speculated that her personal characteristics such as motivation and dedication may have contributed to the results. Generalizing the findings to all inclusive preschool settings and teachers is not plausible.

**Relation of Findings to Previous Research and Resulting Contributions**

Tiered instruction was found to have a positive impact on CTT for the majority of the child participants. This finding converges with previous research indicating that models of tiered instruction including three levels or tiers produce benefits for groups of children (Gettinger, & Stoiber, 2008; O’Connor et al., 2005); however, those models were different from the current study in three ways. First, they were implemented by researchers so there was no way to determine if the teachers could have used the models independently. Second, they were lacking fidelity of implementation measures. Third, the previous studies that examined three tiers of intervention as a package (Gettinger, & Stoiber; O’Connor et al.) did not examine each component of the intervention separately so there was no way to determine which portion of the tiered model led to changes in child behavior.

The strongest intervention effects were observed at tier one. Positive effects of tier one interventions have also been found within research citing gains in academic and social outcomes for children with disabilities using a curriculum based on the principles of UDL (Lieber, Horn, Palmer, & Flemming, 2008), and research where a functional relationship between school wide positive behavior support and a reduction of students’ problem behavior was established (Stormont, Smith, & Lewis, 2007). The studies revealed the effectiveness of tier one intervention; however, they did not include any
further exploration of increasing intervention tiers. This study provides new information to the literature around tier one interventions. Specifically, it provides a definition and example of UDL in the classroom and revealed that UDL can be an effective approach to increasing CTT among children with and without disabilities.

At tier two, only weak to moderate intervention effects were found. This finding also converges with previous research. A wide variety of tier two interventions have been found effective for producing child progress (e.g. Koutsoftas, Harmon, & Gray, 2009; Pearce, 2009; Schuele et al., 2008), and at least two studies of tier two interventions have reported a small group of non-responders or children for whom the intervention had only small positive effects (Bryant et al., 2008; Denton et al., 2010). It is possible this finding can also be interpreted as a divergence from the research.

According to previous studies, CTT is effectively increased using PMI for children with various abilities and needs (e.g. Doctoroff, 1997; Goldstein, English, Shafer, & Kaczmarek, 1997; Golstein, Kaczmarek, Pennington, & Shafer, 1992; Goldstein & Wickstrom, 1986; Sainato, Goldstein, & Strain, 1992). Moreover, particularly in the area of early literacy, tier two interventions have shown significant effects for children who are at risk for future reading difficulties (e.g. Bryant, Bryant, Gersten, Scammaca, & Chavez, 2008; Denton et al., 2010; Gettinger & Stoiber, 2008). Given the promise of PMI for increasing CTT and the robust effects of tier two interventions among other dependent variables, stronger intervention effects were expected at tier two.

Likewise, there is divergence from previous studies at tier three. Past research has indicated MT as an effective intervention for increasing CTT among children with
various communication needs (Hancock & Kaiser, 2002; Kaczmarek, Hepting, & Dzubak, 1996; Warren, Gazdag, Bambara, & Jones, 1994). It is still unclear why stronger effects were not established at tier three. No previous studies have been done with three additive tiers of intervention that would indicate an explanation.

The fidelity findings converge with previous tiered instruction studies reporting good to excellent intervention fidelity when teachers were responsible for implementation (e.g. Benedict, Horner, & Squires, 2007; McIntosh et al., 2006; Stormont et al., 2007). In addition, at tier one the findings converge with literature examining factors influencing implementation of the Children’s School Success curriculum (Lieber et al., 2009). Lieber and colleagues found that teachers who embrace the process and make a commitment to implementation can do so with success. That would appear to be the case in this study as well. The resulting contribution of the fidelity findings is a better understanding of the feasibility of tiered instruction. Specifically, as tiers are added, teachers may have more difficulty adhering to intervention integrity.

**Implications and Considerations**

According to McMaster and colleagues (2005) “Interventions that can be implemented by classroom teachers, assistants, parents, and school volunteers are likely to be more accessible, and thus more widely beneficial, than those that require special training and many hours outside the general classroom” (p. 461). The inclusive preschool teacher was, in fact, able to manipulate and deliver CTT instruction based on child response at three tiers of intervention, with only moderate support from an outside source. Other teachers interested in using such a model should keep in mind that an
experienced teacher with previous knowledge of data based decision making, systematic and consistent data collection, and evidence-based interventions might have been the key to successful fidelity of implementation. Before implementing tiered instruction in any classroom, professional development may be needed to ensure at least a basic understanding of each intervention strategy, data collection methods, and decision-making rules. The amount of researcher time spent on training and feedback averaged between 1 and 3 hours per month. Furthermore, less than 1 hour per month was spent conducting face-to-face training. Given the study has only been conducted in one classroom it is still unclear how much professional development the average teacher would need in order to implement tiered instruction independently.

At tier one, the teacher implemented universal design for learning (UDL) which is a fairly novel instructional approach. In fact, this study was one of the first to operationalize UDL as a tier one intervention within the early childhood classroom. The teacher had previous training on UDL as a theory, but at the start of the study, indicated that she was having trouble conceptualizing the theory for classroom practice. Specifically, the teacher stated that she was having a hard time understanding whether she was “doing it right.” Teachers and researchers interested in using UDL in the classroom may need to consider professional development designed to clearly define UDL, provide examples and perhaps videos, and allow opportunities for practice and discussion around how the principles of UDL look in practice, before attempting implementation.
At tier two, the teacher implemented Peer Mediated Instruction (PMI) and she experienced a barrier when the peer models began to lose motivation. During one of the informal opportunities for feedback and discussion between the teacher and researcher, the teacher stated that she was uncomfortable with how the peer models were reacting to her prompts. She had ethical concerns about continuing to prompt them to engage in the specific behaviors when they clearly no longer wanted to do so. Changes in the intervention were made to alleviate her concerns; however, it is important to consider that other teachers may have the same reaction. Other teachers or researchers interested in using PMI in the classroom should be aware of the possibility of negative reactions from the peer models and have a plan in place for handling both student and teacher comfort when concerns arise.

At tier three, the teacher implemented Milieu Teaching (MT), which requires the use of specific antecedents and consequences while following the child’s lead in the natural environment. Based on her own admission, as well as the researchers' observations, one of the teacher’s strengths was following the children’s lead; however, she clearly stated that the use of MT felt unnatural and unfair to her. Essentially, she was being asked to use a very different teaching style than she was accustomed to. Other teachers and researchers interested in using MT should consider whether it is a good match for the strengths and/or preferred teaching style of the person who will be expected to implement it. The teacher was able to adapt her teaching style with minimal coaching, feedback and support; however, some teachers may need more feedback, more training, or more support than initially anticipated.
Finally, there are implications and considerations regarding the decision-making model that other teachers and researchers should keep in mind. A number of decision-making models currently exist for determining children’s movement through tiers (Burns, Scholin, Kosciolek, Livingston, 2010; Fuchs et al. 2007). The decision-making model utilized within the current investigation incorporated the use of visual analysis of graphed data. The model most resembled the Dual Discrepancy (DD) approach (Fuchs, 1995) where children’s final levels of performance after the intervention as well as their progress over time are considered in conjunction to determine responsiveness to intervention. Previous research has found that a DD approach is preferable to a single discrepancy approach (Fuchs, 2003); however, research on DD is lacking data to inform decisions about the specific criteria that should be used to determine progress. Furthermore, there is no consensus regarding how far below average a student must perform to warrant a change in intervention (McMaster et al., 2005). Primarily, the children’s mean levels (i.e. number of conversational turns per day across each phase) were used to determine progress in both the visual analysis as well as the mean level in comparison to peers. Other teachers or researchers interesting in using the model should keep in mind that the use of mean levels in an inclusive setting may skew the exit criteria. In future application, normative data would be helpful in determining a more accurate estimation of adequate progress.

**Future Directions**

A number of possibilities exist for future research to extend and support the current investigation. First, the increasing or decreasing intensity single subject research
design may have potential for helping researchers visualize tiered instruction as a classroom based intervention and experiment with multiple variations of interventions organized on a hierarchy of intensity. Future research should continue to explore the use of increasing or decreasing intensity designs to determine the effects of tiered instruction within inclusive settings.

Additionally, the potential for effective classroom application of tiered instruction lies, in part, in the ability of classroom teachers to understand and implement all of the procedures, including the data collection and analysis. Future research should explore whether teachers can be trained to develop, utilize, and interpret child level data using increasing or decreasing intensity designs.

Future research should continue to explore tiered instruction as a package with multiple components. The majority of tiered instruction research has looked at components of the package separately, however, further examination of the whole package allows researchers to determine things like which tier of instruction has the largest effect, how effective the decision making model is for inclusive environments, and the feasibility of the model for classroom application.

Also, researchers should continue to define and explore models of tiered instruction designed for classroom implementation with limited support from outside sources. As such, a question of social validity of tiered instruction should be included in future research in order to better understand the feasibility of the approach in relation to variables such as teacher burn out, level of frustration, contentment with results, integration with other classroom activities, etc.
It is clear from previous research that children with adequate CTT skills in early childhood have a better chance for future social and academic success; however, the true value of a meaningful interaction is still unclear. Future studies should be used to examine aspects of quantity versus quality. For example, is it better for a child to take 30 meaningless conversational turns in 15 minutes (i.e. just babbling) or five meaningful and responsive conversational turns in that same amount of time? Future research could examine that question, and then further be used to explore the implications for each child’s future academic success.

Finally, a follow up analysis of the existing LENA data should be conducted to determine a more sensitive estimate of the effects of tiered instruction on CTT for preschoolers with and without disabilities. The assessment of intervention effects currently provides results that may be underestimated. Given the data exist on video and audio recordings, a future transcript analysis of the audio and video files may allow for the extrapolation of corroborating data to support and/or extend the current results. Specifically, conversational turns can be counted across baseline and intervention phases, discounting the additional recording time. The results would provide a secondary measure of CTT that could confirm or disprove the current estimation of the effects of tiered instruction.

**Conclusion**

The purpose of the study was to examine the effects and feasibility of using tiered instruction to increase the frequency of conversational turn taking (CTT) among preschoolers with and without disabilities in an inclusive setting. Three CTT
interventions were organized on a hierarchy of intensity and implemented in an additive manner. Using an increasing intensity across participants with a reversal design, child progress was monitored over time and children were moved through tiers based on level of need. A functional relationship between tiered instruction and CTT was found for nine of 13 child participants with the strongest intervention effects observed at tier one. All but one child participant showed an increase in conversational turn taking from baseline to reinstatement. Teacher fidelity of implementation was monitored at each tier. Her overall average was 90% with the highest percent occurring in tier one. Resulting contributions to the literature include a better understanding of the feasibility of tiered instruction for the inclusive early childhood classroom, the effectiveness of tiered instruction for increasing CTT, and considerations for implementation across tiers and phase change decisions.
APPENDICES
APPENDIX A

LITERATURE REVIEW TABLE
Appendix A

Literature Review Table

- Research Databases: Academic Search Complete, Education Research Complete, ERIC, MasterFILE Premier, Primary Search, Psychology and Behavioral Sciences Collection, Academic Search Premier, Professional Development Collection

- Search Terms: Tiered instruction, tiered intervention, tiers of intervention, response to intervention, responsiveness to intervention, intervention intensity, early childhood, preschool

- Inclusion: empirical examinations of interventions defined as being one or more parts of a tiered model, participants in early childhood, classroom settings

- Exclusion: school age or older participants (i.e. beyond 3rd grade)

*TI = Tiered Instruction; RTI = Response to Intervention; *= Feasibility is about whether the intervention being examined is reasonably applicable to the classroom environment where teachers do not have research support for daily implementation*
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<th>Reference</th>
<th>Participants &amp; Setting</th>
<th>Independent Variable</th>
<th>Dependent Variable</th>
<th>Design</th>
<th>Results</th>
<th>Limitations</th>
<th>Future Directions</th>
<th>Tiered Instruction</th>
<th>Definition of TI/RTI</th>
<th>Fidelity &amp; Feasibility</th>
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<tr>
<td>Benedict, E.A., Horner, R.H., &amp; Squires, J.K. (2007). Assessment and implementation of positive behavior support in preschools. Topics in Early Childhood Special Education, 27, 174-192.</td>
<td>Four low-performing classrooms (less than 60% implementation of PBS during pre-assessment) 2 full day head start classrooms 1 half day head start classroom 1 community preschool classroom Children ranged from 3-6 years old</td>
<td>Consultation around a three-tier prevention model called positive behavior support (PBS)</td>
<td>Teachers' use of PBS practices (i.e. classroom materials, transitions, and classroom routines) and Children’s problem behavior</td>
<td>Multiple baseline design across classrooms</td>
<td>A functional relationship was established between PBS consultation and teachers’ implementation of universal PBS practices</td>
<td>Low levels of problem behavior prevented assessment of the impact of PBS practices… lack of functional relationship between PBS consultation and changes in children’s challenging behavior</td>
<td>Longer time frame, larger sample</td>
<td>This study focused on tier 1 – universal practices – of a three tiered model.</td>
<td>Primary level = prevention, focus on environment</td>
<td>Tier 1 intervention implemented by teachers Implementatio n recorded on the preschool wide PBS fidelity checklist</td>
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<td>Bryant, D.P., Bryant, B.R., Gersten, R., &amp; Scammacca, N., &amp; Chavez, M.M. (2008). Mathematics intervention for first and second grade students with 126 First and 140 second grade students identified as having mathematics difficulties</td>
<td>15 minute intervention booster lessons, 3-4 days per week for 18 weeks in early mathematics skills and concepts</td>
<td>Number, operation, and quantitative reasoning skills and concepts</td>
<td>Quasi experimental Regressi on discontinuity design</td>
<td>Significant intervention effect for second-grade tier 2 students Not significant for first grade tier 2 students</td>
<td>Were all the students from the same school? What did each child receive as tier one instruction? If they were different, the effects of the tier 2 intervention would probably look different</td>
<td>Larger sample size Additional intervention time Including instruction in word problem solving</td>
<td>The authors essentially define tier 2 as increased practice time for students There was no examination of tier 1 or tier 3, although the authors note there was clearly a group of students whose performance remained low in comparison to Tier 1 – evidence based core instruction for all students Tier 2 – supplemental intervention and ongoing progress monitoring for identified struggling students Tier 3 – intensive</td>
<td>Project staff administered tests Tier 2 intervention implemented by trained tutors (graduate students and experienced teachers) Fidelity of implementatio n was assessed using quality performance</td>
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<td>mathematic difficulties: The effects of tier 2 intervention delivered as booster sessions. Remedial and Special Education, 29, 20-32. DOI 10.1177/07431932507309712</td>
<td>Students participated in a tier 2 intervention (small group reading intervention)</td>
<td>Child progress as defined by repeated CBM-R data</td>
<td>Whether or not a school uses an aimline or DD approach could result in different decisions for 40% of the students (i.e. lack of internal consistency of decision making frameworks)</td>
<td>No treatment integrity data were collected</td>
<td>Future examinations of different decision making models</td>
<td>No interobserver agreement data were collected for the CBM-R assessments</td>
<td>Students participated in a tier 2 intervention (small group reading intervention)</td>
<td>No treatment integrity data were collected</td>
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<td>Burns, M.K., Scholin, S.E., Kosciolke, S., &amp; Livingston, J. (2010). Reliability of decision-making frameworks for response to intervention for reading. Journal of Psychoeducational Assessment; 28, 102-114.</td>
<td>30 second grade students</td>
<td>Small group reading instruction</td>
<td>Child progress as defined by repeated CBM-R data</td>
<td>Whether or not a school uses an aimline or DD approach could result in different decisions for 40% of the students (i.e. lack of internal consistency of decision making frameworks)</td>
<td>No treatment integrity data were collected</td>
<td>Future examinations of different decision making models</td>
<td>Students participated in a tier 2 intervention (small group reading intervention)</td>
<td>No interobserver agreement data were collected for the CBM-R assessments</td>
<td>RTI and assessment are somewhat synonymous terms</td>
<td>Tier 2 intervention implemented by licensed reading teachers (not classroom teachers)</td>
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<tr>
<td>Denton, C.A., Kethley, C., Nimon, K., Kurz, T.B., Mathes, P.G., Shih, M., et al. (2010). Effectiveness of a supplemental early reading intervention scaled up in multiple schools. <em>Exceptional Children</em>, 76, 394-416.</td>
<td>First grade students in 31 schools (RRI; n=182; TSP; n=240) across 2 years</td>
<td>Responsive Reading Instruction (RRI) versus Typical School Practice (TSP)</td>
<td>Reading skills as defined by multiple measures</td>
<td>Experim ental Comparison study</td>
<td>RRI group had significantly higher outcomes than the TSP group on multiple measures of reading</td>
<td>Some researcher intrusion – not a clear picture of typical classroom practices</td>
<td>Conduct more scaling up studies with various interventions that have demonstrated efficacy in controlled research environments</td>
<td>Tier 1 – high quality classroom instruction delivered to all students</td>
<td>Tier 2 intervention was implemented by classroom teachers</td>
<td>Intervention fidelity data were collected for less than 1% of sessions? Implementatio n highly variable across schools</td>
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<tr>
<td>Duhon, G. J., Mesmer, E. M., Atkins, M. E., Greguson.</td>
<td>35 students (7 - 8 years old) Elementary school in Midwest rural</td>
<td>Increased intensity of mathematics practice (skill probes)</td>
<td>Mathematics performance</td>
<td>Non-experimental design used to identify</td>
<td>All students were responsive to the intervention</td>
<td>Used a benchmark criterion as a means for specifying adequate</td>
<td>Conduct the study using a larger population</td>
<td>More research</td>
<td>Students remained in the intervention condition until established performance</td>
<td>Intervention components are added to increase intervention intensity,</td>
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<td>L.A., &amp; Olinger, E.S. (2009).</td>
<td>community</td>
<td>1, 5, or 10 sessions per day</td>
<td>derived from a 2 min probe administration of addition facts sums to 9</td>
<td>non-responders for participation in the intensity analysis phase</td>
<td>Student response during the intensity analysis phase evaluate d within a multiple baseline design across subjects</td>
<td>ion, however, some were sensitive only to more frequent application of the treatment at more intense levels</td>
<td>All but three children responded to the initial intervention</td>
<td>Two children responded to five sessions daily</td>
<td>One child responded to 10 sessions daily</td>
<td>that systematically quantifies intervention intensity and response</td>
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<td>Fuchs, D., Compton, D.L.,</td>
<td>42 first grade classrooms in 16 schools...</td>
<td>Secondary intervention consisted of word identification, word Field based, longitudinal</td>
<td>WIF was greater in the</td>
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<td>Results indicate a strong need</td>
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<td>Fuchs, L.S., Bryant, J., &amp; Davis, N.G. (2008).</td>
<td>Total of 252 low-performing children</td>
<td>small group tutoring (sight word recognition, letter sound recognition, decoding, echo reading, choral reading, and speed game)</td>
<td>attack, sight word reading efficiency, phonemic decoding efficiency</td>
<td>tutorial group</td>
<td>tutored group compared to control</td>
<td>Gains during first grade maintained throughout second grade</td>
<td>making models for secondary intervention (i.e. who should be chosen, what are its effects, how should non-responsiveness be defined)</td>
<td>making models for secondary intervention (tier 2) involves intensive pullout, small group instruction, tertiary intervention (tier 3) typically denotes most intensive special education</td>
<td>to classroom instruction; secondary intervention; 45 minutes 4 days a week outside the classroom</td>
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<td>Results may be seen as support of the use of a standard treatment protocol during secondary intervention</td>
<td>Results may be seen as support of the use of a standard treatment protocol during secondary intervention</td>
<td>for an empirically-based consensus about what RTI methods are most useful</td>
<td>No examination of general or tier 3 instruction</td>
<td>by research assistants</td>
<td>Intervention 45 minutes 4 days a week outside the classroom</td>
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<td>Sessions were audio-taped and fidelity was evaluated using a 79 item checklist</td>
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<td>Across tutors and sessions fidelity was high</td>
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<td>Gettinger, M., &amp; Stoiber, K. (2008). Applying a response to intervention model for early literacy</td>
<td>15 classrooms housed in 5 center-based, early childhood programs Each classroom enrolls 18-20</td>
<td>Exemplary Model of Early Reading Growth and Excellence (EMERGE)</td>
<td>Various early literacy skills</td>
<td>Pre-post test with a control group</td>
<td>On each measure, EMERGE children outperformed children in the control The study looks at the overall effects of the model, however, it does not examine each component so there is no way to tell More frequent assessment of the control group in order to make comparisons for children who receive tier 2 and tier 3 intervention</td>
<td>More frequent assessment of the control group in order to make comparisons for children who receive tier 2 and tier 3 intervention</td>
<td>Used a tiered model of instruction Tier 1 included evidence-based curriculum, tier 2 included daily small group instruction, and tier 3 included</td>
<td>Inherent to an RTI approach is the practice of providing high-quality instruction and supplemental individualize</td>
<td>Tier 1 &amp; 2 intervention is provided directly by teachers in classrooms</td>
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<td>Tier 3 intervention is provided by</td>
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| Kamps, D.M., & Greenwood, C.R. (2005). Formulating secondary level reading interventions. *Journal of Learning Disabilities*, 38, 500-521. | First grade students in urban schools in the Midwest (4 experimental and 4 comparison) | Secondary and tertiary (tier 3) reading and behavior interventions Small group explicit instruction Reading Mastery, Proactive Reading | Nonsense word fluency, oral reading fluency | Randomized trial | Significantly larger growth for experimental second-year-level at-risk students than for comparisons | Control group used conventional whole group instruction, little or no individualization, and curricula with weak scientific evidence | Examination of the professional development and technical assistance needed from the research team, decision making rules (i.e. when to change tiers) | This study looks at school wide implementation of instruction and curricula. Students must meet benchmark DIBELS levels for two assessment periods (8-9 months). | Primary intervention – effective instructional programs are implemented by general educators; secondary intervention – strategic small group instruction in deficit areas; | Tier 2 intervention implemented by classroom teachers. Implementatio required intensive training, ongoing efforts, and follow-along efforts by the...
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<tr>
<td>Koutsofas, A.D., Harmon, M.T., &amp; Gray, S. (2009). The effect of tier 2 intervention for phonemic awareness in a response-to-intervention model in low-income preschool classrooms. <em>Language,</em></td>
<td>Programmed Reading, and Read Well – varied by choice across experimental-group schools</td>
<td>Experimental group first graders not showing growth were those identified with disabilities or behavioral risks and English language learners</td>
<td>Multiple baseline across participants</td>
<td>Experimemntal group first graders not showing growth</td>
<td>n required intensive training, ongoing efforts, and follow-along efforts by the research team</td>
<td>weeks apart) before exiting the secondary intervention</td>
<td>No description of the “tertiary” intervention</td>
<td>Tier 2 supplemented tier 1; children received both Tier 1 instruction consists of high-quality evidence-based classroom instruction. Tier 2 intervention consists of high-quality, short-term explicit instruction that is carried out in small groups</td>
<td>Tier 3 is not required.</td>
<td>Research team found variation in the ability to implement interventions in a timely fashion for all students</td>
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<td>Speech, and Hearing Services in Schools, 40, 116-130.</td>
<td>Elementary school students who entered kindergarten in 1998 and completed fifth grade in a school district with school-wide reading and behavior support systems</td>
<td>School wide reading and behavior support programs (as measured by the Planning and Evaluation tool for effective school wide reading programs revised 2002 and the school wide evaluation tool 2004)</td>
<td>Reading skills and problem behaviors</td>
<td>Longitudinal analysis of a grade cohort from kindergarten through fifth grade</td>
<td>Both reading and behavior variable significantly predicted the number of discipline referrals received in fifth grade Early differences become more pronounced as students progress</td>
<td>Limited sample size Unusual setting (a school successfully implementing tiered reading and behavioral support systems for the last 10 years)</td>
<td>Comparing the trajectories of students in schools with and without the school wide behavior and reading support systems</td>
<td>This study was designed to explore interactions between reading skills and problem behavior (not tiered instruction)</td>
<td>Universal interventions promote success for most students Three-tiered systems are based on a set of principles (a) providing all students with universal interventions (b) screening students to determined needed services (c) delivering a continuum of services matched to the level of support</td>
<td>Fidelity measured using the Planning and Evaluation Tool for Effective School-Wide Reading Programs – Revised, and the School-Wide Evaluation Tool</td>
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Elementary school students who entered kindergarten in 1998 and completed fifth grade in a school district with school-wide reading and behavior support systems.

Reading skills and problem behaviors.

Longitudinal analysis of a grade cohort from kindergarten through fifth grade.

Both reading and behavior variable significantly predicted the number of discipline referrals received in fifth grade.

Early differences become more pronounced as students progress.

Limited sample size

Unusual setting (a school successfully implementing tiered reading and behavioral support systems for the last 10 years).

Comparing the trajectories of students in schools with and without the school wide behavior and reading support systems.

This study was designed to explore interactions between reading skills and problem behavior (not tiered instruction).

Limited description of the instructional programming (the tiered programs).

Universal interventions promote success for most students.

Three-tiered systems are based on a set of principles (a) providing all students with universal interventions (b) screening students to determined needed services (c) delivering a continuum of services matched to the level of support.

School personnel implemented the tiered interventions.

Fidelity measured using the Planning and Evaluation Tool for Effective School-Wide Reading Programs – Revised, and the School-Wide Evaluation Tool.

Range 88-96%
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<tr>
<td>McMaster, K.L., Fuchs, D., Fuchs, L.S., &amp; Compton, D. (2005). Responding to nonresponders: An experimental field trial of identification and intervention methods. <em>Exceptional Children</em>, 71, 445-463.</td>
<td>66 first graders identified as non-responders</td>
<td>First grade PALS reading program</td>
<td>Reading skills</td>
<td>Experimental field trial</td>
<td>CBM measures were reliable valid indicators of student’s reading skills</td>
<td>Discrepancy criterion is arbitrary</td>
<td>Investigation of the aspects of individual tutoring that may make it more effective than other treatments</td>
<td>Tier 2 interventions implemented by peers (PALS) or research assistants (tutoring)</td>
<td>Tier 2 interventions indicated by screening and assessment</td>
<td><em>Feasibility</em></td>
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<td>Three groups included PALS, Modified PALS, and tutoring</td>
<td>Scores on PALS chapter tests and CBM measures (rapid letter sound, segmentation, blending, word ID, spelling)</td>
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<td>Established grade level benchmarks are needed</td>
<td>Interventions that can be implemented by classroom teachers are more accessible the thus an important future direction for research</td>
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<td>Dual discrepancy holds promise as a better method of identification than performance-level and growth-rate only</td>
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<td>Non-responders were identified using word-level CBM measures rather than other indicators of reading skill</td>
<td>Not clear whether teachers were able to ensure that interventions were conducted</td>
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Tier 2 interventions implemented by peers (PALS) or research assistants (tutoring) | Tier 2 interventions indicated by screening and assessment | *Feasibility* |
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<tr>
<td>O'Connor, R., Harty, K.R., &amp; Fulmer, D. (2005). Tiers of intervention in kindergarten through third grade. <em>Journal of Learning Disabilities</em>, 38, (6), 532-538.</td>
<td>2 schools, 20 teachers, grades K-3, 100 students at each grade level</td>
<td>Tiered intervention: (1) professional development (2) small group instruction, 3 days per week, (3) daily small-group or individual instruction</td>
<td>Students reading development and placement in special education</td>
<td>Longitudinal examination with repeated measures across time and a historical control group</td>
<td>Direct early intervention (tiers 2 &amp; 3) showed moderate to large effect sizes over the control group at the end of grade 3</td>
<td>Special education placements dropped from 15% to 8%</td>
<td>No evidence of intervention fidelity measures; no social validity; too small of a sample size to make speculations about the strong outcomes for students who received tier 1 &amp; 2 but were not identified</td>
<td>Future examination of the trend found during summer months (students eventually identified dropped over the summer months while others grew) with a larger sample</td>
<td>Tier 1 – ongoing professional development for teachers; tier 2 – instruction in small groups, based on ongoing measurement of student progress delivered in addition to class instruction and delivered by research personnel; tier 3 – individual or group of 2 instruction 5 days per week conducted by the research team</td>
<td>Tier 1, 2, &amp; 3 interventions implemented by researchers Tier 3 = 30 min 5 days per week No fidelity data reported</td>
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<td>Pearce, L.R. (2009)</td>
<td>9 children (ranging from grades K-5) with significant emotional and behavioral difficulties across 2 rural elementary schools</td>
<td>3 tiers of interventions&lt;br&gt;Tier 1: classroom and building level approaches (e.g. assertive discipline, name on the board, rewards, character counts, individual disciplinary processes)&lt;br&gt;Tier 2: interventions determined through functional behavioral assessments (e.g. applied behavioral analysis, cognitive behavioral interventions, social skills training, counseling, differentiated instructional practices, and parent involvement) were applied in an additive manner and then faded</td>
<td>Maladaptive episodes (i.e. endangering themselves or others, disruptive behaviors that could not be redirected, behaviors that disrupted or interfered with the learning of other students)</td>
<td>Single subject</td>
<td>7 of 9 students’ behavior improved substantially as a result of interventions&lt;br&gt;2 students were referred to special education</td>
<td>Variable implementation of tier 1 interventions&lt;br&gt;Additional interventions were added, if the student’s behavior was improving&lt;br&gt;Teacher implementation of ABA was weak&lt;br&gt;No baseline before tier 1</td>
<td>A more tightly controlled examination of the tier 2 interventions&lt;br&gt;Inclusion of a baseline to examine tier 1&lt;br&gt;More tightly defined tier 3&lt;br&gt;Larger sample&lt;br&gt;Examination of each intervention separately (rather than packaged interventions)</td>
<td>Given there was no baseline, examination of tier 1 cannot be done.&lt;br&gt;This study really looks at an individualized tier 2 intervention that changed over time.&lt;br&gt;Tier 3 was considered special education and there was a lack of description around what that really entails.&lt;br&gt;Multi-tiered model including school wide intervention (classroom and building level approaches) in tier 1, and six separate interventions in tiers 2 &amp; 3 (tier 3 was a continuation of tier 2 intervention with supports from outside resources)</td>
<td>Tier 1 &amp; 2 intervention implemented by classroom teachers and/or intervention teams&lt;br&gt;Each child’s intervention was individualized based on the result of a functional behavior assessment&lt;br&gt;Teachers reported challenges with following through with reward systems and antecedent condition strategies&lt;br&gt;No other fidelity data reported</td>
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<td>Schuele, C.M., Justice, L.M., Cabell, S.Q., Knighton, K., Kingery, B., &amp; Lee, M.W. (2008). Field-based evaluation of two-tiered instruction for enhancing kindergartener phonological awareness. <em>Early Education and Development, 19</em>, 726-752. DOI 10.1080/1090598070180154.</td>
<td>57 kindergartners from 3 classrooms (experimental) and 56 kindergartners from 3 classrooms (control) 6 children from each supplemental classroom received tier 2 instruction</td>
<td>Supplemental phonological awareness program (tier 1) plus an additional 12-week small group intervention (tier 2)</td>
<td>Phonological awareness skills</td>
<td>Experimental pre-post</td>
<td>The tier 1 curriculum did not produce statistically significant differences between groups The supplemental low achiever s (who received tier 2) outperformed the comparison on low achiever s</td>
<td>Unsure whether children received tier 2 as a supplement or as a replacement for the tier 1 instruction Neglected to use relevant measures that would have provided a better picture of child differences between groups</td>
<td>Future research might examine how child engagement in the instructional sessions influences child outcomes</td>
<td>Tier 1 was “supplemental” and the regular classroom curriculum was used as a comparison (however it did include PA instruction) This study looked at the effects of both a tier one intervention and a tier 2 intervention and found the tier 1 intervention did not make a difference, but the tier 2 intervention did make a difference</td>
<td>Tier 1 – classroom based instruction; tier 2 – intensive small group instruction that provides more explicit, comprehensive, intensive, and supportive instruction than the regular classroom</td>
<td>Tier 1 instruction implemented by classroom teachers, 20 min per day Fidelity was self reported by teachers Tier 2 intervention implemented by school SLPs Tier 2 pull-out sessions lasted 30 min, 3 times per week Fidelity was self reported by SLPs Assessments administered by authors</td>
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<td>Stormont, M.A., Smith, S.C., &amp; Lewis, T.J. (2007).</td>
<td>3 head start teachers with 7, 9, and 9 children in their preschool classrooms</td>
<td>Positive teacher behaviors and students’ problem behavior</td>
<td>Intervention to increase teacher use of pre-corrections and specific behavioral praise statements</td>
<td>Multiple baseline design</td>
<td>A relationship was established between the three teachers’ use of key features of program-wide PBS and the reduction of students’ problem behavior in a small group setting</td>
<td>Generalizability</td>
<td>Explore the relative influence of each of the interventions components on preschool students’ behavior</td>
<td>Examination of tier 1: universal features of program-wide PBS</td>
<td>No discussion of tiers 2 and 3</td>
<td>Tier 1 intervention implemented by classroom teachers; The frequency of teacher behaviors was recorded using a paper and pencil event recording instrument</td>
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<tr>
<td>VanDerHeyden, A.M., Snyder, P.A., Broussard, C., &amp; Ramsdell, K. (2008).</td>
<td>35 preschool-age children at risk for learning difficulties</td>
<td>Early literacy targets</td>
<td>Single subject? Pre-post? Combination?</td>
<td>Curriculum units based, measure of the intervention in this study No meaningful</td>
<td>Examine the effect on risk identification given a supplemental intervention (tier 2?). It is unclear how they know the</td>
<td>This study really looks at the effects of a supplemental intervention (tier 2?)</td>
<td>Tier 1—core instruction in the classroom Tier 2—a brief classwide</td>
<td>Measurement procedures implemented by trained examiners; tier 2 interventions implemented</td>
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<td>Measuring response to early literacy intervention with preschoolers at risk. Topics in Early Childhood Special Education, 27, 232-249. DOI 10.1177/02711121407311240</td>
<td>preschool</td>
<td>formats (4 days a week for 5 weeks for a total of 20 class-wide sessions and 20 individual sessions per child)</td>
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<td>accuracy about children at risk for learning difficulties</td>
<td>link to ongoing instruction</td>
<td>tier 1 and the value of more intensive supplemental intervention provided at tier 2 and individualized intervention provided at tier 3</td>
<td>effects of classwide versus individual intervention if they implemented them both at the same time</td>
<td>early literacy intervention delivered in classwide and individual formats</td>
<td>by interventionists. Intervention sessions were observed to ensure integrity of administration procedures. “Intervention may not be appropriate or effective in preschool classrooms” (no link to classroom instruction)</td>
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<td>Vellutino, F.R., Scanlon, D.M., Zhang, H., &amp; Schatschneider, C. (2008). Using response to kindergarten and first grade intervention to identify children at risk for long-term reading difficulties. <em>Reading and Writing, 21</em>, 437-480. DOI 10.1007/s11455-007-9098-2</td>
<td>Entry level kindergartners classified as &quot;at risk&quot; for early reading difficulties</td>
<td>Project-based intervention condition with Supplementary intervention in small groups in kindergarten and first grade</td>
<td>Literacy development</td>
<td>Control group</td>
<td>The RTI measure is more effectively and more consistently distinguished between the two groups (continuing risk and no-longer-at-risk) at first grade entry than did the psychometric kindergarten measure.</td>
<td>It is possible that the classroom instruction was not designed to meet the needs of some children – and there was no classroom observation to confirm or deny this.</td>
<td>This study focused more on the effectiveness of the measures (for predicting reading difficulties) than on the tiered model itself.</td>
<td>Tier 1 – involves assessment and possible modification of the program in a targeted classroom; tier 2 – secondaries (small group) intervention of children whose difficulties are not resolved by appropriate adjustments to the classroom instructional program; tier 3 – more intensive intervention (fewer children in a group, daily one-to-one tutoring, etc.) for children who continue to perform below their peers</td>
<td>Tier 2 &amp; 3 intervention implemented by teachers – trained and supervised by project staff (not classroom teachers?) Fidelity of treatment insured through monitoring of tape recordings of treatment sessions Intervention took place in a room outside the classroom</td>
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APPENDIX B

ADULT DEMOGRAPHIC QUESTIONNAIRE
Appendix B
Adult Demographic Questionnaire

Directions: Please answer each question to the best of your ability and return this form to the lead investigator. All information provided will be kept strictly confidential. Thank you.

Name_______________________________________________________________

Address_________________________________________________________________

City_____________________________ State__________ Zip Code______________

Job Title____________________________________________________________

Gender (circle one)  □ Male          □ Female

Age Range (circle one)  20-29 □ 30-39  □ 40-49  □ 50-59  □ 60 +

Education/Degrees Held (Check highest)  □ High School Diploma
□ Associate’s Degree
□ Bachelor’s Degree
□ Master’s Degree
□ Doctorate Degree

Ethnicity (Check one)  □ Caucasian  □ Native American
□ African       □ Hawaiian
□ Asian         □ Pacific Islander
□ Hispanic/Latino □ Other

Family Income (Check one)  □ 20 to 40,000 per year
□ 40 to 60,000 per year
□ 60 to 80,000 per year
□ 80 to 100,000 per year
□ 100,000 + per year
List Certifications/Licenses held:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Years of experience working with young children  __________

Briefly describe your experience working with young children:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Briefly describe your experience (if any) using tiered instruction in the classroom:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Please Return to: Sandra Hess Robbins
4146 Wyncote Rd, South Euclid, OH 44121
APPENDIX C

CHILD DEMOGRAPHIC QUESTIONNAIRE
Appendix C

Child Demographic Questionnaire

Directions: Please answer each question to the best of your ability and return this form to your child’s teacher. All information provided will be kept strictly confidential. Thank you.

Child’s Name____________________________________________________________

Address___________________________________________________________________

City_________________________________ State_________ Zip Code______________

Child’s School____________________________________________________________

Child’s Date of Birth       Month_________ Day_______ Year________

Child’s Gender (check one)       □ Male       □ Female

Child’s Ethnicity
(Check one)

□ Caucasian          □ Native American
□ African            □ Hawaiian
□ Asian              □ Pacific Islander
□ Hispanic/Latino    □ Other

Does your child receive special education or related services?       □ Yes       □ No

If yes, please list the types of services he/she receives:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

169
Briefly describe your child’s favorite interests, toys, and play activities:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Family Information

Primary Caregiver (check one)
☐ Mother  ☐ Father
☐ Grandparents
☐ Guardian  ☐ Other

Education of Primary Caregiver
(Check highest)
☐ High School Diploma
☐ Associate’s Degree
☐ Bachelor’s Degree
☐ Master’s Degree
☐ Doctorate Degree

Family Income
(Check one)
☐ 20 to 40,000 per year
☐ 40 to 60,000 per year
☐ 60 to 80,000 per year
☐ 80 to 100,000 per year
☐ 100,000 + per year

Please list siblings’ (if any) names and ages

Name___________________________________ Age_____________
Name___________________________________ Age_____________
Name___________________________________ Age_____________
Name___________________________________ Age_____________

Please return to: Sandra Hess Robbins
4146 Wyncote Rd, South Euclid, OH 44121
APPENDIX D

AEPS SOCIAL COMMUNICATION PROTOCOL
Appendix D

AEPS Social Communication Protocol

![Image of the AEPS Social Communication Protocol page]

### Social-Communication Area

<table>
<thead>
<tr>
<th>S</th>
<th>N</th>
<th>Notes</th>
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<tbody>
<tr>
<td>2</td>
<td>=</td>
<td>Consistently meets criterion</td>
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<tr>
<td>1</td>
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<td>Inconsistently meets criterion</td>
</tr>
<tr>
<td>0</td>
<td>=</td>
<td>Does not meet criterion</td>
</tr>
</tbody>
</table>

### Scoring Key
- A = Assistance provided
- B = Behavior Interfered
- D = Direct test
- M = Modification/adaptation
- Q = Quality of performance
- R = Report

<table>
<thead>
<tr>
<th>Name:</th>
<th>Test period:</th>
<th>Test date:</th>
<th>Examiner:</th>
</tr>
</thead>
</table>

#### A. Social-Communicative Interactions

1. Uses words, phrases, or sentences to inform, direct, ask questions, and express anticipation, imagination, affect, and emotions (p. 177)
   - 1.1 Uses words, phrases, or sentences to express anticipated outcomes
   - 1.2 Uses words, phrases, or sentences to describe pretend objects, events, or people
   - 1.3 Uses words, phrases, or sentences to label own or others' affect/emotions
   - 1.4 Uses words, phrases, or sentences to describe past events
   - 1.5 Uses words, phrases, or sentences to make commands to and requests of others
   - 1.6 Uses words, phrases, or sentences to obtain information
   - 1.7 Uses words, phrases, or sentences to inform

2. Uses conversational rules (p. 179)
   - 2.1 Alternates between speaker/listener role
   - 2.2 Responds to topic changes initiated by others
   - 2.3 Asks questions for clarification
   - 2.4 Responds to contingent questions
   - 2.5 Initiates context-relevant topics
   - 2.6 Responds to others' topic initiations

3. Establishes and varies social-communicative roles (p. 181)

---

Child Observation Data Recording Form II: Social-Communication Area

Name: ____________________________ Test period: ____________________________

Examined: ________________________ Test date: ____________________________

| [FSP] [IEP] | S | N | S | N | S | N | S | N |

3.1 Varies voice to impart meaning

3.2 Uses socially appropriate physical orientation

B. Production of Words, Phrases, and Sentences

1. Uses verbs (p. 182)
   1.1 Uses auxiliary verbs
   1.2 Uses copula verb “to be”
   1.3 Uses third person singular verb forms
   1.4 Uses irregular past tense verbs
   1.5 Uses regular past tense verbs
   1.6 Uses present progressive “ing”

2. Uses noun inflections (p. 184)
   2.1 Uses possessive “s”
   2.2 Uses irregular plural nouns
   2.3 Uses regular plural nouns

3. Asks questions (p. 185)
   3.1 Asks yes/no questions
   3.2 Asks questions with inverted auxiliary
   3.3 Asks “wh” questions
   3.4 Asks “why,” “who,” and “how” questions
   3.5 Asks “what” and “where” questions
   3.6 Asks questions using rising inflections

4. Uses pronouns (p. 186)
   4.1 Uses subject pronouns
   4.2 Uses object pronouns

# AEPS Three to Six Years

<table>
<thead>
<tr>
<th>Name:</th>
<th>Test period:</th>
<th>Test date:</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Examiner</th>
<th>IFSP/IEP</th>
<th>S</th>
<th>N</th>
<th>S</th>
<th>N</th>
<th>S</th>
<th>N</th>
<th>S</th>
<th>N</th>
</tr>
</thead>
</table>

1. Uses possessive pronouns
2. Uses indefinite pronouns
3. Uses demonstrative pronouns
4. Uses descriptive words (p. 188)
5. Uses adverbs
6. Uses prepositions
7. Uses conjunctions
8. Uses articles

An Area Raw Score can be computed by adding all the 2 and 1 scores underlined in the 5 column for a specific test period. To compute the Area Percent Score: divide the Area Raw Score by the Area Raw Score Possible, then multiply by 100.

## RESULTS

<table>
<thead>
<tr>
<th>Test date</th>
<th>Area Raw Score</th>
<th>Area Raw Score Possible</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>98</td>
<td>98</td>
</tr>
</tbody>
</table>

Area Percent Score

---

Child Observation Data Recording Form II: Social-Communication Area

SOCIAL-COMMUNICATION AREA

EXAMINER: ______________________ DATE: ______________________

COMMENTS: ______________________________________________________

_______________________________________________________________

_______________________________________________________________

_______________________________________________________________

_______________________________________________________________

EXAMINER: ______________________ DATE: ______________________

COMMENTS: ______________________________________________________

_______________________________________________________________

_______________________________________________________________

_______________________________________________________________

EXAMINER: ______________________ DATE: ______________________

COMMENTS: ______________________________________________________

_______________________________________________________________

_______________________________________________________________

_______________________________________________________________

EXAMINER: ______________________ DATE: ______________________

COMMENTS: ______________________________________________________

_______________________________________________________________

_______________________________________________________________

_______________________________________________________________
APPENDIX E

AEPS SOCIAL COMMUNICATION FAMILY REPORT
Appendix E

AEPS Social Communication Family Report

Family Report II

Social-Communication Area 1

Social-communication skills are those that involve communicating with others. These skills include understanding conversational rules and use of grammar.

1. Does your child use words, phrases, and sentences to express feelings, needs, and questions, and to provide information? (A1) NOTE: Place a “Y”, “S,” or “N” by items a through g:

   a. Does your child talk about the future? For example, your child predicts the ending of a story or says, “I'm going swimming tomorrow.” (A1.1)
   b. Does your child talk about pretend objects, events, or people? For example, your child says, “This is my magic spaceship and I’m going to drive it to the moon.” (A1.2)
   c. Does your child talk about how he or she feels? For example, your child says, “I am happy when I play with my puppy.” (A1.3)
   d. Does your child talk about the past? For example, your child says, “I fell down yesterday,” or “I had soup at school today.” (A1.4)
   e. Does your child tell other people what to do? For example, your child says, “Give me the red block.” (A1.5)
   f. Does your child ask questions to gain information? For example, when you are cooking, your child says, “What are you making?” (A1.6)
   g. Does your child talk about what he or she sees, hears, or does? For example, your child says, “I saw a cat today,” or “I'm going outside to play.” (A1.7)

2. Does your child carry on a conversation appropriately with others? (A2) NOTE: Place a “Y”, “S,” or “N” by items a through f:

   a. Does your child take turns being the speaker and the listener when talking to others? (A2.1)
   b. Does your child change the subject when you do? For example, your child says, “I want to play outside some more,” and you say, “We need to go inside now and fix a snack.” Your child responds by changing the subject and saying, “What are we going to eat?” (A2.2)
   c. Does your child ask questions during conversations if he or she needs more information? (A2.3)

Some caregivers may require the assistance of a communication specialist to complete the Social-Communication Area.


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d. Does your child answer questions about things he or she sees, hears, says, or does? For example, your child says, "I want that," and you ask, "What do you want?" Your child says, "I want the red truck." (A2.4)

e. Does your child talk about things that are relevant to the situation or to the person he or she is talking to? For example, your child sees you cutting carrots and asks for one. (A2.5)

f. Does your child respond to things you talk about? For example, you say, "You look nice," and your child says, "I have on my new sweater." (A2.6)

3. Does your child vary the way he or she talks to match his or her needs? (A3) NOTE: Place a "Y," "S," or "N" by items a and b:

   a. Does your child change his or her voice through a variety of techniques to provide greater meaning? For example, your child may speak words slowly, with small pauses between words to convey seriousness, or speak through clenched teeth to tell you the need for the bathroom is great. (A3.1)

   b. Does your child change position to face the person to whom he or she is speaking? (A3.2)

4. Does your child use a variety of verbs (action words)? (B1) NOTE: Place a "Y," "S," or "N" by items a through f:

   a. Does your child use verbs, such as is, will, have? For example, "She is running," "He will go with us," "The girls have the toys." (B1.1)

   b. Does your child use am, is, are, and was? (B1.2)

   c. Does your child use he and she when talking about another person? For example, your child says, "She plays, he doesn't." (B1.3)

   d. Does your child use past tense verbs such as came, ran, fell, did, told, went, and sat? (B1.4)

   e. Does your child use past tense verbs such as walked, washed, played, and helped? (B1.5)

   f. Does your child use "ing" verbs such as washing, going, and eating? (B1.6)

5. Does your child use words to express possession and more than one of something? (B2) NOTE: Place a "Y," "S," or "N" by items a through c:

   a. Does your child use possessive "s" (a word followed by an apostrophe and "s" to show something belongs to someone)? For example, your child says, "Mom's hat," or "Ann's shoes." (B2.1)
Family Report II

b. Does your child use irregular plural nouns such as men, mice, and children? (B2.2)

c. Does your child use regular plural nouns such as dogs, houses, boats, and blocks? (B2.3)

6. Does your child use different types of words to ask questions? (B3) NOTE: Place a "Y," "S," or "N" by items a through f:

   a. Does your child ask questions with "yes" or "no" as the answer? (B3.1)

   b. Does your child ask questions such as, "Can I go?" or "Is he hiding?" (not "I go?" or "He hiding?") (B3.2)

   c. Does your child ask questions that begin with the word "when"? (B3.3)

   d. Does your child ask questions that begin with the words "why," "who," and "how"? (B3.4)

   e. Does your child ask questions that begin with the words "what" and "where"? (B3.5)

   f. Does your child ask questions by a rise in pitch at the end of a sentence? For example, your child asks, "I go?" (B3.6)

7. Does your child use a variety of pronouns? (B4)

   NOTE: Place a "Y," "S," or "N" by items a through e:

   a. Does your child use I, she, he, they, and we? For example, your child says, "He went home" or "I did it." (B4.1)

   b. Does your child use you, me, him, her, us, them, and it as the object in phrases and sentences? For example, your child says, "John hurt me." (B4.2)

   c. Does your child use my, your, her, its, our, their, mine, yours, hers, ours, and theirs to show possession? For example, your child says, "Those are her shoes." (B4.3)

   d. Does your child use pronouns such as some, any, none, every, anything, something, nothing, all, lots, many, and more? For example, your child says, "He doesn't have any" or "I have some." (B4.4)

   e. Does your child use pronouns such as this, that, these, and those to point out objects? For example, your child says, "I want those." (B4.5)
8. Does your child use a variety of words to describe? (BS) NOTE: Place a "Y," "S," or "N" by items a through f:

   ___ a. Does your child use words to describe things? For example, your child says, "Throw the big ball," or "I want the red pepper." (BS.1)

   ___ b. Does your child use words to talk about how things are different from one another? For example, your child says, "I have the biggest bowl of ice cream," "My car is best," or "She is the strongest." (BS.2)

   ___ c. Does your child use words to describe actions? For example, your child says, "He runs fast" or "She eats slowly." (BS.3)

   ___ d. Does your child use words to describe position such as in, on, out, up, down, under, by, of, and for? For example, your child says, "My books are on the bookshelf." (BS.4)

   ___ e. Does your child use words that connect other words such as and, but, because, if, and or? For example, your child says, "We could play or take a nap." (BS.5)

   ___ f. Does your child use words such as the, on, and a? For example, your child says, "I want an apple," or "Where’s the ball?" (BS.6)

What social-communication skills do you want your child to learn?

________________________________________

________________________________________

________________________________________

________________________________________

________________________________________
APPENDIX F

CHILD INTEREST SURVEY
Appendix F
Child Interest Survey

Play fascinations
How does the child mostly prefer to pass the time?

☐ Obsessive interests
☐ Rituals
☐ Hobbies
☐ Other

Explain___________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________

Materials
What types of toys or props are most attractive to the child?

☐ Wind-up toys
☐ Shiny objects
☐ Stuffed Animals
☐ Action figures
☐ Realistic props
☐ Other

Explain___________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
Activities

What play activities does the child prefer?

☐ Face to face
☐ Physical
☐ Sensory exploration
☐ Constructive
☐ Realistic props
☐ Pretend
☐ Art
☐ Music
☐ Puzzles and games
☐ Other

Explain____________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Themes

What play themes does the child prefer?

☐ Familiar routines
☐ Fantasy
☐ Other

Explain____________________________________________
________________________________________________________________________
Play with others

With whom does the child prefer to play?

☐ No one in particular
☐ One or more specific adults
☐ One or more specific peers
☐ Other

Explain_______________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
APPENDIX G

PLS-4 PROTOCOL
## Appendix G

### PLS-4 Protocol

#### Raw Score Calculation

<table>
<thead>
<tr>
<th>Task Type</th>
<th>Standard Score</th>
<th>SE Confidence Band (Level)</th>
<th>Percentile Rank (PR)</th>
<th>PIs for SE Confidence Band Values</th>
<th>Age Equivalent</th>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td>Last AC task administered</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Minus number of errors</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>AC Raw Score</td>
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</tr>
<tr>
<td>Expressive Communication</td>
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<td></td>
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</tr>
<tr>
<td>Last EC task administered</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<tr>
<td>EC Raw Score</td>
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<td>Total Language Score</td>
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<td>AC Standard Score</td>
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<td>Plus AC Standard Score</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>AC Raw Score + AC Raw Score</td>
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#### Norm-Referenced Scores

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<th>AC Score</th>
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<td>-</td>
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<td>-</td>
<td>-</td>
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</tr>
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<tr>
<td>50</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>50</td>
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</tbody>
</table>

#### Supplemental Measures

- **Articulation Screening Raw Score**: Indicates performance typical of age group; may indicate need for further evaluation.
- **Language Sample Checklist**: References information obtained on PLS 4; differs greatly from information obtained on PLS 4.
- **Category Questionnaire**: References information obtained on PLS 4; differs greatly from information obtained on PLS 4.
**Start Point:** Start at least 1 year below chronological age. See Examiner's Manual, Chapter 2.

**To score:** Give the child credit for passing a subtask if an E, S, or C response is circled. (E = Elicited Response, S = Spontaneous Response, C = Caregiver Response.) Pass criteria for numbered tasks are shown in parentheses below the task stimulus. Mark "T" in the box if the pass criterion is met, mark "0" if the pass criterion is not met.

**Basal:** Three consecutive 1 scores prior to the first 0 score. **Ceiling:** Select a criterion of 5, 6, or 7 consecutive 0 scores. See Chapter 2 of the Examiner's Manual for more information.

### Auditory Comprehension

<table>
<thead>
<tr>
<th>Task</th>
<th>0:0 to 0:2 (Birth to 2 months)</th>
<th>0:3 to 0:5 (3 to 5 months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Glances momentarily at a person who talks to him or her</td>
<td>□ E S C</td>
<td>□ E S C</td>
</tr>
<tr>
<td>(Pass: Glances at speaker for one second)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Enjoys caregiver's attention</td>
<td>□ E S C</td>
<td>□ E S C</td>
</tr>
<tr>
<td>(Pass: Smiles, coos, relaxed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Reacts to sounds other than voice in the environment</td>
<td>□ E S C</td>
<td>□ E S C</td>
</tr>
<tr>
<td>(Pass: Takes object, opens eyes, etc. in response to sound)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Looks intently at a speaker</td>
<td>□ E S C</td>
<td>□ E S C</td>
</tr>
<tr>
<td>(Pass: Looks intently for two or more seconds)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Expressive Communication

<table>
<thead>
<tr>
<th>Task</th>
<th>0:0 to 0:2 (Birth to 2 months)</th>
<th>0:3 to 0:5 (3 to 5 months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Has a suck/swallow reflex</td>
<td>□ E S C</td>
<td>□ E S C</td>
</tr>
<tr>
<td>Materials: bottle, nipple, pacifier, provided by the caregiver</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Pass: Coordinated suck/swallow sequence, no coughing, choking)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Vocilizes soft, throaty sounds</td>
<td>□ E S C</td>
<td>□ E S C</td>
</tr>
<tr>
<td>(Pass: Makes soft, throaty, gargling sounds)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Responds to speaker by smiling</td>
<td>□ E S C</td>
<td>□ E S C</td>
</tr>
<tr>
<td>(Pass: Smiles in response to speaker talking to him or her)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Vocilizes pitch, length, or volume</td>
<td>□ E S C</td>
<td>□ E S C</td>
</tr>
<tr>
<td>(Pass: Vocilations vary in pitch, length, or volume)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Vocilizes pleasure and displeasure</td>
<td>□ E S C</td>
<td>□ E S C</td>
</tr>
<tr>
<td>(Pass: 2 correct)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Vocilizes when talked to, moving arms and legs during vocalizations</td>
<td>□ E S C</td>
<td>□ E S C</td>
</tr>
<tr>
<td>(Pass: Vocalizations paired with arm waving, leg chewing, or other non-vocalized responses)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**187**
**Auditory Comprehension**

<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
<th>Materials</th>
<th>Correct Response</th>
<th>Erroneous Response</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.</td>
<td>Encourage the child to point out objects in the room.</td>
<td>Ball, blocks, spoon, toy, picture, book</td>
<td>Ball</td>
<td>Other objects</td>
<td>Visual tracking; object placement</td>
</tr>
<tr>
<td>18.</td>
<td>Follows routine familiar person with a toy.</td>
<td>Ball, blocks, spoon, toy, picture, book</td>
<td>Ball</td>
<td>Other objects</td>
<td>Visual tracking; object placement</td>
</tr>
<tr>
<td>19.</td>
<td>Identifies familiar objects from a group of objects.</td>
<td>Ball, blocks, spoon, toy, picture, book</td>
<td>Ball</td>
<td>Other objects</td>
<td>Visual tracking; object placement</td>
</tr>
</tbody>
</table>

**Expressive Communication**

<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
<th>Materials</th>
<th>Correct Response</th>
<th>Erroneous Response</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.</td>
<td>Able to recognize visual accompanying auditory input.</td>
<td>Ball, blocks, spoon, toy, picture, book</td>
<td>Ball</td>
<td>Other objects</td>
<td>Visual tracking; object placement</td>
</tr>
<tr>
<td>15.</td>
<td>Participation in a play routine with another person.</td>
<td>Ball, blocks, spoon, toy, picture, book</td>
<td>Ball</td>
<td>Other objects</td>
<td>Visual tracking; object placement</td>
</tr>
<tr>
<td>16.</td>
<td>Rubs two globes together &amp; sings.</td>
<td>Ball, blocks, spoon, toy, picture, book</td>
<td>Ball</td>
<td>Other objects</td>
<td>Visual tracking; object placement</td>
</tr>
</tbody>
</table>

**Task 19 Notes:**
- Use consistent objects for tracking.
- Encourage the child to engage with objects.
- Provide auditory input to accompany visual stimuli.
21. Identifies photographs of familiar objects
Materials: Picture Manual pages 1, 3
Tell the caregiver: I'm going to ask you to point to some pictures, so your child can see what to do. Point to the ball.
Wait for caregiver to point. Tell the child: Look at all these pictures! You see me do this?
   a. cookie E  e. balloons E
   b. kitty E  f. cup E
   c. shoe E  g. bird E
   d. ball E  h. spoon E
(Pass: 4 correct)

22. Understands inhibitory words
Materials: two cars, one to five blocks
Wait My turn or Stop!
(Pass: Passes in response to Wait, My turn, or Stop)

23. Identifies body parts on self, caregiver, or teddy bear
Materials: teddy bear
How are you? E or Touch yourself E
   a. nose E  e. mouth E
   b. eye(s) E  f. tummy E
   c. foot/feet E  g. ear(s) E
   d. hand(s) E  h. head E
(Pass: 4 correct)

24. Understands verbs in context
Materials: teddy bear, blanket, spoon, cup, bowl
   a. The bear is thirsty. Give him something to drink. E
   b. The bear is hungry. Give him something to eat. E
   c. The bear is tired. Make the bear go to sleep. E
(Pass: 2 correct)

25. Produces different types of consonant-vowel combinations
   a. CV E
   b. CV-C E
   c. CV-V E
   d. other E
(Pass: 3 correct)

26. Produces monosyllable strings with intonation similar to adult speech
Materials: toys and objects
Syllable strings said by the child:
(Pass: One syllable string produced with intonation)
### Auditory Comprehension

<table>
<thead>
<tr>
<th>25. Identifies clothing items on self or caregiver</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Materials:</strong> none (Test only the items worn by the child or caregiver)</td>
</tr>
<tr>
<td><strong>Show me your/the</strong></td>
</tr>
<tr>
<td>a. shoes</td>
</tr>
<tr>
<td>b. shirt</td>
</tr>
<tr>
<td>c. socks</td>
</tr>
<tr>
<td>d. shorts</td>
</tr>
<tr>
<td>E (Pass: 3 correct)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>26. Understands spatial concept (in, on, around)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Materials:</strong> box, toy blocks</td>
</tr>
<tr>
<td>a. Put the block in the box.</td>
</tr>
<tr>
<td>b. Take the block off of the box.</td>
</tr>
<tr>
<td>E (Pass: 3 correct)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>27. Recognizes actions in pictures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Materials:</strong> Picture Mat pages 3, 4</td>
</tr>
<tr>
<td>Look at all the children. Show me the child who is</td>
</tr>
<tr>
<td>a. sleeping</td>
</tr>
<tr>
<td>b. eating</td>
</tr>
<tr>
<td>c. playing</td>
</tr>
<tr>
<td>E (Pass: 4 correct)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>28. Understands several pronouns (me, my, your)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Materials:</strong> body, three cups, three spoons</td>
</tr>
<tr>
<td>We're having a picnic. Everyone gets a cup. You take a cup.</td>
</tr>
<tr>
<td>a. Give me a cup. (Do not score)</td>
</tr>
<tr>
<td>b. You take a spoon. Give a spoon to me. (Do not score)</td>
</tr>
<tr>
<td>c. Show me your spoon.</td>
</tr>
<tr>
<td>d. Where's my spoon? (pretend to eat and drink)</td>
</tr>
<tr>
<td>E (Pass: 3 correct)</td>
</tr>
</tbody>
</table>

### Expressive Communication

<table>
<thead>
<tr>
<th>26. Names objects in photographs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Materials:</strong> Picture Mat pages 5, 6</td>
</tr>
<tr>
<td>Look at this picture. What is it?</td>
</tr>
<tr>
<td>a. ball</td>
</tr>
<tr>
<td>b. ball</td>
</tr>
<tr>
<td>c. bird</td>
</tr>
<tr>
<td>d. cookie</td>
</tr>
<tr>
<td>E (Pass: 5 correct)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>27. Uses words more often than gestures to communicate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Materials:</strong> toys and objects</td>
</tr>
<tr>
<td>(Pass: Typically uses words rather than gestures)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>28. Asks questions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Materials:</strong> two cups, wind-up toy, blanket</td>
</tr>
<tr>
<td>Where's the toy? (Search) Where is it? (Search) Is it here?</td>
</tr>
<tr>
<td>a. raising attention</td>
</tr>
<tr>
<td>b. question construction (who, what, when, where, how, why)</td>
</tr>
<tr>
<td>E (Pass: 1 correct)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>29. Uses words for a variety of pragmatic functions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Materials:</strong> backpack, bug with crickets, a key inside, a wind-up toy, toys and objects</td>
</tr>
<tr>
<td>a. request actions or object</td>
</tr>
<tr>
<td>b. labels actions or objects</td>
</tr>
<tr>
<td>c. indicates that he or she wants something to happen again</td>
</tr>
<tr>
<td>d. request assistance</td>
</tr>
<tr>
<td>e. answers questions with yes or no</td>
</tr>
<tr>
<td>Do you like that? Do you want the?</td>
</tr>
<tr>
<td>e. uses a word to get a person's attention</td>
</tr>
<tr>
<td>E (Pass: 4 correct)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>30. Uses different word combinations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Materials:</strong></td>
</tr>
<tr>
<td>a. noun + verb</td>
</tr>
<tr>
<td>b. verb + noun</td>
</tr>
<tr>
<td>c. noun + verb + location</td>
</tr>
<tr>
<td>d. noun + verb + adjective</td>
</tr>
<tr>
<td>E (Pass: 3 correct)</td>
</tr>
</tbody>
</table>
2:6 to 2:11: (30 to 35 months)

29. Understands use of objects
   Materials: Picture Manual page 5
   Look at all of these pictures:
   a. Show me what you use to drink water. .................................................. E
   b. Show me what you wear on your feet. .................................................... E
   c. Show me what you can ride. ...................................................................... E
   d. Show me what you turn on to watch cartoons. ....................................... E
   e. Show me what you use to cook food. ......................................................... E
   (Pass: 3 correct)

30. Understands part/whole relationships
   Materials: Picture Manual page 6
   Look at this picture. Show me the:
   a. door of the car ......................................................................................... E
   b. nose of the dog ......................................................................................... E
   c. tail of the dog ............................................................................................ E
   d. wheels of the car ...................................................................................... E
   (Pass: 3 correct)

31. Understands simple descriptive concepts (big, wet, little)
   Materials: Picture Manual pages 7, 8, 9
   Look at all the pictures:
   a. Which animal is big? ................................................................................ E
   b. Which dog is wet? ....................................................................................... E
   c. Which one is little? .................................................................................... E
   (Pass: 2 correct)

32. Follows two-step, related commands without cue
   Materials: box with lid, toy honey, cup
   a. Open the box and give me the honey. ...................................................... E
   b. Get the cup and give the honey a drink. ..................................................... E
   (Pass: 2 correct)

33. Answers what and where questions
   Materials: Picture Manual page 7
   a. Look at this boy. What is he holding? (yellow) ......................................... E
   b. This boy is not in a truck. (Point to boy) Where is he? (car, here, in the car) E
   (Pass: 2 correct)

34. Uses "a" + noun
   Materials: Picture Manual page 7
   Demonstrate: Point to girl in the sandbox and say: "This girl is playing.
   a. Tell me about this girl. (eating) ............................................................... E
   b. Now tell me about this girl. (sleeping) ..................................................... E
   (Pass: 2 correct)

35. Uses a variety of nouns, verbs, and pronouns in spontaneous sentences
   Materials: toys and objects
   a. uses 10 different nouns ............................................................................ E
   b. uses 10 different verbs ............................................................................. E
   c. uses 2 different modifiers ........................................................................ E
   (Pass: 1 correct)
### Auditory Comprehension

#### 3:0 to 3:5 (36 to 41 months)

- **33.** Understands quantity concepts (one, some, rest, all)
  - **Materials:** Five block box
  - **Practice:** Give me just one.
  - **E**  
  - **Put some blocks here.**
  - **E**  
  - **I'll put these blocks over here.**
  - **E**  
  - **Now put all the blocks in the box.**
  - **Pass: 2 correct**

- **34.** Understands pronouns
  - **Materials:** *Picture Manual* pages 10, 11, 15
  - **Practice:** Look at these children. They are wearing shoes. Show me *his* shoes. Show me *her* shoes.
  - **E**  
  - **Look at these two children. Show me *her* hat.**
  - **E**  
  - **Show me *his* hat.**
  - **E**  
  - **Look at these children. Show me *her* jacket.**
  - **E**  
  - **Show me *his* jacket.**
  - **E**  
  - **Now look at these pictures. Find the one that shows: She is on the stairs.**
  - **E**  
  - **Now find: He is in the pool.**
  - **Pass: 2 correct**

- **35.** Understands negatives in sentences
  - **Materials:** *Picture Manual* pages 13, 14, 15
  - **Practice:** Look at all the babies. Show me the baby who is not crying.
  - **E**  
  - **Look at the chickens and the nests. Show me the nest with no eggs.**
  - **E**  
  - **Look at all the toys. Which toys are not in the basket?**
  - **Child points to one or both toys outside of the basket.**
  - **Pass: 2 correct**

### Expressive Communication

#### 3:0 to 3:5 (36 to 41 months)

- **36.** Produces basic four- to five-word sentences
  - **Practice:** Tell me what all these things are:
  - a. teddy bear
  - b. scissors
  - c. refrigerator
  - d. carrots
  - e. spoon
  - f. horse
  - g. banana
  - h. monkey
  - (Pass: Says 2 or more four- or five-word sentence)

- **37.** Names a variety of pictured objects
  - **Materials:** *Picture Manual* pages 72, 73
  - **Practice:** I have a pencil/pen. What can I do with a pencil/pen?
  - (Can ask as needed) Now look at this picture. This is a ___.
  - Tell me what you do with a __.  
  - a. spoon
  - b. coat
  - c. towel
  - (Pass: 2 correct)

- **38.** Uses quantity concepts
  - **Materials:** *Picture Manual* page 79
  - **Practice:** Look at all the little chicks. Can you count them?
  - **How many chicks are there?**
  - (Pass: Uses any quantity word, e.g., five, lots)

- **39.** Uses possessives
  - **Materials:** *Picture Manual* page 76
  - a. This is the boy's car. Whose cat is this? (the girl's)
  - (See Examiner's Manual for scoring dialectal variations)
  - (Pass: 2 correct)
3:6 to 3:11 (42 to 47 months)

36. Identifies colors
Materials: Picture Manual page 10
Look at all the bears. They’re different colors. Show me the one that is:
- orange (E)
- yellow (E)
- blue (E)
- green (E)
(Pass: 4 correct)

37. Makes inferences
Materials: Picture Manual pages 17, 18, 19
Look at these pictures.
- Annie scraped her knees and elbows.
- How do you think Annie got hurt? (E)
- Charlie played outside and got his shoes wet.
- What was it like outside? (E)
- Andrea came home from school. She was very hungry.
- What do you think she did when she got home? (E)
(Pass: 2 correct)

38. Identifies categories of objects in pictures
Materials: Picture Manual pages 20, 21
Look at all of the pictures: a dog, apples, a cat, a chair, a bed, an ice-cream cone, a horse, and a cake.
- Show me all the animals. (E)
- Show me all the clothes we eat. (E)
- Look at all of the pictures: a toy, shorts, a ball, a strawberry, a shirt, a dress, a bear, and an orange.
- Show me all the things we wear. (E)
(Pass: 3 correct)

39. Understands picture analogies
Materials: Picture Manual pages 22, 23, 24
Look at these pictures and finish the sentence.
- You sleep in a bed. You sit on a ___ (chair) (E)
- You eat your food with a fork. You eat your food with a ___ (spoon) (E)
- You listen with your ears. You see with your ___ (eyes) (E)
(Pass: 2 correct)

40. Understands more and most
Materials: Picture Manual page 25, 26, 27
- Now look at this picture. They both have ice-cream cones. Which child has more ice cream? (E)
- These girls were picking apples. Which girl picked more apples? (E)
- These boys are sharing candy. Which boy has the most candy? (E)
- Look at these children. Who has the most balloons? (E)
(Pass: 3 correct)

41. Answers questions logically
Materials: Picture Manual page 77
Practice: What would you do if you were hungry?
- (Use if needed) Look at this.
  - Her hands are dirty. What would you do if your hands were dirty? (E)
  - She is sleepy. What would you do if you were sleepy? (E)
  - She is cold. What would you do if you were cold? (E)
(Pass: 3 correct)

42. Uses words that describe physical state
Materials: teddy bear, cup, spoon, blanket
Practice: (Make the bear not!) The bear is running fast! (Stop the bear!) Whew! It’s sure hot! (Wipe forehead)
How do you think the bear feels? Oh, the bear must be very ... (Pass) ( tethered if needed)
- The bear wants something to drink. (Give cup to child)
  - He must be very ... (thirsty)
- Now the bear wants a cup of tea. (Give spoon to child)
  - He hasn’t had dinner. How do you think the bear feels? (Pass) (hungry)
  - He must be very ... (hungry)
- The bear is ready to lie down. ( Lay bear on table) He’s ready to go to sleep. (Pass) He must be very ... (sleepy, tired)
- The bear can’t go to sleep. Brrr! (Shiver) He needs a blanket. (Pass) (child blanket to child)
  - He must be very ... (cold)
(Pass: 2 correct)

43. Completes analogies
Practice: Show me your hand. My hand is big:
- Your hand is ... (E)
Let’s do some more:
- A ice cream is cold. A fire is ... (hot)
- A bug is little. An elephant is ... (big, large)
- You’re awake during the day. You’re asleep during the ... (night)
(Pass: 2 correct)

44. Answers questions about hypothetical events
Materials: Picture Manual page 78
Practice: What do you have to do if you can’t find your shoe in the morning? (Use as needed)
- What should you do if you feel sick? (E)
- What would you do if you got food on your shirt? (Pass 1 correct)
<table>
<thead>
<tr>
<th>Auditory Comprehension</th>
<th>Expressive Communication</th>
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</thead>
<tbody>
<tr>
<td>41. Understands expanded sentences</td>
<td>45. Responds to where questions</td>
</tr>
<tr>
<td>Material: Picture Manual pages 26</td>
<td>Now I'm going to ask you some questions about where you do things. Ready?</td>
</tr>
<tr>
<td>Look at this picture.</td>
<td>a. Where do you sleep?</td>
</tr>
<tr>
<td>a. Point to the white kitten that is sleeping.</td>
<td>b. Where do you play?</td>
</tr>
<tr>
<td></td>
<td>(Pass 2 correct)</td>
</tr>
<tr>
<td>b. Point to the gray cat that is not black.</td>
<td>(Pass 2 correct, named any location for a eat for b)</td>
</tr>
<tr>
<td>(Child points to one kitten that is not black)</td>
<td></td>
</tr>
<tr>
<td>c. Point to the small black kitten in the box.</td>
<td>46. Completes analogies</td>
</tr>
<tr>
<td>(Pass 2 correct)</td>
<td>Practice: Do you cry when you are sad? What do you do when you're happy? (Talk smile or laugh) I could say &quot;When I'm sad I cry, but when I'm happy I...&quot; (Pause for response). Let's try some more. (Can be repeated)</td>
</tr>
<tr>
<td></td>
<td>a. I sit on a chair; I sleep in a... (ans)</td>
</tr>
<tr>
<td>42. Understands qualitative concepts (tall, short, near)</td>
<td>b. Noodles are for eating; milk is for... (drinking)</td>
</tr>
<tr>
<td>Material: Picture Manual pages 30, 31, 32, 33</td>
<td>c. An apple is red; a banana is... (yellow)</td>
</tr>
<tr>
<td>a. Here are some pictures of little girls. Which picture shows a girl with long hair?</td>
<td>(Pass 2 correct)</td>
</tr>
<tr>
<td>b. Look at all of these boys picking apples from the tree. Which boy is tall?</td>
<td></td>
</tr>
<tr>
<td>c. These little girls are trying on new pants. One of them has pants that are too short. Show me the pants that are short.</td>
<td></td>
</tr>
<tr>
<td>(Pass 2 correct)</td>
<td></td>
</tr>
<tr>
<td>43. Understands qualitative concepts (shapes)</td>
<td>47. Names objects when the object is described</td>
</tr>
<tr>
<td>Material: Picture Manual pages 32, 33</td>
<td>Practice: Now I want you to try to figure out what I'm talking about. What do you call an animal that chases mice, has whiskers, and says meow? (Cat or a mouse)</td>
</tr>
<tr>
<td>Prompt one time if the child only points to one or two correct answers. Ask Is that another? Do not prompt if the child points to one incorrect answer. Look at all of these pictures. Some of these things look like a square.</td>
<td>a. What is a round toy that you use to play catch?</td>
</tr>
<tr>
<td>Some look like a star.</td>
<td>It bounces. (Tennis ball)</td>
</tr>
<tr>
<td>a. Show me all of the things that look like a star.</td>
<td>b. What do you use when you take a bath?</td>
</tr>
<tr>
<td>b. Show me the things that look like a square.</td>
<td>You dry off with it. (Towel)</td>
</tr>
<tr>
<td>Look at all of these pictures. Some of these things look like a circle.</td>
<td>c. What do you use to unlock the door? You have one for the car and one for the house. (Key)</td>
</tr>
<tr>
<td>Some of these things look like a triangle.</td>
<td>(Pass 2 correct)</td>
</tr>
</tbody>
</table>
4:5 to 4:11 (54 to 59 months)

45. Understands order ending as one who...
   Materials: Picture Workbook pages 34, 35, 36
   Look at all the pictures. Point to them:
   a. sister ........................................... E
   b. painter ........................................ E
   c. drummer ..................................... (Pass: 2 correct)

46. Understands time concepts (yesterday, today)
   Materials: Picture Workbook pages 37, 38
   Look at all the pictures:
   a. Show me the picture that shows something that happens at night. .... (Pass: 2 correct)
   b. Which picture shows something that happens during the day? ........ (Pass: 2 correct)

47. Understands expanded sentences
   Materials: Picture Workbook pages 34, 40, 41, 42
   Practice: I'm going to tell you about one of the pictures. You try to tell me what I'm talking about, here is the first one:
   The rabbits digging a hole. (Cue correct answer if needed)
   a. The boy is sitting on the girl to slide. E
   b. Julie found her shoes and umbrella under the bed. E
   c. The baby has a big bear. (Pass: 2 correct)

48. Understands one more than one modifying adjectives
   Materials: Picture Workbook page 43
   Practice: I want you to look at all of the dogs. Find the big brown dog. (Cue correct answer if needed)
   a. Point to the small black dog. E
   b. Point to the big white dog. (Pass: 2 correct)

49. Understands qualitative concepts
   Materials: Picture Workbook page 44
   Look at all the animals. Which animal has:
   a. the longest nose ................................ E
   b. a long, thin tail ................................ E
   c. pointed ears ................................... (Pass: 2 correct)

50. Repeated patterns
   Practice: Listen and say what I say. I have a dress. (As needed, by saying things such as: Your coat or how we say) Here's another one. Can I have a drink?
   a. Where is my new marker? E
   b. When can we have a snack? E
   c. I want to play basketball with my friend. E
   d. Can my friend come over and watch TV? E
   e. We saw a boy riding his bike. (Pass: 4 correct)

51. Uses adjectives
   Materials: Picture Workbook page 79
   Practice: Look at these pictures. This chain is long; this chain is... (Cue answer)
   a. This dress is short; this dress is... (long) E
   b. Her ribbons are long; her ribbon is... (short) E
   c. This rope is short; this rope is... (long) (Pass: 2 correct)

continued on next page
Auditory Comprehension

Expressive Communication

4.5 to 4.11 (54 to 59 months) continued

32. Use adjectives to describe objects
   Materials: Picture Manual pages 88, 89
   Practice: Here are two animals, a mouse and an elephant. Tell me something about one of the animals so that I know which one to point to. You could say, "Point to the one with the little ears" or "Point to the one that is big." Tell me, "Point to the one that..."
   (Give as needed)
   a. Here are two cars. Tell me which car to point to. Say, "Point to the one that..."
   b. Here are two dogs. Tell me which dog to point to. Say, "Point to the one that..."
   (Pass 1 correct)

33. Use prepositions to indicate one who...
   Practice: What do we call a person who works on a farm? That person is called a farmer. What do we call a person who drives a bus? (Give as needed) Let's do more.
   a. A person who teaches is a... (teacher)
   b. A person who paints is a... (painter)
   c. A person who wins a game is the... (winner)
   (Pass 1 correct)

34. Use past tense forms
   Materials: Picture Manual pages 92, 93, 94, 95
   Practice: Look at these pictures. (Point to first picture)
   The girl is skating. (Point to second picture) Now she has finished. Tell me what she did. She...
   (Accept any past tense verb. Prompt if necessary)
   Now look at these pictures.
   a. Right now she is washing her hands. Now she has finished. Tell me what she did. She...
   b. In this picture the ice cream is melting. Tell me what happened to the ice cream in this picture. It...
   Practice 2: The girl is catching the ball. Tell me what she did. She... (cog the ball)
   c. The boy is drawing a picture. Now he's done. Tell me what he did. He...
   d. The boy is falling off the bike. Tell me what happened. He...
   (See Examiner's Notes for scoring dialectal variations)
   (Pass: 3 correct; accept any past tense verb)
5:0 to 5:5 (50 to 65 months)

50. Identifies an object that doesn't belong
Materials: Picture Manual pages 45, 46, 47, 48
Practice: Here is a carrot, a t-shirt, shorts, and a dress. One of these things does not go with the others. Tell me which one does not belong with the others. (Circle one)
   a. Here is a glass, an orange, an apple, and a banana. Which one of these does not belong with the others? E
   b. Here is a car, a truck, a boat, and a chair. Which one of these does not belong with the others? E
   c. Here is a book, a pencil, a paintbrush, and a marker. Which one of these does not belong with the others? E

51. Understands quantity concepts three and five
Materials: Picture Manual pages 49, 50
Practice: Look at the baskets. Which basket has three puppies? E
   a. Look at three baskets. Which basket has three puppies? E
   b. Look at five baskets. Which basket has five strawberries? E

52. Indicates body parts on self
Show me your:
   a. elbow E
   b. forehead E
   c. eyelashes E
   d. wrist E

53. Understands passive voice sentences
Materials: Picture Manual pages 51, 52
Practice: Look at all these pictures. Show me:
   a. The dog was chased by the chicken. E
   b. How are a bird and airplane alike? E

54. Formulates meaningful, grammatically correct questions in response to picture stimuli
Materials: Picture Manual pages 86, 87, 88, 89
Practice: Look at this picture. Linda is getting ready to go to the store with her mother. She can't find her other shoe! What should she ask her mother? She could ask her mother, “Can you help me find my shoe?” E
   a. Darlene wants to help her sister pass out cups. What should she ask her sister? E
   b. Kathy wants to play outside. What could she ask her father? E
   c. Matt needs help tying his shoe. What should he ask his sister? E

55. Describes similarities
Materials: Picture Manual page 90
Practice: We're going to talk about how two things are alike. A spoon and a fork are alike because...
   a. How are a bird and airplane alike? E
   b. How are a crayon and pencil alike? E
   c. How are an apple and tomato alike? E

56. Names items that fit into categories
Materials: Watch with a second hand
Practice: When I get dressed, I put on my clothes. Today I put on (name articles of clothing you are wearing). Think of as many kinds of clothes as you can. Tell me all the clothes you can think of until I tell you to stop. (Tell me if you need help) E
   a. I like lots of different kinds of food. Do you? Tell me all the different kinds of food you can think of, until I tell you to stop. E

   b. I see animals at the zoo and on TV. I think of some animals I could see there. Name as many animals as you can until I tell you to stop. E

   (Pass: 2 correct, names at least 6 foods for a and 6 animals for b)
Auditory Comprehension

5:6 to 5:11 (66 to 71 months)

34. Order pictures from largest to smallest:
   Materials: Picture Manual pages 50, 54
   a. Here are three balls. (Point to each ball) Show me each ball, starting with the biggest ball, then a smaller ball, then the smallest ball.
   b. Here are three trucks. Show me the trucks, starting with the biggest truck, then a smaller truck, then the smallest truck.
   (Pass 1 correct)

35. Understands quantity concepts (half, whole)
   Materials: Picture Manual page 55
   a. Jack shared half of a cookie with his brother. Which picture shows half of a cookie?
   b. Which picture shows a whole cookie?
   (Pass 2 correct)

36. Understands time/sequence concepts (before, after)
   Materials: Picture Manual page 56
   Look. These pictures show a boy who took a bath.
   The boy filled the tub with water. He washed his face and body. He played with his toys for a while, then he got out of the tub and dried off.
   a. What did the boy do last?
   b. What did the boy do first?
   (Pass 2 correct)

Expressive Communication

56. Completes sentences
   Practice: Think of something that is very hot. (Use as needed)
   The sun is hot, a stove is hot, a fire is hot. I could say that something may be as hot as... (Use the child's response)
   Let's do some more.
   a. If I could swim really well, I could say I can swim like a... E
   b. If I touch something that is very cold, I could say that it is as cold as... E
   c. If I touch something that is very sharp, I could say that it is... E
   (Pass 2 correct)

59. Counts items and gives correct number
   Materials: Picture Manual pages 91, 92
   Practice: How many fingers am I holding up? (Hold up 5 fingers. Use as needed) Now let's look at the pictures:
   a. How many children are in the picture? (seven)
   b. How many puppies are in the room? (eight)
   (Pass 3 correct)

66. Repairs semantic absurdities
   Materials: Picture Manual page 93
   Practice: I'm going to tell you something that is silly. I want you to fix what I say so that it sounds right. Let's try one. (Child's name) is a (incorrect gender). Is that right? No! I should have said (Child's name) is a (correct gender). Change what I say so that it makes sense. (Point to each picture)
   a. The boy ate a big car. Does that make sense? Change it so it makes sense. (Use the cue as needed for b, c, and d)
   b. The boys sleep on a bicycle.
   c. The boy put a cat on his head.
   d. He eats soup with a shoe.
   (Pass 3 correct)
38. Understand rhyming sounds. (Pass 2 correct)
Materials: Picture Monocards pages 58-60, 66
Practice: Do you know what a rhyme is? The word playground has two words put together: play and ground. It takes away the silent e, (which is silent) at the end of the word. It's just how it is! Each word has a different sound. In the word playground, the second word is ground. It has a new sound. Which one? (Yes, it changes.)
Now listen to the words that rhyme with fan. Which one? (Yes, it changes.)
Which one rhymes with 'fun' (Yes, it changes.)
I want you to find the one that rhymes with fun. Which one? (Pass 2 correct.)
Auditory Comprehension

6:6 to 6:11 (78 to 83 months)

60. Adds and subtracts numbers to five
   a. If you have two crayons and I give you two more crayons, how many will you have? (four) E
   b. If you have three candies and eat one, how many will you have? (two) E
   c. If you have three pennies and I give you two more pennies, how many will you have? (five) E
   (Note: 3 correct)

61. Understands time concepts (season)
   Materials: Picture Manual page 65
   These pictures show the different times of the year, like fall and spring. Point to the picture that shows...
   a. winter E
   b. fall (autumn) E
   c. summer E
   d. spring E
   (Pass: 3 correct)

62. Makes grammaticality judgments
   Materials: Picture Manual page 66
   Practice: I’m going to tell you a sentence. I want you to point to the smiling face if the sentence sounds OK. If the sentence does not sound OK, point to the sad face.

   Practice 1: Listen: I am eating. Does that sound OK? (point to smiling face) or not OK? (point to sad face)

   Practice 2: Try this one: Him am eating. Does that sound OK or not OK?
   Let’s do some more.
   a. The girl can eat cookies. E
   b. They are going to the store. E
   c. The boy will go to school. E
   d. The bird can flying high. E
   (Pass: 3 correct)

Expressive Communication

65. Tells a story in sequence, using grammatically correct sentences
   Materials: Picture Manual pages 96, 97, 98
   Practice: These pictures tell a story. I’ll tell you the story:
   Two brothers were playing basketball. The big brother said, "You'll never make a basket!" But the little brother grabbed the ball. He threw the ball as high as he could. Oomp! The little brother tripped. But the ball still went into the basket! Now you tell me the story. Tell me about each picture. (Con: use of complete sentences as needed)
   a. This little boy was trying to make his own breakfast. Look at all the pictures and tell me the story. Start with this picture. E
   b. This little boy lost his teddy bear. Look at all the pictures. Now tell me the story. Start with this picture. E
   (Pass: 1 correct)

66. Tells a story with introduction, sequence, and conclusion
   Materials: Picture Manual pages 99, 100, 101, 102
   Circle what the child says or write the child’s response on the left side of the page:
   A. Buddy Story: This is a story about two children and their dog named Buddy. Listen to the story. I want you to tell me the story after I’m done.
      1. Mike and Pam have a dog named Buddy. Buddy likes to sleep on an old blanket by the door.
      2. One night it rained and rained. Buddy got soaking wet!
      3. Mike told his sister, "Pam, Buddy is getting all wet in the rain. What can we do?"
      4. The next day, Mike and Pam looked for something to keep Buddy dry. They found a sturdy box. "This should work," said Mike.
      5. Buddy saw the children carrying the box. Buddy wondered what was going on.
      6. Mike and Pam cut a door in the box. "Look, Buddy," said Pam. "You can sleep in here!" Mike and Pam were surprised when Buddy ran off. "Hey, Buddy! Where are you going?"
      7. Buddy dragged his blanket from the porch and put it inside the box. Then he lied this blanket just the way he liked it.
      8. Now when it rains, Buddy is happy and dry in his new home. Now you tell me the story.

B. Aunt Mary Story. This is a story about two children who visit their Aunt Mary. Listen to the story. I want you to tell me the story after I'm done.
1. Matt and Sara have to visit their Aunt Mary. Aunt Mary is a lot of fun!
2. She plays basketball with Matt and Sara. Aunt Mary helps Sara make baskets. Matt says, "That's not fair!"
3. Aunt Mary makes cookies and Matt and Sara get to help.
4. Aunt Mary cuts out cookies in the shape of their hands.
   Matt says, "I'm going to eat 10 cookies!"
5. As the cookies are baking, Matt says, "Turn on the radio Sara. I want Aunt Mary to teach me a song."
6. Matt and Aunt Mary sing songs as loud as they can.
   "Aunt Mary!" says Sara, "I think the cookies are ready!"
7. Aunt Mary takes the cookies out of the oven. "We'll finish our song later, Matt. It's time to eat cookies."
8. Sara says, "These cookies are yummy. We are good cooks!" Matt says, "We always have so much fun when we come to your house, Aunt Mary!"
   Now you tell me the story.
   (Pass 2 correct)

☐ 47. Use irregular plurals
Materials: Picture Manual page 101
a. This girl lost one tooth. This girl lost two (tooth) ... 
   (Pass 2 correct)
b. Here is one man. Here are two (man) ...
   (Pass 2 correct)
c. Here is one mouse. Here are two (mouse) ...
   (Pass 2 correct)

☐ 48. Expresses quantity (empty, more)
Materials: Picture Manual page 101
a. This boy's glass is full. This boy's glass is ... (empty) ... 
   (Pass 2 correct)
b. The boy didn't get many noodles. He got less than she did. She got ... (more) ...
   (Pass 2 correct)
APPENDIX H

REINFORCEMENT INVENTORY
Appendix H

Reinforcement Inventory

Child’s Name______________________________

Date_____________________________________

Food Items

☐ Candy
☐ Nuts
☐ Potato Chips
☐ Pretzels
☐ Cookies
☐ Beverages
☐ Other

Explain_________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________

Toys

☐ Dolls
☐ Musical instruments
☐ Dress-up
☐ Cars
☐ Building blocks/Legos
☐ Fidget toys
Other
Explain
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Activities

☐ Board games
☐ Being read to
☐ Drawing/Coloring
☐ Puzzles
☐ Painting
☐ Recess/Free time
☐ Computer
☐ Playdough
☐ Looking at books
☐ Other
Explain
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Social

☐ Playing with others
☐ Helping the teacher
☐ Being hugged and kissed
☐ Being touched and tickled
☐ High five
☐ Happy faces/smiles
☐ Other

Explain____________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Tokens

☐ Stars on a chart
☐ Happy/smiling faces
☐ Certificate/Badge
☐ Accumulation of marbles/chips
☐ Points/numbers
☐ Play money

Explain____________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
What is the child’s favorite thing to do?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

What is the child’s least favorite thing to do?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

What does the child ask for most often?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

What does the child complain about the most?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
APPENDIX I

UDL FIDELITY MEASURE
Appendix I

UDL Fidelity Measure

Name of Observer___________________________________

Date of Observation__________________________________

<table>
<thead>
<tr>
<th>Element</th>
<th>Criteria</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differentiated complexity of actions, directions, prompts, processes, scaffolding, and/or supports</td>
<td>Within a single activity, conversational turn taking is represented and/or addressed through at least two of the following actions:</td>
<td></td>
</tr>
<tr>
<td>□</td>
<td>Model and prompt earlier to later developmental skills</td>
<td></td>
</tr>
<tr>
<td>□</td>
<td>Coos to babbles</td>
<td></td>
</tr>
<tr>
<td>□</td>
<td>One word to multiple words</td>
<td></td>
</tr>
<tr>
<td>□</td>
<td>Responses to Initiations</td>
<td></td>
</tr>
<tr>
<td>□</td>
<td>Give easier to more difficult directions</td>
<td></td>
</tr>
<tr>
<td>□</td>
<td>Verbal directions paired with modeling (&quot;errorless teaching&quot;)</td>
<td></td>
</tr>
<tr>
<td>□</td>
<td>Verbal directions paired with visual cue/picture</td>
<td></td>
</tr>
<tr>
<td>□</td>
<td>Verbal directions paired with gesture (e.g. pointing)</td>
<td></td>
</tr>
<tr>
<td>□</td>
<td>Verbal directions only</td>
<td></td>
</tr>
<tr>
<td>□</td>
<td>Model and prompt single to multiple components (one turn versus multiple turns, or one word versus multiple words)</td>
<td></td>
</tr>
<tr>
<td>□</td>
<td>First/Then (e.g. &quot;my turn first, then it’s your turn&quot;)</td>
<td></td>
</tr>
<tr>
<td>□</td>
<td>Picture schedules/sequences (e.g. a series of pictures or symbols depicting two individuals taking turns talking)</td>
<td></td>
</tr>
<tr>
<td>□</td>
<td>Provide least to most support for conversational turn taking</td>
<td></td>
</tr>
<tr>
<td>□</td>
<td>Modeling (e.g. quiet and loud verbalizations; having a conversation with another child or another adult)</td>
<td></td>
</tr>
<tr>
<td>□</td>
<td>Visual prompting (e.g. pointing to signal the child’s turn to talk)</td>
<td></td>
</tr>
<tr>
<td>□</td>
<td>Verbal prompting (e.g. saying &quot;your turn&quot; or asking &quot;what can you say?&quot;); giving choices &quot;is it wet or dry?&quot;)</td>
<td></td>
</tr>
<tr>
<td>□</td>
<td>Time delay (Starting the turn and waiting for the child to finish)</td>
<td></td>
</tr>
<tr>
<td>□</td>
<td>Mand/Model (telling the child what to say – sometimes paired with physical, visual, or other prompts)</td>
<td></td>
</tr>
</tbody>
</table>
Variety of **forms** or mediums

<table>
<thead>
<tr>
<th><strong>Within a single activity</strong>, conversational turn taking is represented using <strong>2 or more</strong> types of both auditory and visual means (i.e. two of each)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Auditory</strong> (i.e. the children can “hear” conversational turn taking)</td>
</tr>
<tr>
<td>- Books on tape</td>
</tr>
<tr>
<td>- Computer/Internet</td>
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<tr>
<td>- Poetry/Rap</td>
</tr>
<tr>
<td>- Song (e.g. songs that allow for back and forth singing or dialogue)</td>
</tr>
<tr>
<td>- Story (spoken) (e.g. at least two characters interact/talk with each other)</td>
</tr>
<tr>
<td>- Verbalizations (e.g. the teacher models conversational turns)</td>
</tr>
<tr>
<td>- Video/CD/DVD</td>
</tr>
<tr>
<td><strong>Visual</strong> (i.e. the children can “see” conversational turn taking)</td>
</tr>
<tr>
<td>- Books (e.g. the book has pictures/sequences that show people taking conversational turns)</td>
</tr>
<tr>
<td>- Bulletin board</td>
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<tr>
<td>- Closed captioning</td>
</tr>
<tr>
<td>- Diagram/Model</td>
</tr>
<tr>
<td>- Digital Camera (e.g. pictures of the children taking conversational turns paired with written text or “talk bubbles”)</td>
</tr>
<tr>
<td>- Felt Board Story</td>
</tr>
<tr>
<td>- Document Camera</td>
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<tr>
<td>- LCD Projector; Overhead</td>
</tr>
<tr>
<td>- Multi-media presentation</td>
</tr>
<tr>
<td>- Objects/Toys</td>
</tr>
<tr>
<td>- Picture/Symbol/Drawing</td>
</tr>
<tr>
<td>- Power Point slide show</td>
</tr>
<tr>
<td>- Sign Language/Gesture</td>
</tr>
<tr>
<td>- Smartboard</td>
</tr>
<tr>
<td>- Story (written)</td>
</tr>
<tr>
<td>- Video/CD/DVD</td>
</tr>
<tr>
<td>- Puppets</td>
</tr>
</tbody>
</table>
### Multiple Means of Engagement
Within a Single Activity

<table>
<thead>
<tr>
<th>Element</th>
<th>Criteria</th>
<th>Evidence</th>
</tr>
</thead>
</table>
| Variety of learning opportunities | Within a single activity, children’s opportunities for engagement incorporate both of the following considerations:  
- Child/Student choice (2 or more)  
  - Choice of action/process  
  - Choice of location/position  
  - Choice of product  
  - Choice of reward  
  - Choice of topic  
  - Choice of toy/material/object  
  - Choice of play/work partners  
  - Choice of start/stop time  
- Variety of Materials (2 or more)  
  - Auditory  
  - Visual  
  - Tactile  
  - Kinesthetic |          |

### Multiple Means of Expression
Within a Single Activity

<table>
<thead>
<tr>
<th>Element</th>
<th>Criteria</th>
<th>Evidence</th>
</tr>
</thead>
</table>
| Flexibility in child/student expression | Within a single activity, Children are encouraged/asked/allowed to demonstrate what they know and are able to do related to conversational turn taking through a variety of flexible and individually appropriate expressions (both criterion below are observed)  
- Children/students are encouraged to choose/use verbal expressions/conversational turns based on their strengths, preferences, and abilities (e.g. when a child changes topics, teachers encourage their contribution) |          |
- Verbal expressions/conversational turns are used for a variety of purposes (3 or more)
  - Answering questions
  - Asking questions
  - Commenting
  - Describing
  - Directing
  - Discussing
  - Explaining
  - Greeting
  - Informing
  - Labeling
  - Predicting
  - Reciting
  - Reporting
  - Rhyming
  - Translating
  - Singing
APPENDIX J

PMI FIDELITY MEASURE
Appendix J

PMI Fidelity Measure

Directions: Circle all components observed. Be sure to fill in the correct day/week of the intervention.

<table>
<thead>
<tr>
<th>Days</th>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Weeks 4-8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M  T  W  R</td>
<td>M  T  W  R</td>
<td>M  T  W  R</td>
<td>M  T  W  R</td>
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<tr>
<td>Show the card</td>
<td>X X X X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Talk about steps</td>
<td>X X X X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Puppet show</td>
<td>X X X X</td>
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<td></td>
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<tr>
<td>Role play</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn and talk</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prompt the peer</td>
<td>X X X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td>X X X X</td>
</tr>
<tr>
<td>models during play</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unlimited support</td>
<td>X X X X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal prompts</td>
<td>X X X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td>X X X X</td>
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<tr>
<td>(steps only)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Visual prompts</td>
<td></td>
<td>X X X X</td>
<td>X X X X</td>
<td></td>
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<tr>
<td>Reimburse the peers</td>
<td>X X X X</td>
<td>X X X X</td>
<td>X X X X</td>
<td>X X X X</td>
</tr>
</tbody>
</table>

NOTE: Reinforcement must be contingent on the peer mediated instructional strategies. The peer models should not be reinforced if they do not engage in the steps of the intervention. If the peer model fails to complete the intervention steps, he/she should not be reinforced AND the fidelity of implementation score should be adjusted to reflect the teacher’s correct implementation of the intervention.
APPENDIX K

MT FIDELITY MEASURE
Appendix K

MT Fidelity Measure

Directions: Conduct a five minute observation of the teacher and target child engaged in a one on one interaction. Code every adult utterance as a mand or request, time-delay, expansion or model, or reinforcement or praise by placing an X in the appropriate box. Code every child utterance as an initiation, response, or no response. If the teacher does not respond before a child makes a second initiation, strike through the teacher line and code the next child utterance. When the observation is complete, code each sequence as correct or incorrect by comparing it to the procedures for Milieu Teaching.

Key: T = Teacher; C = Child; I = Initiation; R = Response; NR = No Response; CS = Correct Sequence; IS = Incorrect Sequence

Example

<table>
<thead>
<tr>
<th>Teacher</th>
<th>Child</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mand or Request</td>
<td>Time-Delay</td>
</tr>
<tr>
<td>T</td>
<td>X</td>
</tr>
<tr>
<td>C</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teacher</th>
<th>Child</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mand or Request</td>
<td>Time-Delay</td>
</tr>
<tr>
<td>T</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
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<td>T</td>
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<tr>
<td>C</td>
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<tr>
<td>Teacher</td>
<td>Child</td>
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<td>-------</td>
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<tr>
<td>Mand or Request</td>
<td>Time-Delay</td>
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<tr>
<td>T</td>
<td>C</td>
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APPENDIX L

TEACHER CONSENT FORM
Dear Teacher/Early Interventionist,

My name is Sandra Robbins. I am a doctoral candidate in the department of Special Education from Kent State University. I am working on a research study about tiered instruction under the supervision of my advisors Dr. Kristie Pretti-Frontczak, Dr. Sanna Harjusola-Webb, and Dr. Christine Balan. The intent of my study is to determine the effects of tiered instruction on social communication skills for preschool children in an inclusive classroom. I would like permission to conduct my research in your classroom and I would like to invite you to take part in the project as the single adult participant.

The research I plan to conduct is important to early childhood special education because it promotes social communication skills which are critical to children’s future academic success. Furthermore, the results of the study will contribute to a broader understanding of tiered instruction and how it can work for preschool children in inclusive classrooms. Each of the procedures included in the model of tiered instruction are research-based. This means that they have been shown through research to increase preschool children’s social communication skills.

If you choose to participate, your role during the study will involve (a) attending a three hour training four times throughout the school year, (b) helping to obtain parent/guardian consent, (c) assisting with the collection of assessment information (assessments listed below), (d) implementing three consecutive interventions (universal design, peer-mediated instruction, and milieu teaching) with my continuous support, and (e) allowing me and my research assistant(s) to observe and collect data in your classroom. You will also be asked to complete a confidential demographic form with general background information such as your age range, gender, ethnicity, socio-economic status, geographic location, level of education/degrees held, licenses/certificates held, and years of experience. The form should take about five minutes to complete.
The following list of assessments will be administered and completed in the context of the classroom by the researcher with assistance from the parents/guardians and the classroom teacher:

- Preschool Language Scale 4 (PLS-4)
- Battelle Developmental Inventory, Second Edition (BDI-II)
- Assessment, Evaluation, and Programming System (AEPS), Social Communication Area
- AEPS Family Report, Social Communication Area

Throughout the study, appropriate actions will be taken to assure your confidentiality will be maintained to the limits of the law. Your name and the names of the children, families, and professional staff involved in the study will never be used on any of the research documents. Each person involved in the study will be assigned a pseudonym or a number which will then be used for all assessments and coding forms. All research documents will be stored at Kent State University where they will be kept in locked files until the data are converted to electronic form. Once information is entered into a computer, names of children, families, and professional staff will not be attached to the data. At the end of the study, the results will be shared through papers and presentations. At no time will the information reveal the identity of you, the children, or their families.

Taking part in the project is entirely up to you, and no one will hold it against you if you decide not to do it. If you do take part, you may decide to stop at any time. If you agree to participation in this project, I ask that you sign below. If you have questions, or want to know more about this research project, please call me (216) 952-9107. The project has been approved by Kent State University. If you have questions about Kent State University's rules for research, please call Dr. John West, Vice President of Research, Division of Research and Graduate Studies (330) 672-2704.

Sincerely,

Sandra Hess Robbins, M.Ed.
Doctoral Candidate
Center for Excellence in Early Childhood Research and Training
Kent State University
CONSENT STATEMENT

I agree to take part in this project. I know what I will have to do and that I can stop at any time.

___________________________________________
Name

___________________________________________
Signature Date

___________________________________________
Contact e-mail and/or phone

Please Return to: Sandra Hess Robbins
4146 Wyncote Rd, South Euclid, OH 44121
APPENDIX M

PARENT/GUARDIAN CONSENT FORM
Dear Parent/Guardian,

My name is Sandra Robbins. I am a doctoral candidate in the department of Special Education from Kent State University. I am working on a research study about tiered instruction under the supervision of my advisors Dr. Kristie Petti-Frontczak, Dr. Sanna Harjusola-Webb, and Dr. Christine Balan. The intent of my study is to determine the effects of tiered instruction on social communication skills for preschool children in an inclusive classroom. I would like permission to conduct my research in your child’s classroom and I would like to invite your child to take part in the project along with his/her classmates.

The research I plan to conduct is important to early childhood special education because it promotes social communication skills which are critical to children’s future academic success. Furthermore, the results of the study will contribute to a broader understanding of tiered instruction and how it can work for preschool children in inclusive classrooms. For the study, a three-tiered instructional model including (a) universal design, (b) peer-mediated instruction, and (c) milieu teaching will be implemented. Universal design is when the teacher arranges the classroom activities, schedule and materials to increase opportunities for children to practice important skills. Peer mediated instruction is when the teacher trains peers to prompt, model, and assist target children. Milieu teaching is an intervention in which the teacher uses naturalistic teaching strategies such as prompting and modeling to promote social communication. Each of the procedures included are research-based. This means that they have been shown through research to increase preschool children’s social communication skills.

If you decide to let your child participate he/she will be asked to work and play in the classroom as he/she typically does. During the study, your child will be given multiple opportunities to work with the teacher and his/her classmates to practice social communication skills. In order to monitor your child’s progress, your child will be observed and his/her communicative interactions will be recorded using the Language
Environment Analysis (LENA) System. LENA is an automatic vocalization assessment (voice recorder) that uses automatic speech recognition technology to capture every utterance of a child and the individuals surrounding them. The information collected is then summarized in order to provide information about children’s language and social communication skills. To obtain copies of the audio/statistical data obtained during the study, you can contact me anytime at srobin4@kent.edu.

In addition to examining the communicative interactions in the classroom, I will be administering several assessment instruments that will provide information about your child’s social communication skills. If you choose to let your child participate, he/she will be evaluated using the following list of assessments. Each of the assessments will be administered and completed in the context of the classroom by the researcher with assistance from the parents/guardians and the classroom teacher:

- Preschool Language Scale: Fourth Edition (PLS-4)
- Battelle Developmental Inventory: Second Edition (BDI-2)
- Assessment, Evaluation, and Programming System (AEPS), Social Communication Area

The measures listed above are widely used developmental and language measures. I will arrange to conduct the assessments with your child’s teacher at times that are convenient and during times when your child will not be missing important or preferred activities. Furthermore, I will be asking you to fill out three different parent questionnaires. The questionnaires are designed to help us individualize the instruction in the classroom to best meet your child's needs. The three measures include 1) the social communication section of the AEPS Family Report, 2) a child interest survey, and 3) a reinforcement index. Additionally, I am requesting that you complete a confidential demographic form that elicits general background information on you and your child. The information from the demographic form will be used to provide broad descriptive information about the study sample. No names or identifying information will be revealed at any time.

Throughout the study, your child’s confidentiality will be maintained to the limits of the law. Names will never be used on any of the research documents. Everyone involved in the study will be assigned a pseudonym or a number which will then be used for all assessments and coding forms. All research documents will be stored at Kent State University where they will be kept in locked files until the data are converted to electronic form. Once information is entered into a computer, the names of children, families, and professional staff will not be attached to the data. At the end of the study,
the results will be shared through papers and presentations. At no time will the information reveal the identity of you, your child, or your school.

Letting your child take part in the project is entirely up to you, and no one will hold it against you if you decide not to do it. If you do let your child take part, you or your child may decide to stop at any time. If you agree to your child’s participation in this project, I ask that you sign below. If you have questions, or want to know more about this research project, please call me (216) 952-9107 or Dr. Kristie Pretti-Frontczak (330) 672-0597.

The project has been approved by Kent State University. If you have questions about Kent State University’s rules for research, please call Dr. John West, Vice President of Research, Division of Research and Graduate Studies (330) 672-2704.

Sincerely,

Sandra Hess Robbins, M.Ed.
Doctoral Candidate
Center for Excellence in Early Childhood Research and Training
Kent State University

CONSENT STATEMENT

I ____________________________________________________
Print your name here

agree to let my child ___________________________________________
Print your child’s name here

take part in this project. I know what he/she will have to do and that he/she can stop at any time.

Your Signature __________________________________________

Today’s Date _________________________________________

Return this form to your child’s teacher/early interventionist and he/she will mail it to:
Sandra Hess Robbins: 4146 Wyncote Rd, South Euclid, OH 44121
APPENDIX N

AUDIO/VIDEO/PHOTO CONSENT FORM
Appendix N

Audio/Video/Photo Consent Form

The effects of tiered instruction on social communication

I ______________________________ agree to the following in the classroom:

(print name)

______ Videotaping  ______ Audio taping  ______ Photography

__________________________________________________________

Signature  Date

I understand that I have the right to see/hear any tapes or photographs before they are used. I have decided that I:

_____ want to see any video tapes or photographs

_____ want to hear any audio tapes

_____ do not want to see any video tapes or photographs

_____ do not want to hear any audio tapes

If you do not want to see the tapes or photographs, please sign below now. If you do want to see the tapes or photographs, you will be asked to sign after seeing them.

Sandra Robbins and other researchers approved by Kent State University may use the tapes or photographs. I agree to allow the original tapes or photographs or copies to be used for:

_____this research project  _____teacher education  _____presentation at professional meetings

__________________________________________________________

Signature  Date

Please provide your mailing address:
APPENDIX O

INTERVENTION TRAINING MATERIALS
Appendix O

Intervention Training Materials

Context for the Study
- National path for inclusion
- Full participation in the general curriculum for all children
- Essential skills needed for participation
- Social-emotional
- Conversational turn taking
- Instructional models designed for inclusive programs
- Tiered instruction

General Study Overview
- Inclusive classroom
- One adult (teacher), 6 children
- Dependent variable = Conversational turn taking
- Independent variable = Tiered Instruction

General Study Overview Cont...
- Increasing intensity across subject, single subject research design
- Additive Phases
  - A: Baseline
  - B: Universal Instruction
  - B/C: Targeted Instruction
  - B/C/D: Individualized instruction
  - B/C/D/E: Universal Intervention
- Each phase approximately 4 weeks

Increasing Intensity Design
Baseline Phase
- Conduct class as usual
- Typical daily activities and classroom routines
- Establish stable data for each child participant

Data Collection During Baseline
- Consent forms
- Baseline measures
- Development profile for each child participant
- Dependent variable measure
- Establish stable data
- Independent variable measure (researcher)
- Determine an absence of the intervention procedure

Preschool Language Scale, 4th Edition (PLS-4)
- Standardized, norm-referenced measure
- Assesses receptive and expressive language skills
- Begins testing approximately one year below child's age
- Continues until lexical and sentence skills are established
- Rhythm behavior through pictures, verbal prompts, or both
- Scoring
- Check – correct
- Miss – incorrect
- NR – no response
- Some written responses to open-ended questions

PLS-4 Administration and Scoring Activity
- Watch video
- Score adult on procedural integrity checklist

PLS-4 Administration and Scoring Activity
- Watch video
- Score child on test protocol
Assessment, Evaluation, and Programming System (AEPS) Social-Communication Area

- Criterion-referenced measure
- Observation, direct test, report
- Scoring
  - Consistently meets criterion = 1
  - Inconsistent meets criterion = 2
  - Does not meet criterion = 3
- Social-communication
  - Collect baseline samples
  - Complete social-communication assessment form (SCAP)
  - Complete social-communication assessment form (CSAP)
- Complete social-communication area protocol

AEPS Social-Communication Administration and Scoring Activity

- Watch videos
- Take language samples
- Complete social-communication scoring sheets

Family completed measures

- AEPS Family Report
- Child Interest Survey
- Individual interventions based on child interests
- Reinforcement index
- Individual reinforcement for each child

Language Environment Analysis (LENA) System

- Measures conversational turn taking between child participants and adults or peers
- Start when child enters at school and
- Stop when child leaves for home
- 4 children per day, 4 days per week
- Each child monitored once per week

The Language Environment Analysis System (LENA)
Using Tiered Instruction to Promote Conversational Turn Taking in an Inclusive Preschool Classroom: Part Two

- Independent Variable – Tiered instruction
- Dependent Variable – Conversational Turn Taking
- Increasing intensity across subjects: single subject research design
- 3 Additive Phases
  - Tier 1 Universal instruction
  - Tier 2 Individualized instruction
  - Tier 3 Individualized instruction
- Each phase approximately 4 weeks

**Tiered Instruction**

- Individualized
- Targeted

**Universal Design for Learning**

**What is Universal Design for Learning (UDL)?**

Universal design for learning is an “approach to planning and developing curricula in ways that promote access, participation, and progress in the general curriculum.” (Oakhill & McLaren, 1998)

With UDL, every student is an individual with unique interests, needs, and abilities.

**Multiple Means of Representation**

Supports one’s ability to acquire information, knowledge, and skills through various and preferred means of access to achieve a targeted outcome.

**Asking a Different Question**

How can an activity address the needs of diverse learners?

Rather than

How does the activity need to be modified for a particular child?
Multiple Means of Representation
- Differentiated complexity of actions, directions, prompts, processes, scaffolding, and/or support
- Model and prompt earlier to later developmental skills
- Give easier to more difficult directions
- Model and prompt single to multiple components
- Provide least to most support for conversational turn taking
- Variety of forms or mediums
  - Auditory
  - Visual

Multimodal Communication
- The use of various communication methods by one person
- Multimodal communication is natural
- Everyone uses a variety of communication methods all the time

Multiple Means of Engagement
- The use of a variety of activities and means of active learning that allows students to participate in various learning processes geared towards the same outcome

Multiple Means of Engagement
- Variety of learning opportunities
  - Child/Student Choice
  - Materials

Multiple Means of Expression
- Allows students to use a variety of methods to express what they know and are able to do in means appropriate for their ability
Multiple Means of Expression

- Flexibility in child/student expression
- Based on strengths/preferences/abilities
- Used for a variety of purposes

UDL Observation

- Watch the video
- Score the Tier one UDL Fidelity Checklist

Procedures

- Implement UDL written and across the day
- Develop a daily lesson plan for this time
- Implement the lesson plan each day
- Don’t forget to keep using UDL written and across the day

Tier one UDL fidelity self-monitoring

- Did I explain conversational turn taking using differing levels of directions, models, and support?
- Did I use multiple types of both auditory and visual means to show conversational turn taking?
- Did I give the children choices and a variety of materials in order to engage them in conversational turn taking?
- Did I allow the children to express their ability to take conversational turn in multiple ways that were meaningful to them?
Central Study Overview
- Independent Variable - Tiered instruction
- Dependent Variable - Conversational Turn Taking
- Increasing intensity across sessions: single subject research design
- 5 Additive Phases
  - Phase 1: baseline
  - Phase 2: Universal instruction (tier 1)
  - Phase 3: MCC Targeted Instruction (tier 2)
  - Phase 4: Individual instruction (tier 3)
  - Phase 5: Universal instruction
- Each phase approximately 4 weeks

Tiered Instruction
- Individualized
- Tier 2
- Peer Mediated Instruction
- Universal Design for Learning

Peer Mediated Instruction
- The teacher trains peers to prompt, model, and assist target children in order to practice conversational turn taking
- Facilitation strategies
  - Look at your friend
  - Say your friend's name
  - Talk to your friend
  - Listen to your friend
  - Take another turn

Matchmaking
- Pair target children with peer models
- Intervene
- Child interest survey
- Additive
- LDB's

Training
1. Show the card
2. Talk about the steps
3. Puppet show
4. Role play
5. Turn and talk
Promoting
- Prompt card
- Unlimited support
- Verbal prompts
- Visual prompts
- Fade over time

Reinforcing
1. Reinforcement card
2. Reinforcement index
3. Contingent
4. Immediate

Video Observation
- Watch the video
- https://example.com/video/12345

Procedure
- Continue to implement UDL within and across the day
- Continue to develop daily lesson plans for UDL
- Continue to implement UDL during circle time each day
- Watch the children (stage peer models)
- Start the PMI intervention
- Follow the training and prompting schedule

Tier two PMI Fidelity Self Monitoring
- Did I train the peers (e.g., show the card, talk about it, support them, turn and talk) according to the training schedule?
- Did I prompt the peer model during play?
- Did I follow the correct prompting/support procedures given on the schedule?
- Did I reinforce the peer model immediately after they attempted the intervention?
Central Study Overview
- Independent Variable: Tiered instruction
- Dependent Variable: Conversational Turn Taking
- Increasing intensity across subjects, single subject research design
- 3 Additive Phases
  - Tier 1
  - Tier 2
  - Tier 3
- BCES TTRD (Tier 3)
- Individualized instruction (Tier 3)
- Universal instruction
- Each phase approximately 4 weeks

Tiered Instruction
- Tier 3
- Milieu Teaching
- Peer Mediated Instruction
- Universal Design for Learning

Incidental Teaching
- Promote the development of more elaborate language
- The teacher initiates an interaction
- The teacher responds
- Peer initiates #2
- Peer initiates #3
- Child initiates #4
- Child completes

Mand Model
- Eliminate dependency on child initiation
- 1. The teacher initiates the interaction
- 2. The teacher provides a mand request for a child response
- 3. If the child fails to respond, the teacher provides a model
- 4. Correct responses are reinforced with social praise, attention, or access to a desired object or activity

Example 1:
- The teacher observes a child who is looking at a book
- The teacher says, "What is this?"
- The child says, "It's a book"
- The teacher reinforces the use of."It's a book"
- The child says, "A book"
After providing a mand (request)...

- **EXPECT** a response
- **WAIT** for a response
- **PROMPT/MODEL** if no response occurs
- **RESPOND** to student’s communication appropriately
  - You don’t always have to stop the student while they speak.
  - BUT you should always respond and be responsive that is understood by the student (Schwartz, p.6)

---

**Tier three MT fidelity self-monitoring**

- Did I start each interaction by following the child’s lead/behaviors about objects/activities in which the child was showing interest?
- Did I continuously reward the child when a request for more because or a model of extended because?
- Did I use time delays sometimes to show the child I wanted some behaviors from her/him?
- Did I and each interaction in a reinforcing child for correct responses or positive attention/interest or access to a desired object/activity?

---

**Video Observation**

- Visit the video
  - [Link](https://www.asd.asdглядело.ру/video/014/0)
- Score the teacher on the Tier three MT fidelity measures

---

**Time Delay**

- Non-verbal cue/timeout.
- Encourages a response without response/mand or model.
  - The child or teacher initiates the interaction
  - The teacher initiates a time delay before the delivery of a response or reinforcement.

Example:

1. A child approaches the teacher and rubs her hand toward a closed cardboard box.
2. The teacher holds her hand still on the cardboard, looks at the child, and waits. The child says “Open.” The teacher deficiencies the child for waiting the minutes.

---

Page 2
APPENDIX P

UDL LESSON PLAN FORMS
Appendix P

UDL Lesson Plan Forms

Conceptual Organizer: | Date: | Outcome: Conversational turn taking
---|---|---
| **Representation** | **Engagement** | **Expression**
Differentiated complexity of models, prompts, directions, or supports: | Variety of learning opportunities: Choice | Flexibility in child expression: Child strengths, preferences, & abilities
Variety of forms or mediums: | Materials | Purposes
**Conceptual Organizer:** Mrs. Wishy Washy  
**Date:** Example  
**Outcome:** Conversational turn taking

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<th>Expression</th>
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| **Differentiated complexity of models, prompts, directions, or supports:**  
*(easier to more difficult directions)*  
First explain all steps of the activity  
Next explain each step separately with visual prompts  
*(later to earlier development)*  
“What did the cow do?” →  
“Did the cow jump in sand or mud?” →  
“See the cow?”  
*(Least to most support)*  
“What is she doing?” →  
“Is she screaming at the animals?” →  
“She’s screaming at the animals” →  
“Say screaming” →  
**Variety of forms or mediums:** |
| **Auditory**  
- conversational turns between the teacher and other children  
- puppet show where children can “hear” conversational turns between puppets  
- sing “Old Macdonald”, which allows for back and forth verbalizations  
**Visual**  
- conversational turns between the teacher and other children  
- conversational turns within the puppet show | **Choice**  
**Variety of learning opportunities:**  
- **Explicitly show/tell children of their choice options…**  
Children Choose  
- Where to sit when they come to circle (chair or floor)  
- Which puppets will be used for the puppet show  
- Which animals to sing about during “Old MacDonald”  
- Whether or not they would like a turn with the puppets | **Flexibility in child expression:**  
- Child strengths, preferences, & abilities  
  - Praise children for all attempts to verbalize/take a conversational turn, regardless of level of complexity or correct use. Examples: “nice talking”, “I like the way you took a turn”, “thanks for answering”  
  - Acknowledge verbalizations, regardless of whether they are on topic. Examples: child says “I have dog!”, teacher says, “oh dogs are another kind of animal” and continues with the activity  |
| **Materials**  
**Auditory**  
- Song on tape  
**Visual**  
- Puppets, storybook  
**Tactile**  
- puppets, washtub, scrub-brush | **Purposes**  
- Labeling (the animals and objects in the book)  
- Describing (the actions in the book)  
- Answering questions |
APPENDIX Q

PMI PROMPT CARD
Appendix Q

PMI Prompt Card
APPENDIX R

PMI REINFORCEMENT CARD
Appendix R

PMI Reinforcement Card
Appendix S

Fidelity Self-monitoring Checklist

Tier one UDL fidelity self-monitoring

Did I explain conversational turn taking using differing levels of directions, models, and support?  

YES  NO

Did I use multiple types of both auditory and visual means to show conversational turn taking?  

YES  NO

Did I give the children choices and a variety of materials in order to engage them in conversational turn taking?  

YES  NO

Did I allow the children to express their ability to take conversational turns in multiple ways that were meaningful to them?  

YES  NO

Tier two (PMI) fidelity self-monitoring

Did I train the peers (e.g. show the card, talk about it, puppet show, turn and talk) according to the training schedule?  

YES  NO

Did I prompt the peer models during play?  

YES  NO

Did I follow the correct prompting/support procedure given on the schedule?  

YES  NO

Did I reinforce the peer models immediately after they attempted the intervention?  

YES  NO
Tier three (MT) fidelity self-monitoring

Did I start each interaction by following the child’s lead/talking about objects/activities in which the child was showing interest?  
YES  NO

Did I consistently respond to the child using a request for more language or a model of expanded language?  
YES  NO

Did I use time delays sometimes to show the child I wanted more language from him/her?  
YES  NO

Did I end each interaction by reinforcing the child for correct responses by providing attention, praise or access to a desired object/activity?  
YES  NO

NOTES:
______________________________________________________________________________
______________________________________________________________________________
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