

FAMILY IMPLEMENTED EMBEDDED LEARNING OPPORTUNITIES TO SUPPORT
CHILDREN WITH DISABILITIES' LEARNING WITHIN FAMILY ROUTINES

By

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Hsiang-Yi Wu

Submitted to the graduate degree program in the Department of Special Education and the
Graduate Faculty of the University of Kansas in partial fulfillment of the requirements for the
degree of Doctor of Philosophy

Chairperson: Eva M. Horn, Ph.D.

Greg Cheatham, Ph.D.

Susan Palmer, Ph.D.

Barbara J. Thompson, Ph.D.

Graduate Program Representative: Claudia Dozier, Ph.D.

Defended: _____

The Dissertation Committee for Hsiang-Yi Wu

certifies that this is the approved version of the following dissertation:

FAMILY IMPLEMENTED EMBEDDED LEARNING OPPORTUNITIES TO SUPPORT
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Chairperson: Eva M. Horn, Ph.D.

Date approved: _____

Abstract

Young children's healthy growth and development typically occurs as a natural process as they experience learning opportunities within naturally occurring routines in familiar settings. Children with disabilities, however, often are in need of a more deliberate approach. That is, to ensure that young children with disabilities are accessing learning opportunities and making meaningful developmental progress requires careful analysis of the types of learning opportunities that exist in their natural settings and the amount of scaffolding that might be required to support attainment of their goals. Embedded Learning Opportunities (ELO) is a research-based intervention that was developed to increase the teaching and learning opportunities provided to child in natural ongoing routines. ELO would appear to be an appropriate strategy for parents to use in supporting their child's learning within family routines. Thus, the purpose of this study is to assess the feasibility of parents supporting their young children's learning through ELO interventions. Three single-case studies were conducted with three parent/child dyads. Each case represented an independent single-case multi-probe multiple baseline across behaviors design to assess the impact of training on the use of ELO interventions on the parent's and subsequently on the child's behaviors in home routines. The results revealed that all parents learned to use the ELO strategies and their children made improvements in their target goals. Implications for future research and practice including a discussion of the professionals' role in supporting families with young children with disabilities is discussed.

Keywords: embedded learning opportunities, family, routines, young children with disabilities

Acknowledgement

I would never have been able to complete the journey of my doctoral program without the guidance from my committee members, help from my friends, and supports from my family.

First and foremost, I would like to express my deepest gratitude to my advisor, Dr. Eva Horn, for her positive and patient mentoring style, academic guidance and support, and psychological caring and encouragement throughout the whole process. I would like to thank Dr. Susan Palmer, who let me experience first hand research as it was being conducted in the field and provided ongoing support to me throughout my doctoral studies. I would also like to thank Dr. Greg Cheatham and Dr. Claudia Dozier for guiding my research and providing me with guidance and feedback on my work as members of my doctoral committee. A special thanks goes to Dr. Barbara Thompson, who was willing to step in at the final moment as a member of my final defense committee.

I would also like to acknowledge the families who took part in my study. I learned many lessons during my interaction with the parents and their children as I completed together with them by data collection. Thank you for your participation and support of my dissertation study.

My sincere appreciation and thanks to my friends Hyunjoo Lee, Audra Claussen, and Ruby Chan. Thank you for the friendship and endless support as I worked to complete my doctoral program. A special thanks to Su-Ling Hsu for providing me with emotional and practical support as I worked through the completion of this document. .

Lastly, thank you to my parents for their unconditional love and support along the way. You were always there to give me strength. To my uncle and aunt, thank you for the encouragement. You were my best counselors and supporters for my life in the United States. To my brother and sister, thank you for all the emotional supports and practical help through the whole process. To my husband, I could never have accomplished what I have across these years without your companionship. Thank you for your constant understanding, patience, and support. Finally, to my son, thank you for the happiness you have brought and the companionship I felt as I completed my dissertation manuscript.

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CHAPTER 1: INTRODUCTION

For several decades, one of the major focuses of the field of early childhood education has been investigating how to promote and enhance young children's learning and development. A growing number of research studies have emphasized the importance of the natural learning environment for young children's development, especially for those with disabilities (Dunst, Hamby, Trivette, Raab, & Bruder, 2000; Dunst, Bruder, Trivette, Raab, & McLean, 2001a). As a part of the 1997 amendments to the Individual with Disabilities Education Act (IDEA), Part C, an emphasis was noted on the importance of early interventionists providing services "to the maximum extent appropriate, in natural environment" and "in settings other than the natural environments that are most appropriate, as determined by the parent and the IFSP team, only when early intervention services cannot be achieved satisfactorily in a natural environment" to infants and toddlers, ages birth to three, with a disability or developmental delay (Sec. 303.126). The term "natural environment" is defined as "settings that are natural or typical for a same aged infant or toddler without a disability, may include the home or community settings." (Sec. 303.26). Furthermore, under Part B of the IDEA, a state must provide special education to children, ages three to six, with disabilities in the "least restrictive environment" a term similar to natural environment. Taken together, a general agreement thus has been established that in planning for and providing services for infants, toddlers, and preschoolers with disabilities or developmental delays the service delivery locations must be a "natural fit" in the same manner in which that fit naturally for those that do not have an identified disability or delay (Turnbull, 2004).

An ecological system theory perspective of children's learning indicates that children's development occurs when they experience learning opportunities within the context of normally occurring routines in familiar settings (Bronfenbrenner, 1979). These experiences and learning

opportunities may be planned or may happen serendipitously and occur as part of the child's daily living, child and family routines, family rituals, and family and community traditions (Dunst et al., 2000; Dunst et al., 2001a; Dunst, Herter, Shields, & Bennis, 2001b). Young children with disabilities, however, often are in need of a more deliberate approach. That is, to ensure that young children with disabilities are accessing learning opportunities and making meaningful developmental progress requires careful analysis of the types of learning opportunities that exist in their natural settings and the amount of scaffolding that might be required to support attainment of their goals (Xu & Filler, 2008). Research suggests that using children's everyday experiences as sources to extend children's learning and development is vital when providing services for infants, toddlers, and young children and their families (Dunst et al., 2000; Jung, 2003; Xu & Filler, 2008). Dunst and colleagues (2001a) proposed a four-step framework for practitioners to use as they plan together with families for using everyday family and community learning experiences as a way to increase learning opportunities for infants, toddlers, and preschoolers. First, the practitioners need to work with a family to identify potential learning opportunities in across multiple settings. Next, they select or prioritize those natural learning environments that can most consistently provide multiple learning opportunities for priority learning targets. Third, the practitioners and the family consider which of the identified learning opportunities best reflect the children's interests. Finally, with the information from the prior steps in hand, the professional and family work together to develop a plan to increase a child's natural learning opportunities in the natural environments (Dunst et al., 2001a).

Active family involvement in their children's education has long been considered to be an important factor for better outcomes of young children with and without disabilities. Research suggests that high levels of parental involvement in the education and learning of their young

children with disabilities correlate with success in learning and educational settings (Xu & Filler, 2008). Clearly, family members or other primary caregivers who spend the most time with a child may have the greatest impacts on the child's development assuming that they are provided with sufficient supports and resources to be effective in their interactions with their children (McWilliam & Scott, 2004; McWilliam, 2010). While families with children with disabilities make efforts to foster participation and adapt environments to include their children in a variety of activities within natural settings, they are likely to experience multiple difficulties and receive limited support to enhance their children's participation (Beckman & Hanson, 2002). The literature highlights a need for designing interventions to support families as they work with their young children with disabilities in natural learning environments.

An intervention approach that holds promise for supporting families as they engage their child in daily activities and routines is Embedded Learning Opportunities (ELO) intervention. While some studies used the term "Embedded Instruction", the term "Embedded Learning Opportunities" is used throughout the current study. ELO is a research-based intervention that was developed to increase the teaching and learning opportunities provided to children in natural environments (Horn, Lieber, Li, Sandall, & Schwartz, 2000). The term "embedding" refers to "a process of addressing children's target goals during daily activities and events in a manner that expands, modifies, or is integral to the activity or event in a meaningful way" (Pretti-Frontczak & Bricker, 2004, p. 40). ELO interventions can be used in one-on-one or group activities, with other teaching strategies, as well as across settings, developmental domains, and content areas. ELO interventions can occur during child-initiated, planned, and routine activities to target children's learning goals. The effectiveness of ELO interventions is evaluated by a particular child's progress on the selected goal.

To implement an ELO intervention the teacher must complete a number of steps beginning with identification of the child's most salient learning goals which can then be embedded through short, systematic instructional interactions into the existing routines and activities (Horn et al., 2000; Horn, Lieber, Sandall, Schwartz, & Wolery, 2002; Sandall et al., 2008). The specific steps for using ELO intervention in the classroom are as follows:

1. Clarify the learning objective and determine the criteria
2. Gather baseline information to determine the child's current level of performance
3. Use an activity matrix or other type of planning form to select activities, areas, or classroom routines in which instruction can reasonably be embedded
4. Design the instructional interaction and write it on a planning form
5. Implement the instruction, providing the number of opportunities as planned in the previous step
6. Keep track of the opportunities provided
7. Periodically (e.g., every two weeks or whenever you believe that the child has achieved the objective) conduct a probe to monitor the child's progress

Numerous studies (e.g., Daugherty, Grisham-Brown, & Hemmeter, 2001; Grisham-Brown, Schuster, Hemmeter, & Collins, 2000; Horn et al., 2000; Pretti-Frontczak & Bricker, 2001) noted that teachers were able to implement ELO interventions to achieve positive effects on young children's learning. However, to date, there has been relatively little research conducted on family's use of ELO interventions and thus on the effectiveness of ELO interventions in home and community settings. As noted previously, families with children with disabilities are willing to put forth a lot of effort to enhance their children's learning. One of the core values of ELO interventions is to help the adult independently implement the strategies to

support the child's learning in the naturalistic environments. Thus it appears logical that combining our knowledge of the effectiveness of ELO interventions within routine activities for young children, our knowledge of strategies for training a variety of adults to effectively implement ELO interventions, and the desire of families to enhance their children's active learning that ELO training for families may be an effective approach.

Statement of Purpose and Research Questions

The purpose of this study was to develop and implement procedures for supporting a parent's implementation of an ELO intervention to support their child's learning of important learning outcomes. Specifically, the primary research question investigated the parent's use of the trained ELO strategies and the impact on their child's three targeted goals of the parent implementation and their level of engagement. The secondary research question examined the impact of the parent-child interaction due to the parent's implementation of the ELO strategies.

Organization of Dissertation

The report of this study is organized into five chapters, followed by references, tables and figures, and appendices. Chapter 1 provides the introduction of the study topic, statement of purpose, and research questions. Chapter 2 presents a review of the literature most relevant to this study. Chapter 3 describes the study methodology that includes participants and settings, measurements, experimental research design and analytical method. Chapter 4 provides the results of this study. Chapter 5, the discussion, includes the summary, discussion, limitations, and implications for future research and for practice of the study.

References

- Beckman, P., & Hanson, M.J. (2002). Community participation of children with disabilities. In Odom, S. L. (Eds.), *Widening the circle: including children with disabilities in preschool program. Early childhood education series* (pp. 109-119). William, VT: Teachers College Press.
- Bronfenbrenner, U. (1989). Ecological system theory. In R. Vasta (Ed.), *Annals of child development: Six theories of child development: Revised formulations and current issues* (pp. 187-250). Greenwich, CT: JAI Press.
- Daugherty, S., Grisham-Brown, J., & Hemmeter, M. L. (2001). The effects of embedded skill instruction on the acquisition of target and nontarget skills in preschoolers with developmental delays. *Topics of Early Childhood Special Education, 21*, 213-221.
- Dunst, C. J., Hamby, D., Trivette, C. M., Raab, M., & Bruder, M. B. (2000). Everyday family and community life and children's naturally occurring learning opportunities. *Journal of Early Intervention, 23*, 151-164.
- Dunst C. J., Bruder, M. B., Trivette, C. M., Raab, M., & McLean. M. (2001a). Natural learning opportunities for infants, toddlers, and preschoolers. *Young Exceptional Children, 4*, 18-25.
- Dunst C. J., Herter, S., Shield, H., & Bennis, L. (2001b). Mapping community-based natural learning opportunities. *Young Exceptional Children, 4*, 16-24.
- Grisham-Brown, J., Schuster, J., Hemmeter, M., & Collins, B.C. (2000). Using an embedding strategies to teach preschoolers with significant disabilities. *Journal of Behavioral Education, 10*, 139-162.

- Horn, E., Lieber, J., Li, S., Sandall, S., & Schwartz, I. (2000). Supporting young children's IEP goals in inclusive settings through embedded learning opportunities. *Topics in Early Childhood Special Education, 20*, 208-223.
- Horn, E., Lieber, J., Sandall, S., Schwartz, I., & Wolery, R. (2002). Classroom models of individualized instruction. In S. Odom (Ed). *Widening the Circle: Including Children with Disabilities in Preschool Programs* (pp.46-60). New York: Teachers College Press.
- Individual with Disabilities Education Act, 20 U.S.C. & 1400 (1997)
- Lee, A. J. (2003). More better: maximizing natural learning opportunities. *Young Exceptional Children, 6*, 21-26.
- McWilliam, R. A. (2010). *Routine-based early intervention-supporting young children and their families*. Baltimore, MD: Paul H. Brookes.
- McWilliam, R. A. & Scott, S. S. (2001). A support approach to early intervention: a three-part framework. *Infants and Young Children, 55-66*.
- Pretti-Frontczak, K., & Bricker, D. (2001). Use of the embedding strategy during daily activities by early childhood education and early childhood special education teachers. *Infant-Toddler Intervention, 11*, 111-128.
- Pretti-Frontczak, K., & Bricker, D. (2004). *An activity-based approach to early intervention-third edition*. Baltimore, MD: Paul H. Brookes.
- Sandall, S., Schwartz, I., Joseph, G., Lieber, J., Horn, E., Wolery, R., Odom, S., & Chou, H. (2008). *Building Blocks for Teaching Preschoolers with Special Needs 2nd Edition*. Baltimore: Paul H Brookes.

CHAPTER 2: LITERATURE REVIEW

This chapter first reviews the existing research that addresses the use of embedded learning opportunities (ELO) or embedded instruction to enhance children's learning in the natural learning environments. Given that a critical first step in the implementation of effective ELO is the identification of appropriate goals and routines that fit into the child and families' routines, the routine-based interview is proposed as an appropriate strategy. Thus, next an overview of a routines-based interview is provided. Specifically, this chapter is divided into the following topics: (a) history of embedded learning opportunities; (b) empirical studies on embedded learning opportunities; (c) routines-based interview; and (d) conclusions.

History of Embedded Learning Opportunities

Over the past few decades, research and intervention addressing infants, toddlers, and preschoolers with developmental delays or disabilities has shifted from a focus on adult-directed and orchestrated activities to a more balanced approach that includes activities initiated and maintained by children (Pretti-Frontczak & Bricker, 2004). Embedded instruction is one of the child-initiated, adult-mediated approaches that focuses on providing instructions to young children with disabilities in the natural environments. Historically, studies have focused on providing embedded instruction in the field of early childhood has come from language intervention, particularly naturalistic or milieu teaching (Hart & Risley, 1968; Horn et al., 2000; Pretti-Frontczak & Bricker, 2004). These language interventions or naturalistic teaching approaches focus on the authentic routine activities and functional communication skills in natural environments (MacDonald, 1985; Snyder-Mclean, Solomonson, McLean, & Sack, 1984; Koegel & Koegel, 1995; Warren & Kaiser, 1988). Teaching becomes less an "add-on" and more

a part of children's daily lives. These research studies have demonstrated positive effects on children's language development gains when strategies were embedded into daily routines.

Embedding is also one of the major components of an effective evident-based intervention referred to as activity-based intervention (ABI; Pretti-Frontczak & Bricker, 2004). ABI is designed to promote the acquisition and generalization of functional and developmentally appropriate goals in young children with delays or disabilities. This approach aims to create and use authentic activities to enhance children's learning and development in the natural environments. Only a few studies have focused on the full implementation of ABI and its effects on children's skill gains (Apache, 2005; Losardo & Bricker, 1994; Sewell, Collins, Hemmeter, & Schuster, 1998). Two studies (i.e., Losardo & Bricker, 1994; Sewell et al., 1998) reported that children were able to acquire and generalize the skill of identifying object names and specific gross motor skills through an ABI. These authors further indicated that ABI actually produced greater generalization by the children to on teaching contexts and across materials and adults. Furthermore, those implementing the ABI noted that it was easily adapted to a typical preschool educational setting. Sewell and colleagues (1998) also found that pairing a simultaneous prompting strategy within the ABI resulted in the children achieving and maintaining their goals.

A number of researchers have suggested that it might be better to not attempted to research the efficacy of the full ABI approach but rather focused on an element or piece of the approach to facilitate adoption in the real world by allowing for a better match with individual personal beliefs or integrate into an individual educator's current approach (Horn et al, 2000; McWilliam, 2010; Pretti-Frontczak & Bricker, 2004). For example, embedded learning opportunities (or embedded instruction) is an instructional strategy that focuses on one aspect (i.e., embedding) of ABI rather than the whole approach (Horn et al., 2000). Children with

disabilities need additional guidance and supports to learn from natural learning opportunities that occur in their natural environments. Horn and colleagues (2000) proposed ELO as a “user friendly” instructional strategy to help preschool teachers or caregivers identify the opportunities that are most salient to the child’s learning objectives and embed short, systematic instructional procedures that support the child in existing routines and activities. The ELO approach is aimed at facilitating and supporting the use of embedding by early educators in the “real world” and who may be new to the strategy.

Similarly, routines-based intervention (RBI; McWilliam, 2010) is a model that also focuses on embedded instructions within family routines at the family’s home and community settings. Specifically, care providers embed developmental interventions in children’s regular routines and activities to promote their functional skill achievement. While both routines-based intervention and ELO focus on “embedding,” ELO further address the importance of providing instructional procedures on multiple learning opportunities. As noted earlier, young children with disabilities need additional supports to learn from the learning opportunities in the natural environments (Horn et al., 2000). Furthermore, because ELO was designed primarily for children with limited opportunities to learn new skills, adults need to create multiple learning opportunities and provide instructions within the learning opportunities to promote skill gains. For children with significant behavioral challenges or those needing behavioral management interventions, routines-based intervention could be an optional model to help decrease challenging behaviors in daily routines (McWilliams, 2010).

Empirical Studies on Embedded Learning Opportunities

A number of studies have investigated the effects of ELO interventions in supporting young children’s learning goals and adult’s implementations of ELO interventions (e.g.,

Daugherty, Grisham-Brown, & Hemmeter, 2001; Grisham-Brown, Schuster, Hemmeter, & Collins, 2000; Horn et al., 2000; Pretti-Frontczak & Bricker, 2001). Rakap and Parlak-Rakap (2011) conducted a literature review to evaluate the effectiveness of embedded instruction on the acquisition, generalization, and maintenance of specific child skills. The findings indicated that embedded instruction is an effective strategy to teach a range of skills (e.g., pre-academic, motor-adaptive, social, language, cognitive) to young children with a variety of developmental delays and disabilities (e.g., children with Down's syndrome, autism, speech language delays, cerebral palsy, hearing and visual impaired, communication disorders) participating in inclusive preschool classroom. The authors also noted that the research has demonstrated that children were able to generalize the skills they learned via embedded instruction across different people, settings, activities, and materials and maintains skills over time.

The research to date that has addressed the effectiveness of ELO as an intervention strategy can be group into three focuses: child skill acquisition, adults' ability to implement ELO instruction in inclusive school settings, and parents or primary caregivers' ability to implement ELO in home settings. In this section each one of these will be discussed followed by a summary and implications.

ELO's Impact on Child's Skill Acquisition

A number of studies (i.e., Chiara, Shuster, Bell, Wolery, 1995; Daugherty, Grisham-Brown, & Hemmeter, 2001; Fox & Hanline, 1993; Malmskog & McDonnell, 1999; Macy & Bricker, 2007) have examined whether ELO or embedded instruction is an effective way to support learning for young children with disabilities in an inclusive school settings. These investigations, however, did not use typical early childhood teachers to implement the instructions during classroom activities. In these studies, either the researcher worked directly to

implement the ELO procedure (i.e., Chiara et al., 1995; Daugherty et al., 2001; Malmskog & McDonnell, 1999) or the researchers trained university students to implement the intervention (i.e., Fox & Hanline, 1993; Macy & Bricker, 2007).

In the studies in which the researchers directly implemented the ELO intervention, they all reported positive outcomes for children. Specifically, in the Daugherty and colleagues (2001) study, the researcher trained three preschoolers with speech and language delays on a target (i.e., counting) and a non-target skill (i.e., color naming) when trials were embedded into ongoing routines and activities. Results indicated that all children were able to acquire the target skill but only one child gained the non-target skill. Malmskog and McDonnell (1999) worked with three children with a variety of disabilities on their active engagement skills by embedding the instruction into the ongoing classroom activities and reported significant improvements among all participants. Chiara and colleagues (1995) compared two different forms (i.e., small-group massed-trial and individually-embedded distributed-trial) using a constant time delay procedure in inclusive preschool classrooms and noted that both procedures were effective in teaching the target skills (i.e., picture naming) to all three-child participants.

Similarly in the studies in which trained research assistance or graduate students were trained and then implemented the ELO, positive outcomes were achieved for all participants. Specifically, in Fox and Hanline's work (1993) trained university practicum students implemented ELO intervention for cognitive, fine motor, and language target skills of two preschoolers with disabilities in an inclusive setting. The researchers reported that both children acquired the target skills. Macy and Bricker (2007) also conducted their study by training three graduate students to work with three children with disabilities and data showed that all children increased their social skills after the intervention.

Taken together, that is taking studies in which specifically trained individuals implemented the ELO interventions; the results confirm that positive effects in terms of children's learning on targeted outcomes can be achieved. All of these studies, however, also indirectly point out the importance of having well trained interventionists thus highlighting a need for training preschool teachers or parents in the "real world" to use this strategy in order to achieve the same positive outcomes.

Teachers' Implementation of ELO

Several other investigations (e.g., Grisham-Brown, Ridgley, Pretti-Frontczak, Litt, & Nielson, 2006; Grisham-Brown, Shuster, Hemmeter, Collins, 2000; Horn et al., 2000; Kohler, Strain, Hoyson, & Jamieson, 1997; Pretti-Frontczak & Bricker, 2001; Schepis, Reid, Ownbey, & Parsons, 2001; Wolery, Anthony, Caldwell, Snyder, & Morgante, 2002) have measured teachers' ability to embed instruction in inclusive school settings. For example, in a study by Grisham-Brown and colleagues (2006), a classroom teacher and teaching assistants were trained to create embedded learning opportunities on the acquisition of pre-writing skills in three preschoolers with disabilities. Teachers were able to successful in implementing the strategies during daily activities. Grisham-Brown and colleagues (2000) trained children's personal assistants to use embedding strategy for children with significant disabilities and found that even those with no formal education in teaching students with disabilities were able to conduct all intervention procedures with very high accuracy to help children skills gains after receiving training.

Horn and colleagues (2000) conducted a study to specifically examine the feasibility of teachers in inclusive settings to support young children's IEP goals through ELO interventions. They assessed the teacher's planning and implementation, the impact on child attainment of target skills, and the teacher's perceptions of the "usability" of the ELO interventions. Their

results indicated that children were able to make improvements on their target skills and that teachers' implementations of ELO increased. Furthermore, they reported that the teachers viewed the strategies favorably and as feasible. Horn and colleagues (2000) also found that teachers' implementation of ELO intervention (e.g., frequency, consistency) had significant impacts on children's performance. Schepis and colleagues (2001) evaluated a program for training four support staff to embed instruction within the existing activities in an inclusive preschool. All staffs received training that included information instruction (e.g., prompting, correcting, and reinforcing child behavior) and on how to create naturally occurring teaching opportunities. Following a workshop format training, an on-site training was provided in which coaching and feedback for implementation were provided. The authors noted that all staff member increased their use of correct teaching procedures and children were able to acquire skills during the intervention. Again the summary of these studies supports the premise that children with disabilities are able to acquire skills that are taught through an ELO approach. Furthermore, these studies document that teacher in "real world" settings can learn to implement the procedure given appropriate training and support.

Parents' Implementation of ELO

While most of the studies of ELO or embedded instructions have focused on school settings or teacher training, a few studies has begun to focus on how to train parents or caregivers to use teaching strategies embedded into family routines (e.g., Kashinath, Woods, & Goldstein, 2006; Woods, Kashinath, & Goldstein, 2004). For example, Kashinath and colleagues (2006) investigated the ability of parents to learn and use specific teaching strategies embedded within daily family routines and to assess the impacts on their child with autism's communication outcomes. Each parent received a parent-focused training to learn specific teaching strategies

that could be embedded into the family's routines and fit with the family's interaction styles. The findings stressed that parents were able to learn and embed teaching strategies into target routines and generalized their use across other family routines. All parents were satisfied with the intervention and believed that their children showed great improvements on their communication outcomes.

In another study conducted by Woods and colleagues (2004), the researchers trained caregivers to use specific teaching strategies to support their children's communication outcomes during preferred daily routines. All caregivers received a four-step training that included an introduction to the strategy, procedures for narrowing the strategy to fit specifically to their child's current abilities and needs, specific feedback and discussion on how to implement with their child, and opportunities for practicing the strategy. This same four-step procedure was repeated with additional strategies. Woods and colleagues indicated that caregivers increased their overall use of the strategies within target routines and were able to generalize the strategies across family activities. All children also demonstrated gains in their communication outcomes. These findings suggested that there is limited yet promising evidence that parents or caregivers can learn teaching strategies and embed use of them to address specific child targets into the family's daily routines or activities.

Both of these studies (i.e., Kashinath et al., 2006; Woods et al., 2004) thus demonstrated not only that families or primary caregivers could learn to implement the strategies but also that implementation did result in positive effects on their children's communication skills. However, it is important to note that both of these studies focused on enhancing the children's social communication and language skills and provided instruction to the parents in teaching strategies that in a general ways support children's early communication and language rather than focusing

on ELO that targeted more specific child outcome and those that were in other areas than communication.

Summary of Research on ELO and Implications for Future Research

ELO intervention can be considered as an effective approach to teach various skills for young children with a variety of disabilities or developmental delays. Further, it has been demonstrated that adults (e.g., teachers, parents, or caregivers) can learn to effectively implement the procedure in the “real world” to help children learn new skills, actively engage in routines and activities, and achieve positive functional outcomes. However, it should be noted that for the majority of the studies either the researcher worked directly to implement the ELO strategies or trained university students or preschool teachers as interventionists and these interventions took place in classroom settings.

While a few studies (i.e., Kashinath et al., 2006; Woods et al., 2004) investigated the impacts of parents’ use of ELO strategies within home settings, there is no research evidence that has focused on using ELO strategies to target the outcomes that reflect the parents priorities and that have been identified together in partnership with the child’s family. Therefore, it is not known whether ELO strategies could target the priority goals that were identified by families and implemented by parents as a part of their ongoing family routines. For that reason, more research is needed to specifically focus on developing a process to identify priority and functional goals with families and to provide on-going supports for parents to implement ELO strategies at home settings that focus on these family identified, child outcomes. Specifically, issues related to “what to” and “how to” promote parents’ implementation of embedded interventions within family routines needs to be addressed. As the first step, we need to know what are the family needs and work closely with family to jointly identify child goals that are a priority for the

family and are appropriate for training in embedded intervention. Even within the class-based literature, researchers have seen teachers struggle to identify functional goal that can readily and appropriately be embedded into natural routines and activities. Studies have reported that many IEP goals and objectives tend to be poorly written and do not appropriately address children and family needs (Pretti-Frontczak & Bricker, 2000). Thus, gathering information from families to understand their perceptions of their child's needs and then in turn to set up priority goals with families are the foundations for providing any supports to families with young children with disabilities (McWilliam, Casey, & Sims, 2009). McWilliams and colleagues have developed an approach referred to as the routine-based interview that specifically focuses on partnering with families to identify family priority and goals.

Routines-Based Interview

Routines-based interview (RBI; McWilliam, 1992) is one method that can be implemented to capture family needs, resources, functional task demands, family-level needs, and family priorities. RBI is a semi-structured interview that was designed to lead to the development of functional outcomes, to meaningful assessment of child and family functioning, and to the establishment of a positive relationship with the family (McWilliam, 1992; McWilliam et al., 2009). During a RBI with parents or caregivers, they are asked questions about their daily routines typically starting with the beginning of a typical day to the end of the day. It should be noted that "routines" are not activities the professional implements with the family but the naturally occurring activities happening with some regularity in the child's day including both home and community settings (McWilliam, 2010).

A complete RBI consists of the following six steps: (a) beginning statements; (b) routines as the agenda; (c) information from routines; (d) satisfaction with routines; (e) concerns and

priorities; and (f) outcome writing (McWilliam et al., 2009). Specifically, for the first step, the interviewer asks the family to share their main concerns, resources, and priorities. The conversation between the family and professions will then moves to the daily routines of the family. Next, through the conversation with family, interviewer obtains a clearer picture of how the routines occur and the family's satisfaction with each routine. Once all routines have been discussed, the interviewer summarizes the family expressed main concerns and works together with the family to prioritize the goals to target. Finally, the interviewer or a team member is responsible for turning the informal goals/outcomes into formal ones (McWilliam et al., 2009). Through the RBI process, the interviewer is more likely to be addressing the families' true concerns for their children (McWilliam, 2010).

As noted by McWilliam and colleagues (2009), approximately 50% of the states in the United States have incorporated the RBI procedure into their state's plan for implementation of the Infant Toddler Early Intervention service system (i.e., Part C of IDEA). McWilliam and colleagues (2009) have conducted an initial investigation to examine the efficacy of using the RBI for IFSP development. In this study, 16 families participated and were randomly assigned to receive the RBI or a more traditional IFSP development process already in place. The findings suggested that use of the RBI procedure resulted in greater family satisfaction with the IFSP development process and more functional and meaningful outcomes than did the traditional IFSP development procedure. The RBI procedure, typically, is used as a part of the development process for the initial IFSP. As with the initial IFSP outcome development procedures, the RBI approach could be used as the first step to assess family needs and identify functional and priority child outcomes prior developing ELO interventions for parents within family routines (Woods & Lindeman, 2008). The RBI can be viewed as a promising method for providing a

structure way to gather information on the everyday routines, activities, and events of children and their families, which is important for outcomes developing and ELO interventions planning that target the specific child outcomes.

Conclusions

As this brief review suggests, there is promising evidence that adults (i.e., early childhood teachers, primary-care givers and parents) can incorporate instruction for children's goals or objectives into typical daily routines. Children with disabilities benefit from adults' embedded instruction within familiar activities in the acquisition, generalization, and maintenance of targeted skills. Further, family members or caregivers who spend the most time with the child likely have the greatest influence on the child's development and with sufficient supports and appropriate information this influence can be capitalized upon to support positive child outcomes. Thus, while there is a strong assumption that active parent involvement in scaffolding and providing targeted instruction on priority learning outcomes for their children will have positive impacts on the children's learning, little empirical evidence has been reported to verify this assumption. Taken together, it appears logical to combined our knowledge of the use of RBI to understand family needs and develop functional goals with training families to implement ELO interventions within daily routines to support children's acquisition of the targeted functional goals. In doing so we seek to provide evidence that supports the efficacy of harnessing the influence that families have on their children's development and ensuring that their influence provides maximum opportunities for their children to grow and develop.

References

- Apache, R. R. G. (2005). Activity-based intervention in motor skill development. *Perceptual and Motor Skills, 100*, 1011-1020.
- Chiara, L., Schuster, J. W., Bell, J. K., & Wolery, M. (1995). Small-group massed-trial and individually-distributed-trial instruction with preschoolers. *Journal of Early Intervention, 19*, 203-217.
- Daugherty, S, Grisham-Brown, J. & Hemmeter, M. L. (2001). The effects of embedded skill instruction on the acquisition of target and nontarget skills in preschoolers with developmental delays. *Topics in Early Childhood Special Education, 21*, 213-221.
- Fox, L., & Hanline, M. F. (1993). A preliminary evaluation of learning within developmental appropriate early childhood settings. *Topics in Early Childhood Special Education, 13*, 308-327.
- Grisham-Brown, J., Ridgley, R., Pretti-Frontczak, K., Litt, C., Nielson, A. (2006). Promoting positive learning outcomes for young children in inclusive classrooms: A preliminary study of children's progress toward pre-writing standards. *Journal of Early and Intensive Behavior Intervention, 3*, 171-183.
- Grisham-Brown, J., Schuster, J., Hemmeter, M., & Collins, B.C. (2000). Using an embedding strategies to teach preschoolers with significant disabilities. *Journal of Behavioral Education, 10*, 139-162.
- Hart, B. & Risley, T. R. (1968). Establishing the use of descriptive adjectives in the spontaneous speech of disadvantaged children. *Journal of Applied Behavior Analysis, 1*, 109-120.

- Horn, E., Lieber, J., Li, S., Sandall, S., & Schwartz, I. (2000). Supporting young children's IEP goals in inclusive settings through embedded learning opportunities. *Topics in Early Childhood Special Education, 20*, 208-223.
- Kashinath, S., Woods, J., Goldstein, H. (2006). Enhancing generalized teaching strategy use in daily routines by parents of children with autism. *Journal of Speech, Language, and Hearing Research, 49*, 466-485.
- Koegel, R. L., & Koegel, L. K. (1995). Motivating communication with autism. In E. Schopler & G. Mesibov (Eds). *Learning and cognition in autism. Current issues in autism* (pp. 73-87). New York: Plenum.
- Kohler, F. W., Strain, P. S., Hoyson, M., & Jamieson, B. (1997). Merging naturalistic teaching and peer-based strategies to address the IEP objectives of preschoolers with autism: an examination of structural and child behavior outcomes. *Focus on Autism and other Developmental disabilities, 12*, 196-206.
- Lorsado, A. & Bricker, D. (1994). Activity-based intervention and direct instruction: a comparison study. *American Journal on Mental Retardation, 98*, 744-765.
- Macy, M. G., & Bricker, D. D. (2007). Embedding individualized social goals into routine activities in inclusive early childhood classrooms. *Early Child Development and Care, 177*, 107-120.
- Malmskog, S. & McDonnell, A. P. (1999). Teacher-mediated facilitation of engagement by children with developmental delays in inclusive preschools. *Topics in Early Childhood Special Education, 19*, 203-216.
- McWilliam, R. A. (1992). *Family-centered intervention planning: A routine-based approach*. Tucson, AZ: Communication Skill Builders.

- McWilliam, R. A. (2010). *Routine-based early intervention-supporting young children and their families*. Baltimore, MD: Paul H. Brookes.
- McWilliam, R. A., Casey, A. M. & Sims, J. (2009). The routine-based interview: A method for gathering information and assessing needs. *Infants and Young Children, 22*, 224-233.
- Pretti-Frontczak, K., & Bricker, D. (2001). Use of the embedding strategy during daily activities by early childhood education and early childhood special education teachers. *Infant-Toddler Intervention, 11*, 111-128.
- Pretti-Frontczak, K., & Bricker, D. (2004). *An activity-based approach to early intervention-third edition*. Baltimore, MD: Paul H. Brookes.
- Rakap, S., & Parlak-Rakap, A. (2011). Effectiveness of embedded instruction in early childhood special education: a literature review. *European Early Childhood Education Research Journal, 19*, 79-96.
- Schepis, M. M., Reid, D. H., Ownbey, J., & Parsons, M. B. (2001). Training support staff to embed teaching within natural routines of young children with disabilities in an inclusive preschool. *Journal of Applied Behavior Analysis, 34*, 313-327.
- Sewell, T. J., Collins, B. C., Hemmeter, M. L., & Schuster, J. W. (1998). Using simultaneous prompting within an activity-based format to teach dressing skills to preschoolers with developmental delays. *Journal of Early Intervention, 21*, 132-145.
- Snyder-McLean, L., Solomonson, B., McLean, J., & Sack, S. (1984). Structuring joint action routines: A strategy for facilitating communication and language development in the classroom. *Seminars in Speech and Language, 5*, 213-228.

- Wolery, M., Anthony, L., Caldwell, N. K., Snyder, E. D., & Morgante, J. D. (2002). Embedding and disturbing constant time delay in circle time and transitions. *Topics in Early Childhood Special Education, 22*, 14-25.
- Woods, J. J., & Lindeman, D. P. (2008). Gathering and giving information with families. *Infants & Young Children, 21*, 272–284.
- Woods, J., Kashinath, S., & Goldstein, H. (2004). Effects of embedding caregiver-implemented teaching strategies in daily routines on children's communication outcomes. *Journal of Early Intervention, 26*, 175-193.
- Warren, S. F., & Kaiser, A. P. (1988). Research in early language intervention. In S. Odom & M. B. Karnes (Eds.) *Early intervention for infants and children with handicaps* (pp. 89-107). Baltimore: Paul H. Brookes.

CHAPTER 3: METHODS

A single case, concurrent multiple baseline across behaviors design replicated with three different parent/child dyads was implemented to assess the effects of the intervention on parent use of ELO strategies and in turn the impact on their child's three targeted behaviors/goals (Horner & Baer, 1978). While each of the dyad cases was conducted using similar procedures and measures, modification occurred based on the unique contexts and needs of each parent and their child. Thus the methods section will be divided into two major sections: general methods and case specific methods. The general methods section will address participant selection, experimental design and procedures, and measurement procedures. This section will then be followed by presentations of each dyad including participant and setting descriptions, target behaviors, and specific procedures for conducting the case. Finally, a brief description of a pilot implementation of the procedures and measures is presented prior to discussing the general methods.

Pilot Study

A pilot study was conducted with a family of a two year-old typical developing child to assess the intervention procedures and measures prior to the experimental implementation. Prior to beginning the pilot, the researcher explained the purpose, intervention procedures, and parent's and child's roles to the mother. The mother reported that her child was able to follow simple directions but the child often felt frustrated when she was not able to solve problems during her play (e.g., toys were out of reach, couldn't sort the shape into right opening). Based on this discussion the researcher and mother selected the goal of basic problem solving steps for the child to be embedded into her free play at home. For baseline, the researcher asked the mother to play with the child for 10 minutes as they typically did at home. Then, the researcher

conducted an ELO intervention training with the mother and worked with the mother to develop specific instructional strategies and create multiple opportunities for the child to practice the skill at home. The creation of opportunities included placing the child's favorite toys out of reach but within her line of sight, adding some toys/activities that require higher problem solving skills (e.g., shape puzzle, sorting, matching toys, or different sizes containers), and having her mother provide sufficient prompts and scaffold to support the child's learning (e.g., mother guided simple problem solving strategies during play).

Following the training, the researcher video recorded 10 minute free play sessions in which the mother embedded instruction on problem solving strategies by creating opportunities and providing prompting support as needed. Video recorded sessions were conducted twice a week for three weeks for a total of six sessions. Throughout the six sessions the researcher provided ongoing support and coaching to the mother including both information on the child's progress, on the number of opportunities created by the mother, and on the type of instructional promptings. All sessions were coded for mother and child behavior change. Specifically, an opportunity was scored when the mother used a verbal cue (i.e., the mother verbally invited the child to play with the toys which were out of her reach). The mother's use of instructional prompts was also coded and included: a gesture prompt (i.e., the mother pointed out the shape sorter); a model (i.e., the mother modeled simple problem solving steps); and/or a physical prompt (i.e., the mother hold the child's hands to play toys). The child's correct response was scored when she was able to independently solve simple problems during her free play when the mother provided an opportunity. The results revealed that the mother was able to embedded multiple learning opportunities during the free play routine at home. The child also showed great improvement on her problem solving skills.

As a final step, the researcher asked the mother for her feedback and impressions regarding the value of the ELO intervention. Specifically, the mother was asked whether the goal was appropriate for her child, if the training information was easy to understand, and if the teaching strategies were practical and easy to embed into her and her child's daily routine. The mother reported that she felt that the training was easy to understand and follow. She also said that her child acquired the skill very quickly after she provided multiple opportunities for the child to practice during their daily routines.

Thus, the pilot implementation confirmed that the general strategies and materials used for providing training and support to the parent were appropriate and that the parent was able to implement the procedure. The procedures used to measure parent implementation of the ELO strategy and child attainment of the target goal were able to assess changes across time. Furthermore, inter-rater reliability assessment demonstrated that data code was reliable.

General Methods

The following section includes: general information about participant selection and recruitment, the experimental design and procedures implemented, and descriptions of measurements used.

Participant Selection and Recruitment

As noted earlier, the information about the selected family and the characteristics of each parent-child dyad are provided in the case specific methods. The criteria for selection of child participants were: (a) the child's age was between three to five years old; (b) the child was diagnosed with any identified disability or developmental delay either as per their country of origin's or country of residence's criterion (i.e., as defined in People with Disabilities Rights Protection Act, Taiwan and Law of P.R.C. on the protection of Disabled Persons, China or IDEA,

United States of America); (c) the child lived with at least one parent on a full time basis; and (d) the child did not have significant behavioral challenges as per parent's report. The last criterion was included given that this intervention did not aim to address managing these behaviors rather the intervention was designed primarily for children with limited opportunities to learn new skills.

The criterion for selecting adult participants was as follows: (a) the adult was the primary caregiver for the identified child during their family routines; and (b) the adult was willing to make a commitment to participate in the training procedures and implement the strategies in their home settings. There was no exclusion criteria based on parent or child demographics including their ethnicity, gender, or socio-economic status. Thus, parent and child with any ethnicity, gender, educational and income level was eligible to participate.

After obtaining university Human Subjects approval from the university's institutional review board (IRB), the researcher contacted local school and program administrators and teachers that serve children with disabilities and whose ages are between three-to-five in the United States and Taiwan for recruitment purposes. The parents who showed interests in participating were provided with a consent form and a brief questionnaire (See Appendix A). The questionnaire consists of the following parts: (a) child demographic information (e.g., age, gender, and type(s) of disabilities); (b) parent demographic information (e.g., age, relationship with the child); and (c) questions to obtain an understanding of the family's routines. In order to gain more complete information on the child's performance as they participated in family daily routines, families were asked to identify several regularly occurring and priority family routines and describe their child's strength and needs within each routine.

After completion of the consent form and the questionnaire, the researcher then contacted the family to gather more specific information about the family and child (e.g., what are some child learning goals that are a priority for the family), confirm the family's commitment to participate, discuss the potential benefit and risks of the study, and answer any questions that the family may have. Three families were thus recruited who met the criteria and consented to participate, one family living temporarily in the US and two families living in Taiwan.

Experimental Design and Procedures

The study employed a single case, concurrent multiple baseline across behaviors design replicated with three different parent/child dyads. Generalization of the parent's use of the ELO strategies and child's gains in each of the three target behaviors/goals were assessed by probing in a non-targeted family routine. There are several reasons why the researcher decided to use this design. First, the researcher can use an informal analysis to examine the specific behavior changes and generalization skills in different settings by using a single-subject design. Second, the effects of the intervention on both the parent use of ELO strategies and the child target behaviors cannot be reversed nor would we want to reverse them once the child has demonstrated growth and/or skill gain. Third, this design allows the researcher to intermittently collect data and estimate levels of behavioral changes at each time point that the intervention was introduced to a new behavior (Kennedy, 2005). Finally, the researcher can use the data from this study to identify the impacts of the intervention and to guide the design of a future group design study and/or repeated replications.

As noted earlier, the study has also been designed to add to our current knowledge on the efficacy of ELO interventions in that it is a systematic replication of the study conducted by Horn and colleagues (2000). Specifically, this study investigated the feasibility of parents in

home settings rather than early educators in center-based classrooms, as was the case with the Horn and colleagues study. A description of each phase (i.e., pre-implementation, baseline, intervention and generalization, and follow-up) is provided in the following sections.

Pre-Implementation. Initially, the researcher met with the family to broadly describe the concept of ELO intervention and conducted a Routine-Based Interview (RBI; McWilliam, 2010) with the family. The RBI is a family friendly method to gather information about a child's daily activity in order to develop a functional intervention plan. The RBI provides an organized way for the family to share their satisfaction and major concerns about the child as they engage in their family's routines (McWilliam, 2010). During the RBI, each family was asked to report the child's abilities in terms of three functional domains (i.e., engagement, independence, and social relationships) as a part of participation in regular family routines. It should be noted that the researcher did not make any judgments or suggestions and the family was encouraged to speak freely about their daily life. The key questions asked of each family routine are listed in Table 1.1.

In this study, the RBI helped the researcher understand the family's needs and develop strategies that addressed the child's functional learning goals within the identified family routines. Based on the information gathered from the RBI, the researcher and the family identified three learning goals/behaviors and selected two family routines for each goal/behavior in which the learning goals/behaviors could be reasonably addressed. The two family routines were selected one for the intervention training and one for generalization purposes. The researcher asked the family to consider: (a) which goals/behaviors should be priorities; (b) in which family routines the child can appropriately use the skills and in which the greatest number of opportunities could be created frequently; and (c) during which the parent would have time to

work with the child on the skills. The two target routines were selected from all possible family routines to optimize the following criteria: frequent likely occurrence of the target goals, adequate duration of routine, consistent location of occurrence, parent preference, and child preference for the routine.

Baseline. Once goals/behaviors and family routines were selected, data collection began for determining the number of learning opportunities currently being provided and the child's response to those opportunities across the three goals/behaviors during the selected family routines. All routines were video recorded for approximately 10 minutes with parents being asked to interact with their child as they normally would for the given routine. The researcher viewed the video recordings and coded the parent's support of the behaviors in terms of providing both opportunities and instructions and the child's response to opportunities. No specific instructions about "teaching" to support the child's learning of the behaviors were given to the parent.

ELO training and implementation. The intervention was designed to help parents to identify specific strategies for creating learning opportunities to support each goal/behavior. Prior to the first training session, the researcher provided an overview of the basic premise of ELO intervention to the parent and gave some hypothetical examples to help the parent apply the approach (e.g., Ming's goal of learning to make simple choices, following directions, and using utensil appropriately can be embedded into meal time by offering choices on foods and drinks, allowing him to help set up tables, and using a spoon or forks to eat his favorite food). After the parent gained a better understanding of the concept of an ELO intervention, a five step training procedure for each goal/ behavior was conducted with each parent participant. The training consisted of the following: (a) clarify the goal; (b) select strategies; (c) practice the strategies; (d)

discuss and reflect; and (e) monitor progress (See Figure 3.1). The specific components of each step are presented below.

First, the researcher reviewed and clarified the target goals/behaviors with the parent. Specifically, the researcher ensured the parent's understanding of the intent of the goal/behavior. They then worked together to clarify behavior such that they could be used by the child across materials and contexts. The discussion with the parents focused on creating natural and logical multiple opportunities for the child to demonstrate the behavior within and across settings/activities. It should also be noted that the goal/behavior might need to be modified (e.g., a buttoning goal might need to be expanded to include multiple fine motor grasping tasks) to ensure that multiple opportunities within (i.e., the targeted routine/activities) and across settings/routines (i.e., the generalization setting) could be provided. The researcher used an adapted "Home-Routine Matrix" form to help parents plan for sufficient learning opportunities to occur during home routines. A home-routine matrix reminded parents of: (a) the child's target goal/ behavior; (b) the planned activities and routines in which to embed learning opportunities and (c) the plan for creating specific opportunities within the specific activities and routines. An example of a completed home-routine matrix form is attached in Appendix B.

Second, the researcher used an "ELO-at-a-Glance" form (Horn et al., 2000) to guide the parent in developing specific strategies they can use for the selected goal/behavior. The researcher first explained the concept of a teaching sequence (i.e., parent's instruction – child's responsive behavior – parent's feedback) and showed some videos illustrating adults implementing the teaching sequence with a variety of different prompting levels and types. The researcher also used this opportunity to explain the use of a prompting hierarchy of a least to most prompts approach with a focus on fading prompts as soon as possible. The researcher then

reminded the parent of the child's target goal and asked the parent to consider: (a) what environmental modification(s) might be needed for the child to produce the behavior; (b) what he/she is going to say/do to set the occasion for the learning objective; (c) what prompt(s) will be provided; (d) what the child is expected to say or do; and (e) what contingent responses will be given to the child. An example of a completed ELO-at-a-Glance form is provided in Appendix C.

Third, the researcher encouraged the parent to practice the selected strategies with the child. For example, one child's goal was to use multiple word complete sentences to describe events as they occurred (e.g. I am eating an apple) or events that occurred in the recent past (e.g., I colored a picture at school.) in response to questions posed by the parent. The mother, hence, asked the child what she was doing and provided verbal prompts for her as needed to provide a complete sentence response. The researcher then provided feedback or suggestions based on the observed parent and child interaction.

After practicing the selected strategies, the researcher and the parent moved to the fourth step in which they discussed and reflected upon what they have learned during training. Specifically, the parent was asked to talk about her feeling and thoughts in terms of the strategies she had just learned and what possible barriers, if any, she anticipates as she begins implementation. The researcher and parent then discussed potential strategies to overcome or address any concerns or barriers as well as what other family routines learning opportunities might be embedded. Finally, the researcher gave the parent a "self-progress monitoring sheet" for her to record the opportunities she provided and the child's progress on the target skill across the day. An example of a "self-progress monitoring sheet" is attached on Appendix D.

The five-step training process occurred for each target goal/skill but only for the first session when a target goal was introduced. In subsequent visits, the researcher observed and videotaped the parent and child interaction in the targeted routines and discussed with the parent about the strategy use within the observed routines and provided feedback and suggestions to support parent's use of the strategies. Two weekly visits of 60 to 90 minutes were scheduled for the duration of the intervention for each of the three target goals/skills. A typical visit included: (a) gathering information about parent's use of selected strategies and the child's performance and/or improvements of target goals during the week; (b) observing the implementation of intervention and the parent-child interaction in the targeted routines; (c) providing parents with feedback and answering questions regarding their implementation; (d) discussing barriers and working together with the families to develop possible solutions; and (e) confirming or planning for the next visit (See figure 3.2). During the discussion each visit, the researcher specifically praised the parent's efforts, answered questions about embedding strategies, helped with problem solving if necessary, and provided encouragement for the parent to continue to embed learning opportunities during the week between visits. All sessions were videotaped and the researcher reviewed the entire video and identified a 10-minute segment of the parent-child interaction in the target routine for data collection.

Generalization. The generalization of both parent support of and child performance of each target skill was evaluated in another nontargeted family routine in which the skill could be appropriately addressed. The generalization data were probed just prior to implementation of the intervention for the skill and then regularly probed once the intervention began. Specifically, the generalization data were collected approximately every two or three weeks of the intervention phase and each time during the maintenance phase.

Maintenance. Once the parent's and child's target behaviors in the intervention routine had demonstrated clear and stable progress across several sessions, the intervention supports including the parent's prompting strategies and the researchers guidance and feedback to the parent for the target behavior ended. The plan for maintenance probe collection was once two weeks after the intervention sessions had ended and again in two more weeks (4 weeks post intervention). Because all three parents did not have extra time at the end of this study, the maintenance probes were collected twice (i.e., at 2 and 4 weeks) for the first behavior/goal of each child, and once for the second/ third behavior/goal (i.e., 2 weeks) of each child. The maintenance data were collected across all selected routines including generalization routines for both the parent and child behaviors.

Measurement Procedures

A number of measures and measurement procedures were identified and used to address the primary (i.e., impact on parent behaviors, child target goals, and child engagement) and secondary (i.e., impact on parent/child interaction quality and parent perception of social validity) research questions. Data collection procedures consisted of both continuous and repeated measures. Table 3.2 presents each of the research questions and the measures used to address each question.

The continuous measures (i.e., for parent behavior and child target goals/behaviors) included a real-time event recording procedure and a visit log for anecdotal notes including child and parent dispositions during the session and any other impressions relevant to the study by the researcher. The repeated measures used were two observational rating scales with one focused on the quality of the parent/child interaction (i.e., IPCI) and the second on the child's level and quality of activity engagement (i.e., STARE). As mentioned above, all visits were video recorded,

and 10-minute clips of parent and child interaction during selected routines were used for the continuous measures as well as the two observation rating scales. Detailed descriptions of the measures and measurement procedures are as follows.

Continuous measures. A real-time event recording system and a visit log were conducted to collect information on both parent and child behavior change for each visit. The continuous measures were used to assess behavior in baseline, intervention, and follow-up phases as well as for assessing generalization in non-trained setting/routine.

Real-time event recording system. Real-time event recording system is an event recording method using a multi-mode data collection APP to document individual occurrences of a target behavior (Kennedy, 2005; Romanczyk, Gillis, Callahan, n.d.). An event recording system requires a data collector to observe whether a behavior occurs or does not occur during an observation period. Once the length of an observation session is identified, the observer recorded each time an event of interest occurs. The event recording system was selected because it provides an unambiguous estimate of the frequency of a target behavior occurred during an observation period (Kennedy, 2005). A multi-mode data collection APP named “ABC Video Pro” was used as a data collection tool to collect the exact time when each event of interest occurs. The ABC Video Pro APP contains multiple modes for behavior analysis purposes (e.g., event or interval modes) and allows data recorders to customize multiple buttons for behavior and events, frequency and duration, as well as operational defined prompts (Romanczyk, Gillis, Callahan, n.d.). In this study, event mode was selected on the ABC Video Pro APP and buttons were defined with event of interests and different levels of prompts.

In the current study, a real-time event recording system was used to collect both parent and child behavior. Parent behavior included parent’s provision of a learning opportunity and

instructional support in the form of prompts for the child's target skill. The child behavior was the child's response to the parent opportunity and demonstration of the target goal/skill. Observers viewed the 10-minute video clip for a session and coded both parent and child behavior.

First for the parent behavior, an observer recorded if any of the defined parent's provision of a learning opportunity occurred during the 10-minute session. When a learning opportunity was identified, the observer then recorded the type of parent instructional cues that was provided. Generally (Note that specific definitions aligned with the unique child goals/skills are provided in the individual case method descriptions), parent instructional cues included codes for non-verbal cue (i.e., parent used eye contact or facial expression to request the target behavior), verbal cue (i.e., parent verbally cued the behavior from the child), visual cue (parent used pictures or real objects to prompt child's behavior), and model (i.e., parent modeled the behavior for the child). Once the recording was complete, the observer counted the total number of parent provided learning opportunities and the nature of the instructional cues during the 10-minute session.

For each learning opportunity a child behavior category was completed. The child behavior coding, while similar, was conducted somewhat differently. Specifically, for the child behavior, an observer recorded if the child produced a correct or incorrect response to the parent's provision of a learning opportunity. Scoring a child correct response included designation of whether the correct response occurred following the parent's provision of an opportunity. An incorrect response was coded if the child did not respond to the parent's opportunity, produced a different response that was not the appropriate one, produced a partially correct response, or produced the behavior only with additional prompts beyond the original

prompts/cue. In general (Note: again specific definitions are provided in the case descriptions), the child response codes included correct response (i.e., the child correctly and independently produced the target behavior as defined), prompted response (i.e., the child needed additional prompts from parent to complete the behavior), no response (i.e., the child did not show any response to the parent even with additional prompts), and incorrect response (i.e., the child produced a different response that was not the appropriate one). The observer then counted the total number of child correct behaviors and calculated a percent correct of total opportunities. Finally, the parent's response to the child's behavior was coded. The codes included positive feedback, negative feedback, prompted feedback (Note: again specific types of prompts are provided in the case descriptions), and no feedback.

Inter-observer agreement of real-time event recording system. The researcher was the primary data collector and coder. Interobserver agreement was conducted separately for both parent and child behavior. A graduate student served as reliability coder and was naïve to the specific experimental procedures of the study. The training procedures were as follows. First, the researcher provided the coder with a copy of the behavioral definitions, observational codes, and the recording system and verbally explained the coding process. The researcher then reviewed and practiced coding using a training video that closely represented the situations that the coder would be observing. Following the practice coding, the coders independently scored additional video examples and the score was analyzed to determine the interobserver agreement percentage. It should be noted that both trainers were required to record the real time of the occurring events by using the multi mode data recording APP. The acceptable time differences of the same event was based on the first coder's recording time plus/minus 2s. Interobserver agreement levels of parent and child behavior were calculated by summing the number of

agreement and dividing that number by the sum of agreements plus disagreements and multiplying by 100. Training continued until a minimum criterion of 80% agreement was obtained between the two coders.

After the training session, two coders independently coded randomly selected videotape segment for each target behavior of each parent/child dyad. Interobserver agreement was assessed on approximately 25% of the sessions for each phase (i.e., baseline, intervention, follow-up) as well as for generalization probes. The results of interobserver agreement of each parent/child dyad are discussed in the case specific methods sections.

Data analysis. As data was collected, the results of each session were graphed and analyzed utilizing visual analysis of the graphs on a continuous basis. Specifically, in order to better understand the nature of the findings, the researcher visually inspected the graphs considering the level, trend, variability, immediacy of effect, and overlap of the data. The changes of the data on the graph were visually observed to help the researcher identify patterns and determine next steps (e.g., phase changes).

Visit log. Following each visit, a visit log were completed by the researcher to address the following: (a) what activity modification(s) were observed; (b) what behaviors both verbal and nonverbal did the parent direct toward their child; (d) how did the parent respond to their child; and (e) what materials were used. The researcher also logged her general impressions of the visits. This log served as a reliability check to assess the parent's adherence to the planned ELO procedures. Furthermore, informal check-up (i.e., phone call or text with parents) was conducted to collect information between visiting sessions. The information was served to support later ad hoc analysis of child and parent behavior changes.

Repeated measures. The repeated measures included two observational rating scales each based on the following scales: *Indicators of Parent-Child Interaction* (IPCI, Baggett, Carta, & Horn, 2009) and *Scale of Teachers' Assessment of Routine Engagement* (STARE, McWilliams & Casey, 2008). Each rating scale measure was conducted on a regular schedule across all phases of the study. Specifically, the collection occurred once during baseline, three times during intervention, and once for follow-up for each target behavior in both the targeted and the generalization routines (i.e., leg of the multiple probe/baseline). Specific information for the two measures is provided in the following sections.

IPCI. The IPCI is a progress monitoring tool that measures the nurturing skills of parents and/or other primary caregivers that promote positive child social emotional behaviors and development (Baggett, Carta, & Horn, 2009). The approach focuses on activities that routinely occur and in which caregivers and young children interact in home or childcare settings and thus lend themselves to repeated administration. The IPCI consists of two main domains of behavior coding: Parental Caregiver (P/C) and Child (Ch) domains. Each domain is further divided into subdomains with the P/C domain including facilitators and interrupters subdomains and the Ch domain including engagement and reactivity/distress. Data are collected during a 10-minute observation period of the IPCI activities (i.e., free play, looking at books, distraction task, and dressing task). All items of each domain/subdomain are scored on a 4-point scale (0 = never, 1 = rarely, 2 = sometimes or inconsistently, and 3 = often and consistently).

For the current study, the purpose was to assess the quality of parent and child interaction during the selected family routines, thus only the coding items (domains and subdomain) was used not the IPCI activities. Specifically, the researcher used 10-minute video-clips from which the observational measures were being coded and recoded them using the IPCI rating scale.

Further, because the IPCI was designed for children under the age of 3 and their primary caregivers, some of the IPCI item definitions and examples were modified to fit the older children (i.e., dyad 1 and dyad 3) in the current study. An example of a modification made was to change the example of child “positive feedback”: “the baby smiles and coos as Mom shows a book to the baby” to “the child smiles and says “yes, I want to play” when Mom asks if he/she wants to play with a ball.” Definitions and examples of each of the dimensions of parent facilitators (i.e., acceptance/warmth, uses descriptive language, follow child’s lead, introduces/extends, and responds to distress) and parent interruptions (criticism/harsh voices, restrictions/ intrusions, and rejects child’s bid), along with child engagement and reactivity/distress are shown in Appendix E.

Both parent (i.e., facilitators and interrupters) and child (i.e., engagement and reactivity/distress) behaviors were coded. Specifically, the researcher viewed the 10-minute video clip and made tally marks next to each IPCI item on the modified rating sheet when the item was observed. After viewing the video, each IPCI item was rated on a 4-point scale of relative frequency where 0 = never, 1 = rarely, 2 = sometimes or inconsistently, and 3 = often and consistently. The researcher then obtained a subdomain percentage score for each observation by summing the scores of all items of the subdomain and dividing the summed score by the total possible points for the subdomain. Using this method, higher percentages of parent facilitators and child engagement indicated more positive behaviors and higher percentages of parent interrupters and child reactivity/distress indicated more negative behaviors. These scores were presented on a graph to allow for clear comparison of both adult and child behaviors across coded routines. See Appendix F for the modified rubric sheet used for coding the video observations with this measure.

Inter-observer agreement of IPCI. The researcher served as a primary data coder and a trained graduate student was the second coder to ensure the reliability. The training procedures were as follows. First, the researcher provided a copy of the IPCI manual and the modified IPCI rating sheet to the second coder. The researcher then reviewed and practiced coding using video samples with the coder until a minimum criterion of 85% agreement for each subdomain were obtained between the two coders. Specifically, inter-observer agreement scores were calculated by using the IPCI reliability check sheet (see Appendix G). First, the researcher summed the scores for each item of the subdomain from the primary coder and reliability coder. Next, the researcher recorded the number of agreements and disagreements of each subdomain. Finally, an average percent agreement across all subdomains was calculated by using the number of agreement divide sum of number of agreements and disagreements. After the training session, two coders independently coded 25% of the coded sessions for each parent/child dyad. The results of the interobserver agreement of IPCI are provided in the case specific methods section.

STARE. The STARE is a tool for measuring child's engagement level across all routines of the child's day (McWilliam & Casey, 2008). The STARE helps teachers or other adults be more aware of child engagement across all routines of the day and determine which routines are particularly difficult or easy for a child (McWilliam & Casey, 2008). The STARE measures two components (i.e., the amount of time the child is engaged and complexity of the engagement) in a variety of routines. The adult observes a child for about 10 minutes during each routine and rates the child's engagement time and complexity. Specifically, in the first component (child's engagement time), the adult scores the child's engage behavior with adults, peers, and materials on a 5-point scale (1 = almost none of the time, 2 = little of the time, 3 = half of the time, 4 = much of the time, 5 = almost all of the time). In the second component (complexity), choices on

the scale include 1 = non-engaged, 2 = unsophisticated, 3 = average, 4 = advanced, 5 = sophisticated.

In order to assess child engaged time and complexity with the family at home or in community settings as was done in this study, modifications were made to the STARE rating system. First, the school routines noted on the STARE were changed to the selected family routines (e.g., meal, dressing/ undressing, play time) on the rating system. Furthermore, descriptions and examples of child engaged behavior and complexity within the home setting and with family members were added to the rating system. Just as in the STARE, this modified version had two components, engagement and complexity. Again just as in the STARE, in this version, the observer observed the child's behavior on the 10-minute video clip and coded engaged/ non-engaged behaviors on the rating sheet for the engagement component. At the end of the 10-minute observation, the observer used a 5-point scale to rate the child's engaged behavior. In the complexity component, the observer only considered the child's engaged behavior and recorded the complexity of the engaged behaviors within the selected routine on a 4-point scale. The definitions of engagement and complexity along with the modified rating sheet are provided in Appendix H.

Inter-observer agreement of STARE. The researcher was the primary data coder and a trained graduate student was the second coder to ensure the reliability of STARE. The researcher first provided a copy of STARE coding sheet to the second coder. The researcher then reviewed and practiced coding using video samples with the coder until a minimum criterion of 85% agreement for each subdomain were obtained between the two coders. Inter-observer agreement levels were calculated by summing the number of agreement and divided that number by the sum of agreements plus disagreements and multiplying by 100. After the training session, two coders

coded separately the videotape segment for each target behavior. Inter-observer reliability was assessed on 25% of the sessions. The results of the interobserver agreement of this measure are provided in the case specific methods section.

Implementation fidelity. Given that a primary outcome measure for the proposed study was the parent's implementation of the ELO procedure, implementation fidelity for the ELO procedure was assessed through the parent behavior measure. The researcher served as the "trainer" for the parents in how to implement the ELO procedures, thus, requiring a check to ensure that all the parents received all components of the training. Implementation fidelity, therefore for the proposed study was defined as the behavior of the researcher (i.e., what is the researcher providing to the parents). An implementation fidelity checklist was completed by a trained graduate student. The implementation fidelity measurement tool was divided into the two major parts of the intervention (i.e., understanding family needs/ELO Overview and ELO training). The first part (understanding family needs) included three components (i.e., conducting an RBI, selecting goals, and providing an overview of ELO). The second part (ELO training) consisted of five steps (i.e., clarifying the goals, selecting strategies, practicing strategies, discussing and reflecting, and monitoring progress). On the fidelity tool, each component/ step of both parts was represented by specific items that needed to be addressed.

The trained coder used the implementation fidelity checklist to measure the implementation fidelity of this study (see Appendix I for an example of the implementation fidelity checklist). For the first part of the implementation fidelity checklist, the coder was asked to view two videos of each parent/child dyad. The first video includes a routines-based interview conducted by the researcher and the process of goal selection with the family. The second video was of the researcher providing an overview of ELO to the parent. For the second part (i.e., Goal

Specific ELO training), the coder was asked to view three videos (i.e., one video for each of the three target behaviors/goals) for each parent/child dyad. The coder was asked to mark the observed items of each component/step to assess whether the researcher completed the ELO training and implementation procedures fully. Percentages for implementation fidelity for each dyad were calculated on both parts of the implementation measurement tool. Specifically, for the first part (i.e., understanding family needs), the researcher simply summed the number of all marked observed items and divided the number by the total number of items and multiplying by 100. For the second part (i.e., ELO training), the researcher calculated a completed percentage for separately for each goal. Again, an implementation fidelity percentage was calculated by summing the number of all marked observed items and divided the number of the total items of each goal and multiplied by 100 to obtain a percentage per goal.

Social validity. After each visit, the researcher asked the parent what was working well, what was challenging, and what was helpful. Analysis of the notes from the discussion with the parent was used to understand the parent's perspective regarding the social validity of the intervention. Parents also completed an exit survey after the intervention was completed. Specifically, the exit survey was designed to gather parents' perceptions on the importance, effectiveness, and appropriateness of the intervention training procedures and their satisfaction with the intervention following completion. The exit survey included 5 five-point Likert scale questions and five open ended questions. In the first 4 five-point Likert scale questions (i.e., 5 being strongly agree and 1 being strongly disagree), parents were asked their general thoughts of regarding the entire intervention process. In the last five-point Likert scale question (i.e., 5 being very useful and 1 being not useful at all), parents were asked their thoughts regarding the usefulness of specific components of the ELO intervention. Parents were asked to read each

statement and check the box that best matched their view. Parents were also encouraged to add any additional comments under each item. In the open-ended questions, parents were asked to write their thoughts more generally about participating and the procedures learned. A copy of the exit survey can be seen in Appendix J.

Lastly, an informal interview was conducted with the parent during the final intervention session. Parents were asked to share their overall feelings regarding participation in the study, what were some challenges they faced during the intervention, and how the intervention could be improved.

Data syntheses of these measures were conducted as follows. The mean of the five Likert scale questions on the exit survey was calculated of each dyad (parent). The results of the notes from each visit, parents' answer of open-ended questions on the exit survey, and exit interview were qualitatively analyzed by looking for themes and statements that communicated the parents' ideas.

Dyad 1 – Mrs. Guan and Fan - Methods

Participants and Settings

Fan was a five-year-old girl with autism. She lived with her father, mother, and a younger sister (3 months old) in a one-bedroom apartment in a college town of the United States. Fan's family had moved to the United States for a one-year stay and had been living in the US for approximately 6 months at the start of the study. Mrs. Guan, Fan's mother, was identified as adult participant for this study. Mrs. Guan had a doctoral degree in Biochemistry field and worked for a university in China as a researcher. After the family moved to the United States and their second child was born, Mrs. Guan decided to take a few months off to take care of Fan and her younger sister.

Fan was diagnosed with autism at the age three while the family was living in China. Mr. and Mrs. Guan shared that they had never heard about autism before Fan's diagnosis. In addition to having Fan attend a community preschool program in China, they also enrolled Fan in a self-contained special education classroom to receive services two to three times per week. When they moved to the United States they were initially told that a local private autism program had a yearlong waiting list so they opted to enroll her in a community preschool. At the time of the study, Fan had just been referred to the local school district for special education evaluation.

Fan showed significant developmental delays in her communication and social skills. She engaged in echolalia but was able to make appropriate requests (e.g., ask for help) or answer simple questions (e.g., "yes/no" and "what" questions) using short, simple phrases. Even though Fan had only lived in the United States for six months prior to beginning the intervention she had learned some English during this time. According to her preschool teacher, Fan showed great improvements in her English vocabulary but did not like to interact with her peers at school. She was able to follow simple directions (e.g., line up) but did not like to participate in-group activities. When Fan was at home, she would engage in solitary play for a long period of time and liked to play with toys or read books in a specific routinized manner.

Mr. and Mrs. Guan were very satisfied with Fan's educational experience in the United States and felt that Fan was happy in her preschool. The family wanted to participate in this study to learn some strategies to work with Fan and help her with transitioning to elementary school the following year when they returned to China.

The intervention took place in the living room or dining table where the playtime routine and/or mealtime routine, respectfully, usually occurred for this dyad. All materials and equipment that typically belonged to the routine and context were included. Specifically, the

mealtime routine in the dining area included a table, chairs, dishes, food, and utensils. The indoor playtime routine in the living room included a sofa, a small bed, a desk, children's toys, books, and/or electronic equipment (e.g., computer, i-pad, DVD player). In addition to Fan and her mother, her father and younger sister were present during these family routines. It should be noted, however, that the data was only collected for Fan and Mrs. Guan's interaction.

Procedures

As described in the general methods, the target goals and routines in which the goals could be naturally embedded were identified during the RBI. During the RBI, Mrs. Guan shared that she really worried about Fan's social-communication and social interaction skills. She wanted very much for Fan to be able to talk about what she did during the day while attending preschool. She also hoped that Fan would learn to play with her peers in school. Through informal discussion, the researcher and Mrs. Guan identified three goals for Fan: a) to use multiple word complete sentences to describe events as they occurred (e.g. I am eating an apple) or events that occurred in the recent past (e.g., I colored a picture at school.) in response to questions posed by the parent; b) to engage in pretend-play that expanded beyond the routinized scenarios in which she currently engaged; and c) to be able to identify when asked her own as well as other's emotions. For the first goal, the researcher and Mrs. Guan chose mealtime as the target routine and indoor playtime for generalization. The target routine for the other two goals was indoor playtime and the routine for generalization probe was mealtime. Considering Fan's school schedule, all visits were scheduled in the evenings at dinnertime and/or playtime after their dinnertime. Once the target goals and routines were selected, baseline, ELO training and implementation, measurement, and interobserver agreement procedures were conducted as described in the general methods section.

Target Goals and Measurement Procedures

Target goal 1. The first goal for Fan was using multiple word complete sentences to describe events as they occurred or events that occurred in the recent past in response to questions within 2 secs posed by the parent during mealtime (please see appendix K for specific information). Because Fan was able to use words to answer simple questions, she was expected to use complete simple sentences (i.e., S+V or S+V+O) to describe what is occurring or occurred. To embed this goal, Fan's mother needed to create opportunities by asking Fan questions about what she was doing and had done during the day. Specifically, opportunity was scored when the parent used a verbal cue. Verbal cues included asking questions that were related to their dining (e.g., What's father doing? What are you eating?) or about Fan's day (e.g., What did you do at school today? Who did you play with?), along with or without a non-verbal cue (i.e., parent looked at the object when asking questions), a gestural cue (i.e., parent pointed to the object when asking questions) and/or a visual cue (i.e., parent presented the object to the child when asking questions). The child's correct response was scored when Fan independently (i.e., without additional prompts) and accurately (i.e., the information was correct) using either English or Chinese responded with a complete simple sentence (i.e., S+V or S+V+O) to the parent's questions. If Fan didn't respond to parent's questions or gave the incorrect response, the parent then provided additional prompts such as a verbal prompt (i.e., parent asked the question again or verbally prompted the child for a correct answer); a visual prompt (i.e., parent showed the picture of the answer to the child); gestural prompt (i.e., parent pointed to the object of the answer to the child); and/or a model prompt (i.e., parent modeled the correct answer of the question).

Furthermore, due to the nature of this language goal, the researcher transcribed the audios into written forms for closer data analysis rather than using the multi-mode data collection APP

for this goal. Specifically, the researcher closely looked at the written transcript of Fan's and her mother's conversation during the 10-minutes observation period and identified each question asked by mother and Fan's response to the question. The reason we used the written transcript analysis of this target goal was due simply to the fact that it gave the observers extra time to analyze the completed conversations between parent and child.

Target goal 2. The second goal for Fan was engaging in pretend-play that expanded beyond the routinized scenarios in which she currently engaged during her indoor playtime in response to her parent's cue within 2 secs (again see appendix K for specific information). According to Mrs. Guan, Fan engaged in only simple pretend play skills (e.g., holding a bear doll as her baby with minimal variations). Thus, the specific goal for Fan was to expand her pretend play by using a logical sequence with real or substitute objects, and/or imaginary absent objects during her play. To embed this goal, the plan was for Mrs. Guan to simplify each activity and demonstrate pretending actions with Fan. Specifically, an opportunity was scored when the parent used a non-verbal cue (i.e., parent provided objects for pretend play and simply used facial expression to cue the child); verbal cue (i.e., parent verbally requested the child to do pretending actions); gestural cue (i.e., parent pointed to the objects or object substitutions); visual cue (i.e., parent showed pictures or books of the pretending actions); and/or a model cue (i.e., parent modeled the pretend actions). The child's correct response was scored when Fan was able to independently (i.e., without additional prompts) present the expected pretend actions following parent's provision of opportunities. Next, if Fan didn't respond or gave the incorrect response, the parent provided additional prompts such as a verbal prompt (i.e., parent verbally requested the behavior again or verbally prompted her for a correct response); a visual prompt (i.e., parent showed pictures or books of the pretending actions); a gestural prompt (i.e., parent

pointed to the objects or object substitutions); a model prompt (i.e., parent modeled the pretend actions); and/or a physical prompt (i.e., parent physically prompted the child for the pretending actions).

Target goal 3. Fan's third goal was identifying her own emotions or other's feelings either by labeling them or by responding appropriately (e.g., saying "yes/no") to a question asking her about a specific feeling within 2 secs during playtime (again please see appendix K for specific information). Based on discussion with Mrs. Guan and observation during baseline, Fan was able to indicate simple emotions/feelings on books or pictures (e.g., the rabbit is happy or the child is sad). The expectation for Fan was to use emotion words to describe her or other's feeling by responding to a question asking her about feelings. To embed this goal, Mrs. Guan asked Fan about her emotions and/or other's emotions (e.g., how did you feel when playing with Daddy? how did Mommy feel now?) when interacting with her during playtime. Specifically, an opportunity was scored when the parent asked Fan questions about her or other's feelings by using a verbal cue (i.e., parent verbally asked questions about Fan's or other's emotions) along with or without non-verbal cues (i.e., parent used facial expression of her feelings) and/or gestural cues (i.e., parent pointed to Fan or others). The child's correct response was scored when Fan was able to independently (i.e., without additional prompts) and accurately identify her emotions and/or other's emotions in responding to her parent's questions. Just as the other two goals, if Fan didn't respond or gave the incorrect response, the parent provided additional prompts included a verbal prompt (i.e., parent verbally asked the question again or verbally prompted her for a correct response); a gestural prompt (i.e., parent pointed to Fan or others); and/or a model prompt (i.e., parent modeled the correct response).

Interobserver-agreement. As described in the general method section, interobserver agreement of the real-time event recording system was collected on 25% of all sessions for each phase (i.e., baseline, intervention, and maintenance) and routine (i.e., target routine and generalization routine). Table 3.3 presents the results of the interobserver agreement for both parent and child behavior measure. For the parent behavior of the target routine during the baseline, a 100% interobserver agreement was achieved across all three goals. During the intervention phase, an interobserver agreement mean of 85.63% with a range of 81.5% - 88.88% across all three goals was achieved. For the generalization routine, the interobserver agreement for the parent behavior was a mean of 85% with a range of 80.5%-90% across all three goals. Furthermore, for the child behavior of the target routine during the baseline phase, the interobserver agreement level was also very high (i.e., 100%) across three goals. During the intervention phase, the interobserver agreement had a mean of 87.59% with a range of 82%-90.3% across all three goals. During the generalization routine, the interobserver agreement of the child behavior was a mean of 87.33% with a range of 84.8%-91.7% across all three goals.

As noted earlier, interobserver agreement for the IPCI was collected for 25% of all sessions for each phase (i.e., baseline, intervention, and maintenance). The overall percentage of interobserver agreement for the IPCI for Dyad 1 was a mean of 88.24% with a range of 86.3%-90.18%. Interobserver agreement for the STARE was collected for 25% of all sessions across each phase. Interobserver agreement levels for the STARE had a mean of 90.27% with a range of 83.33%-100%.

Dyad 2 – Mrs. Ping and Xiao-An – Methods

Participants and Settings

The second child, Xiao-An, was a three-year-old boy with cerebral palsy. Xiao-An lived together with his mother, father, and grandparents in their home in Taiwan. The family was expecting their second child, which was born just a few weeks after the study was completed. Mr. and Mrs. Ping shared that Xiao-An had a normal birth and appeared to be developing typically. At 15 months, however, he required heart surgery during which he sustained brain damage. Xiao-An remained in the Pediatric Intensive Care Unit (PICU) for one month following the surgery. Xiao-An continues to experience seizure and is receiving medication to manage them. He was no longer able to communicate or controlled his motor movements.

Once he was discharged from the hospital, Mr. and Mrs. Ping sought out an access for occupational therapy, physical therapy, speech language therapy, acupuncture treatment, and foot massage treatment in a local hospital. They also purchased some assistive technologies (e.g., feeding chair, walker, bathing chair) to help Xiao-An's life at home. Xiao-An began attending a self-contained early childhood special education classroom not long after they began participating in the study. Xiao-An's parents felt that he had made a lot of progress over the last year.

Xiao-An was nonverbal but was able to make some sounds to seek attention or make simple requests. He really liked to play with his parents and was able to follow simple directions (e.g., take one more bite), however, he always cried or screamed when someone took his toys or i-Pad away. In addition, Xiao-An was able to sit on his own for few seconds and needed assistance with pulling up to different position. His goal for physical therapy was increasing his independent sitting ability and strengthening his trunk stability. He liked to reach out for toys or small objects within his eyesight but was not able to hold them for few seconds.

Mrs. Ping, Xiao-An's mother was the adult participant for the study. Mrs. Ping had a part time job before but a few weeks into the study, she decided to quit in order to spend more time with Xiao-An. Mrs. Ping had a high school diploma. Mrs. Ping wanted to participate in the study in order to learn some strategies that she and her husband could use at home to help Xiao-An's development.

The study took place in the family's bedroom (Xiao-An and his parents lived in the same bedroom) for the play routine and the dining area for mealtime routines. The setting for playtime routines in the bedroom included a king-size bed, television, puzzle form floor mat, feeding chair, toys, and children's books. The dining area for the mealtime routine consisted of a dining table, regular chairs, feeding chair, iPad, books, and foods.

Procedures

All intervention procedures were conducted as noted in the general method section. During the RBI step, Mrs. Ping shared that Xiao-An was not able to communicate and typically just cried to get what he wanted. She really hoped that Xiao-An would be able to learn more appropriate and functional ways to communicate his wants and needs. In addition, Mrs. Ping said that Xiao-An was not able to control his movement very well. He tried to grab everything in sight but had difficulties on controlling his grasp. Thus, together the researcher and parent identified the following three goals: a) making simple choice; b) indicating yes or no to basic need questions; and c) intentionally releasing a grasp item with appropriate motor control. The researcher and Mrs. Ping then decided that playtime was the appropriate routine for embedding the first and third goal. The second goal was embedded into the mealtime. The generalization routine was mealtime for the first and third goal and playtime for the second goal.

Target Goals and Measurement Procedures

Target goal 1. Xiao-An's first goal was making a choice about preferred item using his eye contact or body movements in response to parent's cue within 5 secs during playtime (see appendix K for detailed information). Based on discussion with Mrs. Ping and observation during baseline, Mrs. Ping knew very well about her son's preferences and always gave the preferred items to Xiao-An directly. Xiao-An didn't have opportunities to make choices during his day. Thus, to embed this goal, the researcher asked Mrs. Ping to use Xiao-An's preferred and/or non-preferred toys or objects and offer him two choices for Xiao-An deciding which one he wants. Specifically, an opportunity was scored when Mrs. Ping used a verbal cue (i.e., parent verbally asked the child's preference) and/or a gestural cue (i.e., parent pointed to the toy or object choices). The child's correct response was scored when Xiao-An was able to independently (i.e., without additional prompts) make choice on his preferred item using eye contact or body movements following parent's provision of opportunities. Next, if Xiao-An didn't respond or gave an incorrect response (e.g., crying), the parent provided additional prompts such as a verbal prompt (i.e., parent verbally asked the child's preference again or verbally prompted him for a correct response); a gestural prompt (i.e., parent pointed to the toys or objects); a model prompt (i.e., parent modeled the expected behavior); and/or a physical prompt (i.e., parent physically prompted the child to grab the toy or object).

Target goal 2. The second goal for Xiao-An was to use eye contact, facial expressions, or body movements to indicate his yes/ no intension to basic needs questions within 5 secs during mealtime (again see appendix K for more information). This goal was embedded after Xiao-An demonstrated mastery skill for his first choice-making goal. After Xiao-An chose the food/ toys he wanted to eat/ play, Mrs. Ping confirmed with his choice with yes/no questions (e.g., do you want to eat a broccoli today?). Specifically, an opportunity was scored when Mrs.

Ping used a verbal cue (i.e., parent verbally asked the child's intension) and/or a gestural cue (i.e., parent pointed to the toy or food). The child's correct response was scored when Xiao-An was able to independently (i.e., without additional prompts) indicate yes/no intension using eye contact, facial expressions, or body movements following parent's provision of opportunities. Next, if Xiao-An didn't respond or gave incorrect response (e.g., crying), the parent provided additional prompts such as a verbal prompt (i.e., parent verbally asked the child's intension again or verbally prompted him for a correct response); a gestural prompt (i.e., parent pointed to the food or toy); a model prompt (i.e., parent modeled the expected yes/no behavior); and/or a physical prompt (i.e., parent physically prompted the child for the expected yes/no behavior).

Target goal 3. Xiao-An's third goal was intentionally releasing a grasp item with appropriate motor control in response to parent's cue within 5 secs during playtime (see appendix K for detailed information). Based on the discussion with Mrs. Ping and observation during baseline, Xiao-An was able to reach small toys or objects with both hands but had difficulties to intentionally hold or release the toy or object with appropriate motor control. Thus, to embed this goal, Mrs. Ping played games that required lots of grabbing and releasing hand movement with Xiao-An with a variety of toys or small objects during playtime routine. She also asked Xiao-An to place his toys or small objects into different containers and help with clean up at the end of the activity. Specifically, an opportunity was scored when Mrs. Ping used a verbal cue (i.e., parent verbally requested the child to release items from his hands); a gestural cue (i.e., parent pointed to the toys or objects); and/or a model cue (i.e., parent modeled the expected behavior). The child's correct response was scored when Xiao-An was able to independently (i.e., without additional prompts) and intentionally releasing a grasp item with appropriate motor control following parent's provision of opportunities. Next, if Xiao-An didn't respond or gave an

incorrect response, the parent provided additional prompts such as a verbal prompt (i.e., parent verbally requested the behavior again or verbally prompted her for a correct response); a gestural prompt (i.e., parent pointed to the toys or objects); a model prompt (i.e., parent modeled the expected behavior); and/or a physical prompt (i.e., parent physically prompted the child for the expected behavior).

Interobserver agreement. Again, interobserver agreement of the real-time event recording system was collected on 25% of all sessions for Xiao-An. The results are shown on Table 3.3. For the parent behavior of the target routine during the baseline, a 99.17% interobserver agreement was achieved across all three goals. During the intervention phase, an interobserver agreement mean of 92.83% with a range of 89% - 100% across all three goals was achieved. For the generalization routine, the interobserver agreement for the parent behavior was a mean of 91.4% with a range of 84%-99.5% across all three goals. Furthermore, for the child behavior of the target routine during the baseline phase, the interobserver agreement level was 99.3% across three goals. During the intervention phase, the interobserver agreement had a mean of 93.83% with a range of 85%-100% across all three goals. During the generalization routine, the interobserver agreement of the child behavior was a mean of 93.23% with a range of 85.3%-97% across all three goals.

Similarly, interobserver agreement for both of the IPCI and STARE was collected for 25% of all sessions for each phase (i.e., baseline, intervention, and maintenance). The overall percentage of interobserver agreement for the IPCI for Dyad 2 was a mean of 95.3% with a range of 89.5%- 99.5%. Interobserver agreement levels for the STARE had a mean of 93.5% with a range of 87%-100%.

Dyad 3 – Mrs. Lee and Yi-Hua – Methods

Participants and Settings

Yi-Hua was a four-years-old boy with developmental delay. He lived with his father, mother, younger sister, and grandmother in their home in Taiwan. Mrs. Lee, Yi-Hua's mother was identified as the adult participant for this dyad. She was a governmental officer in Taiwan and in maternity leave during the intervention. Mrs. Lee had a master degree and shared that Yi-Hua had begun to show some delays after he entered preschool when he was at the age of three. Mr. Lee and Mrs. Lee took Yi-Hua to see several pediatric doctors and professionals (e.g., speech language pathologist, therapist, or early interventionist) but couldn't find an agreed diagnose with Yi-Hua. Some doctors/professionals believed that Yi-Hua was a child with autism while others indicated he had just general developmental delay. Mrs. Lee has also begun to read a lot of parenting books and learned many strategies to work with Yi-Hua. She felt that children grow better in Mother Nature environment so she often took Yi-Hua and his sister to travel in Taiwan. Furthermore, Mrs. Lee sought for religion supports to help Yi-Hua's development. She took Yi-Hua to temple frequently and believed that her child would improve if he could receive God's blessing.

Yi-Hua attended a private inclusive preschool classroom in Taiwan. He was receiving itinerary special education services in his school and an occupational therapy in a local hospital. Yi-Hua also participated in a Lego class and a Chinese bible study group that taught children the traditional Chinese standards for being a good student and child. He was on a waiting list for an art therapy during the intervention.

Prior the intervention begun, Yi-Hua showed poor motor skills and had some difficulties in self-regulation. Specifically, He could grab spoon or fork with whole hand but had hard time to use tripod grasp with any utensils. Yi-Hua was able to jump with both feet but could not catch

the bouncing ball at once. He was not able to calm himself down when he got upset. He had alternating strabismus and did not make eye contact when speaking with others. He also showed obsessive interests on trains. The reason why Mrs. Lee wanted to participate in this study was that she strongly believed the importance of early intervention and wanted to know how she could help Yi-Hua's learning at home.

The intervention setting for this dyad was the living room for both playtime and snack time routine. During the intervention sessions, Yi-Hua's younger sister and grandmother were also presented but the data was only collected for the mother and Yi-Hua's interaction. The materials or equipment of this dyad included a sofa, child size desk and chairs, toys, books, snacks, and drinks.

Procedures

Again, all intervention procedures were the same as noted in the general method. During the RBI step, Mrs. Lee noted that Yi-Hua did not like to use writing instruments nor tools (e.g., scissor) that required better fine motor control ability. He was able to do buttoning but could use tripod grasp to grab a cup. Mrs. Lee worried that Yi-Hua's poor fine motor skills would affect his writing ability when he enters elementary school. Yi-Hua also showed some delays on his social skills. He had a poor eye contact when talking with others and showed tantrums when things were out of control (e.g., his sister took his toys away). Thus, together the researcher and Mrs. Lee then identified the following three priority goals: a) functional grasping; b) catching; and c) scissor using skills. The target routine was indoor playtime and the generalization routine was snack time for all goals.

Target Goals and Measurement Procedures

Target goal 1. The first goal for Yi-Hua was using functional grasp with a variety of tools (e.g., cooking tools, plates, cups, scissor, glue, tape), utensils (e.g., writing implement, eating utensils) or materials (e.g., toys, beads, play dough, books, paper, buttons) in response to parent's cues within 2 secs (again see appendix K for more detailed information). To embed this goal, Mrs. Lee conducted activities that required grasping skill with a variety of tools, utensils, and materials with Yi -Hua. For example, during the playtime, Mrs. Lee often asked Ryan to use different tools (e.g., clothespins; spoon; kitchen tongs) to pick up his candy, trains, or Legos. Specifically, an opportunity was scored when Mrs. Lee used a non-verbal cue (i.e., parent provided tools or materials and simply used facial expression to cue the child); a verbal cue (i.e., parent verbally requested the child to grab the items); a gestural cue (i.e., parent pointed to the tools or items); and/or a model cue (i.e., parent modeled the expected behavior). The child's correct response was scored when Yi-Hua was able to independently (i.e., without additional prompts) and appropriately use functional grasp following parent's provision of opportunities. Finally, if Yi-Hua didn't respond or gave an incorrect response, the parent then provided additional prompts such as a verbal prompt (i.e., parent verbally requested the behavior again or verbally prompted him for a correct response); a gestural prompt (i.e., parent pointed to the toys or objects); a model prompt (i.e., parent modeled the expected behavior); and/or a physical prompt (i.e., parent physically prompted the child for the expected behavior).

Target goal 2. Yi-Hua's second goal was catching different types of objects/items (e.g., balloon, kids size volleyball, small plastic color ball, small and big yoga ball, bean bag, pillow, stuffed animals, clothes) that were thrown, rolled, bounced, or dropped to him within 2 secs (see appendix K for specific information). To embed this goal, Mrs. Lee used a variety of toys, dolls, or balls to play throwing and catching game with Yi -Hua. Specifically, an opportunity was

scored when Mrs. Lee used a non-verbal cue (i.e., parent provided objects or items, throw the objects or items to the child, and/or simply used facial expression to cue the child); a verbal cue (i.e., parent verbally requested the child to grab the items); a gestural cue (i.e., parent pointed to the tools or items); and/or a model cue (i.e., parent modeled the expected behavior). The child's correct response was scored when Yi-Hua was able to independently (i.e., without additional prompts) and successfully (i.e., catching the items without dropping) catching different objects/items following parent's provision of opportunities. Finally, if Yi-Hua didn't respond or gave an incorrect response, the parent then provided additional prompts such as a verbal prompt (i.e., parent verbally requested the behavior again or verbally prompted him for a correct response); a gestural prompt (i.e., parent pointed to the objects/items); a model prompt (i.e., parent modeled the expected behavior); and/or a physical prompt (i.e., parent physically prompted the child for the expected behavior).

Target goal 3. The third goal was using scissor in a correct way to cut out different shapes or materials in response to parent's cues within 2 secs (again see appendix K for detailed information). To embed this goal, Mrs. Lee prepared some paper sheets with Yi-Hua's favorite cartoon characters and asked him to make art products with scissor. She also tried to incorporate scissor with other fun activities (e.g., cutting play dough into small pieces to make a dumpling soup) to increase Ryan's motivation. Specifically, an opportunity was scored when Mrs. Lee used a non-verbal cue (i.e., parent provided tools or materials and simply used facial expression to cue the child); a verbal cue (i.e., parent verbally requested the child for the expected behavior); a gestural cue (i.e., parent pointed to the scissor or materials); and/or a model cue (i.e., parent modeled the expected behavior). The child's correct response was scored when Yi-Hua was able to independently (i.e., without additional prompts) and appropriately use scissor to cut following

parent's provision of opportunities. Finally, if Yi-Hua didn't respond or gave an incorrect response, the parent then provided additional prompts such as a verbal prompt (i.e., parent verbally requested the behavior again or verbally prompted him for a correct response); a gestural prompt (i.e., parent pointed to the toys or objects); a model prompt (i.e., parent modeled the expected behavior); and/or a physical prompt (i.e., parent physically prompted the child for the expected behavior).

Interobserver agreement. Again, interobserver agreement of the real-time event recording system was collected on 25% of all sessions for each phase (i.e., baseline, intervention, and maintenance) and routine (i.e., target routine and generalization routine). Table 3.3 presents the results of the interobserver agreement for both parent and child behavior measure. For the parent behavior of the target routine during the baseline, a 88.77% interobserver agreement was achieved across all three goals. During the intervention phase, an interobserver agreement mean of 88.5% with a range of 80% - 94.5% across all three goals was achieved. For the generalization routine, the interobserver agreement for the parent behavior was a mean of 87.5% with a range of 83%-93% across all three goals. Furthermore, for the child behavior of the target routine during the baseline phase, the interobserver agreement level was 90.2% across three goals. During the intervention phase, the interobserver agreement had a mean of 89.93% with a range of 82%-95.5% across all three goals. During the generalization routine, the interobserver agreement of the child behavior was a mean of 89.6% with a range of 85.3%-94% across all three goals.

Furthermore, interobserver agreement for both of the IPCI and STARE was collected for 25% of all sessions for each phase (i.e., baseline, intervention, and maintenance). The overall percentage of interobserver agreement for the IPCI for Dyad 3 was a mean of 90% with a range

of 85%- 95.3%. Interobserver agreement levels for the STARE had a mean of 86% with a range of 80%-100%.

References

- Baggett, K., Carta, J. J., & Horn, E. (2009). *Indicator of parent-child interaction (IPCI) user's manual*. Retrieve from http://www.igdi.ku.edu/training/IPCI_training/IPCI_admin_instructions.pdf
- Horn, E., Lieber, J., Li, S., Sandall, S., & Schwartz, I. (2000). Supporting young children's IEP goals in inclusive settings through embedded learning opportunities. *Topics in Early Childhood Special Education, 20*, 208-223.
- Horner, R. D., & Baer, D. M. (1978). Multiple-probe technique: a variation of the multiple baseline. *Journal of Applied Behavior Analysis, 11*, 189-196.
- Individual with Disabilities Education Act, 20 U.S.C. & 1400 (1997)
- Kennedy, C. H. (2005). *Single-case designs for educational research*. Boston, MA: Pearson Education, Inc.
- Law of People's Republic of China on the protection of Disabled Persons (1990), China
- McWilliam, R. A. (2011). *Routine-based early intervention-supporting young children and their families*. Baltimore, MD: Paul H. Brookes.
- McWilliam, R. A., & Casey, A. M. (2008). *Engagement of every child in the preschool classroom*. Baltimore, MD: Brookes Publishing Co.
- People with Disabilities Rights Protection Act (2007), Taiwan
- Romanczyk, G., Gillis, J. M., & Callahan, E. H. (n.d.). ABC Video Data Pro App (Computer App). Available from <http://cbtaonline.com/>

Table 3.1

Key Questions of Routine-Based Interview

1. What does everyone do during this time?
 2. What does the child do?
 3. How does the child participate in the routine?
 4. What does the child do by him- or herself?
 5. How does the child communicate and get along with other family members during this routine?
 6. How satisfied are you with the routine?
-

Adapted from McWilliam, R. A. & Casey, A. M. (2008). *Engagement of Every Child in the Preschool Classroom* Baltimore, MD: Brookes Publishing

Table 3.2

Measures for Research Questions

Research Questions	Measures
Primary Research Question(s)	
1. What is the impact on the parent(s) of ELO intervention training?	• Real-time Event Recording System – Parent Behavior
2. What is the impact of parent use of ELO strategies on child three target goals?	• Real-time Event Recording System – Child Behavior
3. What is the impact of parent use of ELO strategies on child’s level of engagement?	• STARE–modified
Secondary Research Question	
4. What is the impact of parent use of ELO strategies on parent-child interaction?	<ul style="list-style-type: none"> • IPCI – Parent Behavior Rating • IPCI – Child Behavior Rating

Table 3.3

Summative Report of Interobserver Agreement of Real-Time Event Recording System

		Baseline Mean% (Range)	Intervention Mean% (Range)	Maintenance Mean% (Range)	Generalization Mean% (Range)
Dyad 1 – Mrs. Guan’s and Fan					
Goal#1	Parent	100	86.5 (85-88)	85.71	87.5 (85-89)
	Child	100	88.47 (85-91.94)	85.72	88 (87-89)
Goal#2	Parent	100	81.5 (80-83)	83.3	82 (80.5-83.5)
	Child	100	84 (82-86)	83.35	85 (84.8-85.2)
Goal#3	Parent	100	88.88	87	85.5 (81-90)
	Child	100	90.3	86	89 (86.3-91.7)
Dyad 2 – Mrs. Ping and Xiao-An					
Goal#1	Parent	100	98.5 (94-100)	95	96.3 (91-99.5)
	Child	100	97 (93.5-100)	96	95 (93-97)
Goal#2	Parent	97.5	90.5 (89-94)	93.3	91.2 (90-93.5)
	Child	98	94 (93-95)	95	96.7 (95.3-97.5)
Goal#3	Parent	100	89.5 (89-90.6)	87.6	86.7 (84-90)
	Child	100	90.5 (85-95.5)	86.8	88 (85.3-92.5)
Dyad 3 – Mrs. Lee and Yi-Hua					
Goal#1	Parent	87.5	83.5 (80-85)	86.5	85 (83-89)
	Child	90	84.6 (82-90.3)	87.5	88.3 (87.2-91)
Goal#2	Parent	92.4	92.5 (90-94.5)	90.3	91 (90-93)
	Child	93	94 (93.3-95.5)	93.5	92 (88-94)
Goal#3	Parent	86.4	89.5	88.5	86.5 (83-91)
	Child	87.6	91.2	87.6	88.5 (85.3-92.8)

Figure 3.1

Steps of ELO Training and Materials

Steps	Materials
1. Clarify the goals	Home-routine matrix
2. Select the strategies	ELO-at-a-glance form
3. Practice the strategies	ELO-at-a-glance form
4. Discuss and reflect	ELO-at-a-glance form
5. Monitor the progress	Self progress monitoring sheet

Figure 3.2

Steps of Weekly Visits

Steps

1. Gathering information from the parents
 2. Observing the implementation of intervention and parent-child interaction
 3. Providing feedback and answering questions
 4. Discussing barriers and developing possible solutions
 5. Confirming or planning for the next visit
-

CHAPTER 4: RESULTS

Data presented in this section will provide the results obtained for the three single case studies or parent/child dyads. The presentation of results for each dyad aligns with the primary and secondary research questions. Specifically, for the primary research questions, first the parent's use of the trained ELO strategies or parent outcome are presented. Second, the impact of the parent's implementation on their child's acquisition of their three targeted goals and their level of engagement during the observed session with their parent are presented. A secondary question was to understand if there was a change in the parent-child interaction due to the parent's implementation of the ELO strategies and thus the data addressing this question is presented next. The results section will finish with a reporting on implementation fidelity for the parent training component and outcomes of the social validity assessment.

Dyad 1 – Mrs. Guan and Fan

Parent Outcomes

As mentioned in the methods section, the primary parent outcome was the data on the frequency of the parent's provision of a defined learning opportunity. The types of instructional cues along with the learning opportunities and responses to the child's behavior were also coded. (See method section for the specific codes of instructional cues and parent's responses). Parent outcome data was collected by the researcher by viewing and coding video clips using a real-time event recording system.

Figure 4.1 graphically displays the number of the learning opportunities (ELOs) provided to the child in each coded session. Table 4.1 provides a summative report of the parent's implementation of ELO. As can be seen in Figure 4.1 and Table 4.1, increases in the primary targeted parent behavior was observed for Mrs. Guan across all three of the child behaviors

between baseline and intervention phases. Specifically, Mrs. Guan did not provide any ELOs during the baseline phase for the three targeted child behaviors. Once the intervention began, she immediately provided multiple learning opportunities for the target goal as planned. It should be noted that as the child began correctly demonstrating the target goal, the parent adjusted her provisions of learning opportunities and response support. For example, for the third goal, Mrs. Guan incorporated another sub-skill (i.e., identify another emotion) once Fan demonstrated mastery in correctly identifying the first emotion. Reviewing the sub-codes of parent cue behavior, Mrs. Guan initially used model cues followed by verbal cues. As Fan began to show some improvements on the target goal, her level of cues changed to non-verbal cues and verbal cues thus eliminating more intrusive model cues. Furthermore, in looking at the parent's response to the child's behavior, a high percentage of negative feedback and prompted feedback responses were observed during the early sessions of the intervention. Once Fan began performing the target skill, however, again the parent's response support shifted to frequent use of positive feedback. For the generalization probes, Mrs. Guan was able to generalize the embedded opportunities strategy into other routines for the first and third goal, but did not show this same level of generalization for the second goal (i.e., pretend play skills).

Child Outcomes

As noted in the methods section and briefly above, the impact on the child was assessed in two ways. That is, using a continuous measure the impact on the child's three targeted goals or said another way the child's response to the learning opportunities provided by the parent was assessed. Second the impact on the child's level of engagement in the sessions was assessed with a repeated measure. The results of each of these are discussed in the following sections.

Child response to learning opportunities. As we indicated in the above methods section, the child's response to learning opportunities dealt with the child's correct or incorrect responses to their parent's provision of a learning opportunity. The specific details of the child's responses were further coded. (Again see method section for specific codes of child's responses). The child's correct response to learning opportunities percentages were calculated by determining the total number of parent provision of learning opportunities (ELOs) for each goal and the number of child independent correct responses to those opportunities and then dividing the child correct responses by the number of ELOs and multiplying by 100.

Figure 4.2 shows the results of Fan's correct responses across three goals and Table 4.1 presents the mean of Fan's correct responses for each of the three phases (i.e., baseline, intervention, and follow-up). Overall, Fan showed significant improvements across all three goals in the intervention compared to the baseline phases. It should be noted that some of this change was because of the increased learning opportunities to perform the target skill. Further, across three goals, Fan showed gradual improvements from the first intervention session to the last session. This was a demonstration that Fan was benefitting from the learning opportunities and their parent support's to practice the skills. For the generalization skill, Fan was able to perform the target skills when Mrs. Guan provided learning opportunities in other family routines.

Child engagement. Again, as was described in the methods section, child engagement was assessed on two dimensions - level of engagement and complexity of engagement. Specifically, the level of engagement refers to the amount of time the child is engaged and the complexity of engagement means the quality of child's engagement during the 10 minutes observation session. A 5-point Likert scale was used to assess child's engagement with higher

score indicating higher levels and complexity of engagement. (See method section for details of child engagement measure).

The results of both level of engagement and complexity of engagement are presented in Figure 4.3. Overall, there were no significant differences between baseline and intervention across three goals for Fan's level of engagement and complexity of engagement. Specifically, during the baseline, Fan spent half of the time to almost all of the time engaged in the activity and her complexity of engagement was scored from unsophisticated to advanced level across the three goals. During the intervention, Fan's level of engagement was scored from little of the time to almost all of the time and her complexity of engagement was unsophisticated to advanced across three goals.

Quality of Parent-Child Interaction

Next, the quality of parent-child interaction was assessed to understand whether there was a change due to the parent's implementation of the ELO strategies. As noted earlier in the methods section, the data on quality of parent-child interaction includes both parent and child behaviors during a 10-minute observation period. Both parent and child behaviors were scored on two subdomains (i.e., parent facilitators and parent interrupters; child engagement and child reactivity/distress) each using a 4-point Likert scale. Both the parent and child behaviors percentages were calculated by summing the scores of all of the items of the subdomain and dividing the summed score by the total possible points for the subdomain.

Results of the quality of parent-child interaction are presented in Table 4.2. For the first goal, parent facilitators (i.e., 6.67% → 37.78%) and child engagement (i.e., 22.22% → 51.85%) showed significant improvements compared with baseline and intervention phases. The percentage of child reactivity/distress decreased from baseline (i.e., 55.56%) to intervention (i.e.,

40.74%) phases. For the second goal, both parent facilitators (i.e., 40% → 53.33%) and parent interrupters (i.e., 33.33% → 40.74%) was higher in intervention than baseline phase. However, the facilitators showed a greater level of change (i.e., 13.3% points) than the increase in interrupter percentage (7.4%). Child reactivity/distress also was higher during baseline than during the intervention phases (i.e., 22.22% → 37.04%). For the third goal, there were no meaningful differences between baseline and intervention for any of the parents or child interaction subdomains.

Implementation Fidelity for Parent Training Component

As noted in the methods section, implementation fidelity for the purposes of this study was defined as the behavior of the researcher (i.e., what is the researcher providing to the parents). An implementation fidelity checklist with two sections representing the two major activities (i.e., understanding family needs/ELO overview and goal specific ELO training) implemented by the trainer (researcher) were coded by a graduate research assistant by viewing and coding video clips. (See methods section for more details on the checklist and the coding procedure). Implementation fidelity was calculated by summing the number of items marked as observed or met and dividing by the total number of possible items and multiplying by 100 to obtain a percent.

As noted in Table 4.3 four separate percent “correct” for implementation fidelity were calculated. First, the percent correct for the “ELO overview component” was calculated at 100% for Dyad 1 – Mrs. Guan and Fan. Implementation fidelity for supporting Mrs. Guan in clarifying the goal, and designing and implementing intervention procedures for each of Fan’s three goals were calculated as 100%, 93.75%, and 100%, respectively.

Social Validity

As noted earlier in the method section, data on social validity was collected from visit logs, an exit survey, and an informal interview with parents. The results were analyzed both quantitatively and qualitatively based on the nature of the data. That is, for the Likert scale questions on the exit survey a mean was calculated. For this dyad a mean of 5 (on a scale in which 5 indicated strong agreement) was calculated. Thus, Mrs. Guan reported that she strongly agreed that this intervention help her gain new skills to support Fan and that she believed that Fan had increased her active participation during their family routines. Furthermore, based on a content analysis of the visit field notes, Mrs. Guan's answers to the open-ended questions on the exit survey, and an informal exit interview, Mrs. Guan was seen as having very positive attitudes about her participation and use of the ELO strategy and on the impact that it had on her daughter's learning and behaviors. She was happy to talk about her child's improvements and also willing to discuss some of the challenges she had encountered. She reported being very pleased with the amount of information and support she received to improve her work with her daughter and support her daughter's learning. Mrs. Guan said " It was for the very first time that Fan told me what she did at school...I learned a lot on how to extend the words and topics with my child, and learned some strategies to get along with her, and learned how to grasp her back to our specific topics and activities."

One particularly interesting theme that emerged from the qualitative analysis was that Mrs. Guan said that she felt her "ability was too poor and that otherwise the final results would be better". She struggled a lot with Fan's second goal of pretend play skill and reported that as the most challenging part of participating in the study. Finally, Mrs. Guan suggested that it

would be better if the interventionist could provide more modeling of some of the strategies to help her better understand how to implement the strategies with her child.

Dyad 2 – Mrs. Ping and Xiao-An

Parent Outcomes

Again, the primary parent outcome was the data on the frequency of the parent's provision of a defined learning opportunity and the types of instructional cues as well as responses to child's behavior provided to the child. (See method sections for the specific codes of instructional cues and parent's responses). Parent outcomes were recorded by viewing and coding video clips using a real-time event recording system.

Changes in the parent's implementation of ELO (i.e., provision of learning opportunities) occurred from baseline to intervention across all three goals. Figure 4.4 depicts the number of learning opportunity (i.e., parent cue) provided to the child in each 10-minute coded session. Table 4.4 summarizes information on the parent's implementation of ELO. Specifically, for the first goal, Mrs. Ping immediately increased the number of opportunities with the onset of intervention and continued to provide opportunities throughout the intervention phase. For the second goal, Mrs. Ping showed increased frequency of opportunities for the first four intervention sessions (i.e., session 9 -12) but the frequency of opportunities provided decreased for the fifth and sixth session (i.e., session 13 - 14). For the third goal, again Mrs. Ping increased the number of learning opportunities with the onset of intervention. Although she continued to provide learning opportunities during the intervention phase for the third goal, the overall trend across session did show a slight decrease in number of opportunities. During the later sessions, the family was experiencing challenges with their child's upcoming transition to school, which

really distracted the mother and made it more difficult for her to concentrate on the ELO implementation.

In reviewing the parent's provision of opportunities it is important to note that the parent's behaviors were affected by both the child's level of competence with the target behavior and due to the nature of the goals. Specifically, for the first goal (i.e., choice-making), because Xiao-An demonstrated quickly mastered the task of making choices, Mrs. Ping created the cue for choice making with just by verbally offering the choice and as appropriate showing her the choices. At no time did she need to model or physically guide Xiao-An to perform the correct response. For the second (i.e., indicate yes/no) and the third goal (i.e., release control skill), Mrs. Ping initially used a model of the correct response pairing it with a verbal request. As Xiao-An began to respond appropriately she no longer provided the model and only used a verbal request. Finally, when looking more closely at the parent's response to the child's behavior, a high percentage of prompted and corrective feedback was noted for the second and third goal during the early sessions. Similarly, however, once Xiao-An began performing the target skill, the parent's response used less prompting and corrective feedback and shifted to provide reinforcement for correct responses. For the generalization probes, Mrs. Ping was able to generalize the skills into other routines for all of the three goals.

Child Outcomes

As noted above, a continuous measure was used to assess the impact on the child's three target goals of the parent provision of learning opportunities. Changes to the child's level and complexity of engagement were also assessed as a child outcome.

Child response to learning opportunities. As mentioned earlier, child response to learning opportunities refers to the child's correct or incorrect responses to their parent's

provision of a learning opportunity. The type of child's responses was further coded. (Again see method section for specific codes of child's responses). Child correct response to learning opportunities percentages were calculated by determining the total number of parent provision of learning opportunities (ELOs) for each goal and the number of child independent correct responses and then dividing the correct responses by the number of ELO and multiplying by 100.

As can be seen on Table 4.4 and Figure 4.5, in general, Xiao-An showed substantial improvements on all three goals with the onset of intervention. Specifically, Xiao-An immediately demonstrated the correct behavior for the first target goal (i.e., choice-making) and maintained a high percentage of correct responses across the intervention phase (i.e., average percentage was 96.3%). For the second goal, Xiao-An still demonstrated significant increases in his correct responses however the increases were more gradual than those for the first goal. Finally, for the third goal, Xiao-An's performance varied from sessions to sessions and was directly related to the number of learning opportunities provided by his mother.

Child engagement. Again, as described earlier, child engagement assessed both the child's level of engagement and complexity of engagement during the activity. Specifically, the level of engagement refers to the amount of time the child is engaged and the complexity of engagement is the quality of child's engagement during each 10-minute observation session. A 5-point Likert scale was used to assess the child's engagement with higher score indicating higher levels and more complex types of engagement. (See method section for details of child engagement measure).

Figure 4.6 presents the results of child's level of engagement and complexity of engagement. No significant changes were observed between baseline and intervention across the three goals. Specifically, Xiao-An showed high level of engagement during both baseline and

intervention phases across three goals. His complexity of engagement also remained at approximately an average level during baseline and intervention phases across three goals.

Quality of Parent-Child Interaction

As noted earlier, the data on quality of parent-child interaction includes both parent and child behaviors. Parent and child behaviors were scored on two subdomains (i.e., parent facilitators and parent interrupters, child engagement and child reactivity/distress) each using a 4-point Likert scale. Both the parent and child behaviors percentages were calculated by summing the scores of all of the items of the subdomain and dividing the summed score by the total possible points for the subdomain.

Table 4.5 presents the results of the quality of parent-child interaction. In general, no significant changes in the quality of the parent child interaction either in terms of the parent behaviors or the child behaviors were observed between baseline and intervention phases across three goals.

Implementation Fidelity for Parent Training Component

As noted earlier, implementation fidelity was defined as the behavior of the researcher (i.e., what the researcher provided to the parent). An implementation fidelity checklist with two sections representing the two major activities (i.e., understanding family needs/ELO overview and goal specific ELO training) implemented by the trainer (researcher) were coded by a graduate research assistant by viewing and coding video clips. (See methods section for more details on the checklist and the coding procedure). Implementation fidelity was calculated by summing the number of items marked as observed or met and dividing by the total number of possible items and multiplying by 100 to obtain a percent.

As shown in the second row of Table 4.3 implementation for the “Overview of ELO component” for Dyad 2 (i.e., Mrs. Ping and Xiao-An) was 93.75%. Implementation fidelity for the supporting Mrs. Ping in clarifying the goal, and designing and implementing intervention procedures for each of Xiao-An’s three goals was calculated at 100%, that is for all three goals all items on the checklist were provided for each goal.

Social Validity

As noted earlier, data on social validity was collected from visit logs, an exit survey, and an informal interview with parents. The results were analyzed both quantitatively and qualitatively based on the nature of the data. That is, for the Likert scale questions on the exit survey a mean was calculated. For this dyad a mean of 5 (on the scale in which a 5 indicated strong agreement) was obtained. Thus, Mrs. Ping reported that she strongly agreed that this intervention helped her to gain new skills to support Xiao-An and felt that the ELO training and intervention procedures was very useful. Furthermore, the qualitative data indicated that she gained a lot of new information and learned new strategies to improve her interaction with her child during the process. Mrs. Ping indicated that she wished that she could have this same level of supports from her early interventionists or special educational professionals now and in the future to support her child’s growth and development.

Dyad 3 – Mrs. Lee and Yi-Hua

Parent Outcomes

As mentioned above, the primary parent outcome was the data on the frequency of the parent’s provision of a defined learning opportunity. The coders also coded the types of initial response cue the parent gave as they provided a learning opportunity and the by the parent and

the instructional response provided to the child's behavior. (See method section for the specific codes of instructional cues and parent's responses).

Figure 4.7 displays the number of learning opportunities (ELOs) provided to the child for each coded session. The summative report of parent provision of ELOs or learning opportunities is provided in Table 4.6. Overall, increases in the primary targeted parent behavior were observed for Mrs. Lee between baseline and intervention phases across three goals. Similar to the findings report with the other two dyads, as Yi-Hua began correctly demonstrating the target behavior, Mrs. Lee adjusted her provisions of learning opportunities and response support. For example, for the first behavior, Mrs. Lee decreased the number of learning opportunities provided as Yi-Hua demonstrated mastery of the target behavior. For the second goal, however, the number of learning opportunities provided by Mrs. Lee's decreased as soon as the intervention for the third goal was implemented. Finally, for the third behavior, Mrs. Lee showed a more gradual increase in the number of learning opportunities provided for Yi-Hua during the intervention phase.

Child Outcomes

Again as with other dyads, the child outcomes were measured as the child's response to learning opportunities provided by parent for the target goal and the level and complexity of the child's engagement in the activity.

Child correct responses to learning opportunities. Again, child response to learning opportunities referred to child's correct or incorrect responses to the parent's provision of a learning opportunity. The types of child responses were further coded. (See method section for specific codes of child's responses). Child's correct response to learning opportunities percentages were calculated by determining the total number of parent provided learning

opportunities (ELOs) for each goal and the number of child independent correct responses to those opportunities and then dividing the correct responses by the number of ELOs and multiplying by 100.

As can be seen on Figure 4.8 and Table 4.6 in general, Yi-Hua showed significant improvements across the three behaviors with the onset of intervention as compared to baseline. Again, it should be noted that Yi-Hua's behaviors were mainly affected by the number and types of learning opportunities Mrs. Lee provided for him. Specifically, for the first (i.e., functional grasping skill) and second goal (i.e., catching skill), the percentage of Yi-Hua's correct responses was as low as zero correct for some of the intervention sessions. During these sessions, there were also a very low number of opportunities provided by Mrs. Lee. Yi-Hua also showed some variations in his performance on the third goal (i.e., cutting skill). This seemed to be impacted by the child's level of interest in the cutting activity that his mother provided. For example, when Mrs. Lee used Yi-Hua's favorite cartoon characters for the cutting activities, Yi-Hua showed higher level of participation and better cutting skills.

Child engagement. As mentioned with the two previous dyads, the results of child engagement were assessed on two dimensions - level of engagement and complexity of engagement. Specifically, the level of engagement refers to the amount of time the child is engaged and the complexity of engagement means the quality of child's engagement during the 10 minutes observation session. A 5-point Likert scale was used to assess child's engagement with a higher score indicating higher levels and more complex engagement. (See method section for details of child engagement measure).

Figure 4.9 presents the results of both level of engagement and complexity. Overall, no significant changes were observed for level of engagement in intervention as compared to

baseline across three goals. Furthermore, the rating of the complexity of engagement slightly decreased between baseline and intervention phases for the second goal (4 → 2.3). No meaningful differences were noted on complexity for the first and third goal between baseline to intervention.

Quality of Parent-Child Interaction

As noted earlier, the measure of quality of parent-child interaction includes both parent and child behaviors. Both parent and child behaviors were scored on two subdomains (i.e., parent facilitators and parent interrupters, child engagement and child reactivity/distress) using a 4-point Likert scale. Both the parent and child behaviors percentages were calculated by summing the scores of all of the items of the subdomain and dividing the summed score by the total possible points for the subdomain.

Table 4.7 presents data for the quality of parent-child interaction for Dyad 3. Overall, positive changes were observed for both parent facilitator and the child engagement subdomains when comparing the intervention phases to baseline for three goals. In addition, parent interrupters decreased during intervention as compared to baseline for all three goals. Furthermore, the child reactivity/distress did show slight increases during intervention as compared to the baseline for the second (0% → 11%) and third (0% → 25.92%) goal.

Implementation Fidelity For Parent Training Component.

As described earlier, implementation fidelity was defined as the behavior of the researcher in providing training and support to the parent. An implementation fidelity checklist with two sections representing the two major activities (i.e., understanding family needs/ELO overview and goal specific ELO training) implemented by the trainer (researcher) were coded by a graduate research assistant by viewing and coding video clips. (See methods section for more

details on the checklist and the coding procedure). Implementation fidelity was calculated by summing the number of items marked as observed or met and dividing by the total number of possible items and multiplying by 100 to obtain a percent.

As noted on the third row of Table 4.3, correct implementation fidelity for the “Overview of ELO” component was 93.75%. Percentage of steps implemented correctly for the “Clarifying the goal, and designing and implementing the intervention procedures” component for the three goals was 100%, 93.75%, and 93.75%.

Social Validity

As noted earlier in the method section, data on social validity was collected from visit logs, an exit survey, and an informal interview with parents. The results were analyzed both quantitatively and qualitatively based on the nature of the data. That is, for the five-point Likert scale a mean was calculated. For this dyad a mean of 4.54 was attained, which means Mrs. Lee agreed that this intervention helped her gain new skills to support Yi-Hua. Furthermore, she indicated that participation in the intervention was “very useful to somewhat useful”. The qualitative data indicated that Mrs. Lee reported that her confidence in how to “teach” Y-Hua increased and that she learned new skills and strategies for working with Yi-Hua’s to support his growth and development. During the intervention, Mrs. Lee struggled a lot when Yi-Hua was not willing to follow her instructions. Thus, the researcher worked with Mrs. Lee to develop some activities based on Yi-Hua’s interests to better help the child learn the target skills. At the end, she was satisfied with Yi-Hua’s improvements on his motor skills and very much wanted to continue to learn more strategies for working with her child.

Table 4.1

Summative Report of Parent Implementation of ELO and Child Correct Response – Dyad 1

	Baseline Mean (Range)		Intervention Mean (Range)		Follow-up Mean (Range)	
	Parent's behavior	Child's behavior	Parent's behavior	Child's behavior	Parent's behavior	Child's behavior
Goal#1	0 (0-0)	0% (0%-0%)	6.2 (0-11)	17.42% (0%-33.33%)	9 (6-12)	24.67% (16%-33.33%)
Goal#2	0 (0-0)	0% (0%-0%)	15.14 (5-32)	35.03% (10%-52.94%)	5	44.44%
Goal#3	0 (0-0)	0% (0%-0%)	6 (1-9)	51.11% (33.33%-100%)	6	40%

Table 4.2

Quality of Parent-Child Interaction – Dyad 1

Subdomains	Baseline%	Intervention Mean% (Range%)	Follow-Up%
Goal 1			
Parent Facilitators	6.67	37.78(33.33-46.67)	40
Parent Interrupters	44.44	44.44(22.22-77.78)	22.22
Child Engagement	22.22	51.85(33.33-77.78)	55.56
Child Reactivity/Distress	55.56	40.74(22.22-66.67)	22.22
Goal 2			
Parent Facilitators	40	53.33(46.67-60)	52.33
Parent Interrupters	33.33	40.74(22.22-66.67)	44.44
Child Engagement	77.78	74.07(44.44-99.89)	66.67
Child Reactivity/Distress	22.22	37.04(22.22-55.56)	33.33
Goal 3			
Parent Facilitators	53.33	51.11(46.67-53.33)	53.33
Parent Interrupters	44.44	40.74(22.22-66.67)	44.44
Child Engagement	55.56	59.26(55.56-66.67)	77.78
Child Reactivity/Distress	44.44	44.44(33/33-66.67)	44.44

Table 4.3

<i>Implementation Fidelity</i>					
	Overview of ELO	Goal 1	Goal 2	Goal 3	Average across 3 goals
Dyad 1 – Mrs. Guan and Fan	100%	100%	93.75%	100%	97.92%
Dyad 2 – Mrs. Ping and Xiao-An	93.75%	100%	100%	100%	100%
Dyad 3 – Mrs. Lee and Yi-Hua	93.75%	100%	93.75%	93.75%	95.83%

Table 4.4

Summative Report of Parent Implementation of ELO and Child Correct Response – Dyad 2

	Baseline		Intervention		Follow-up	
	Mean (Range)		Mean (Range)		Mean (Range)	
	Parent's behavior	Child's behavior	Parent's behavior	Child's behavior	Parent's behavior	Child's behavior
Goal#1	0 (0-0)	0% (0%-0%)	2.22 (1-4)	96.3% (66.67%-100%)	1 (1-1)	100% (100%-100%)
Goal#2	1.67 (0-3)	0% (0%-0%)	5.25 (1-9)	75.04% (40%-100%)	1	100%
Goal#3	1.6 (0-3)	0% (0%-0%)	11.57 (0-23)	22.96% (0%-52.21%)	9	40%

Table 4.5

Quality of Parent-Child Interaction – Dyad 2

Subdomains	Baseline%	Intervention Mean% (Range%)	Follow-Up%
Goal 1			
Parent Facilitators	86.67	84.44(80-93.33)	86.67
Parent Interrupters	0	0(0-0)	0
Child Engagement	88.89	85.19(77.78-88.89)	88.89
Child Reactivity/Distress	0	7.41(0-11.11)	11.11
Goal 2			
Parent Facilitators	80	84.45(80-86.67)	80
Parent Interrupters	0	0(0-0)	0
Child Engagement	77.78	85.19(77.78-88.89)	88.89
Child Reactivity/Distress	0	7.41(0-22.22)	0
Goal 3			
Parent Facilitators	93.33	91.11(86.67-100)	86.67
Parent Interrupters	0	0(0-0)	0
Child Engagement	88.89	85.19(77.78-88.89)	77.78
Child Reactivity/Distress	0	7.41(0-11.11)	0

Table 4.6

Summative Report of Parent Implementation of ELO and Child Correct Response – Dyad 3

	Baseline		Intervention		Follow-up	
	Mean (Range)		Mean (Range)		Mean (Range)	
	Parent's behavior	Child's behavior	Parent's behavior	Child's behavior	Parent's behavior	Child's behavior
Goal#1	0.33 (0-1)	0% (0%-0%)	13.13(0-28)	75.27% (0%-100%)	9 (4-14)	100% (100%-100%)
Goal#2	0 (0-0)	0% (0%-0%)	19.25 (0-65)	32.56% (0%-70%)	26	35%
Goal#3	0.2 (0-1)	0% (0%-0%)	6.43 (3-14)	49.25% (16.67%-75%)	10	50%

Table 4.7

Quality of Parent-Child Interaction – Dyad 3

Subdomains	Baseline%	Intervention Mean% (Range%)	Follow-Up%
Goal 1			
Parent Facilitators	40	68.89(60-73.33)	66.67
Parent Interrupters	44.44	11.11(0-22.22)	22.22
Child Engagement	66.67	77.78(66.67-88.89)	77.78
Child Reactivity/Distress	0	0(0-0)	0
Goal 2			
Parent Facilitators	40	82.22(73.33-93.33)	80
Parent Interrupters	44.44	11.11(11.11-11.11)	22.22
Child Engagement	66.67	92.59(88.89-100)	77.78
Child Reactivity/Distress	0	11.11(0-22.22)	0
Goal 3			
Parent Facilitators	40	77.78(73.33-80)	80
Parent Interrupters	44.44	18.52(11.11-22.22)	22.22
Child Engagement	66.67	81.48(66.67-88.89)	77.78
Child Reactivity/Distress	0	25.92(22.22-33.33)	22.22

Figure 4.1

Parent's Implementation of ELO – Dyad 1

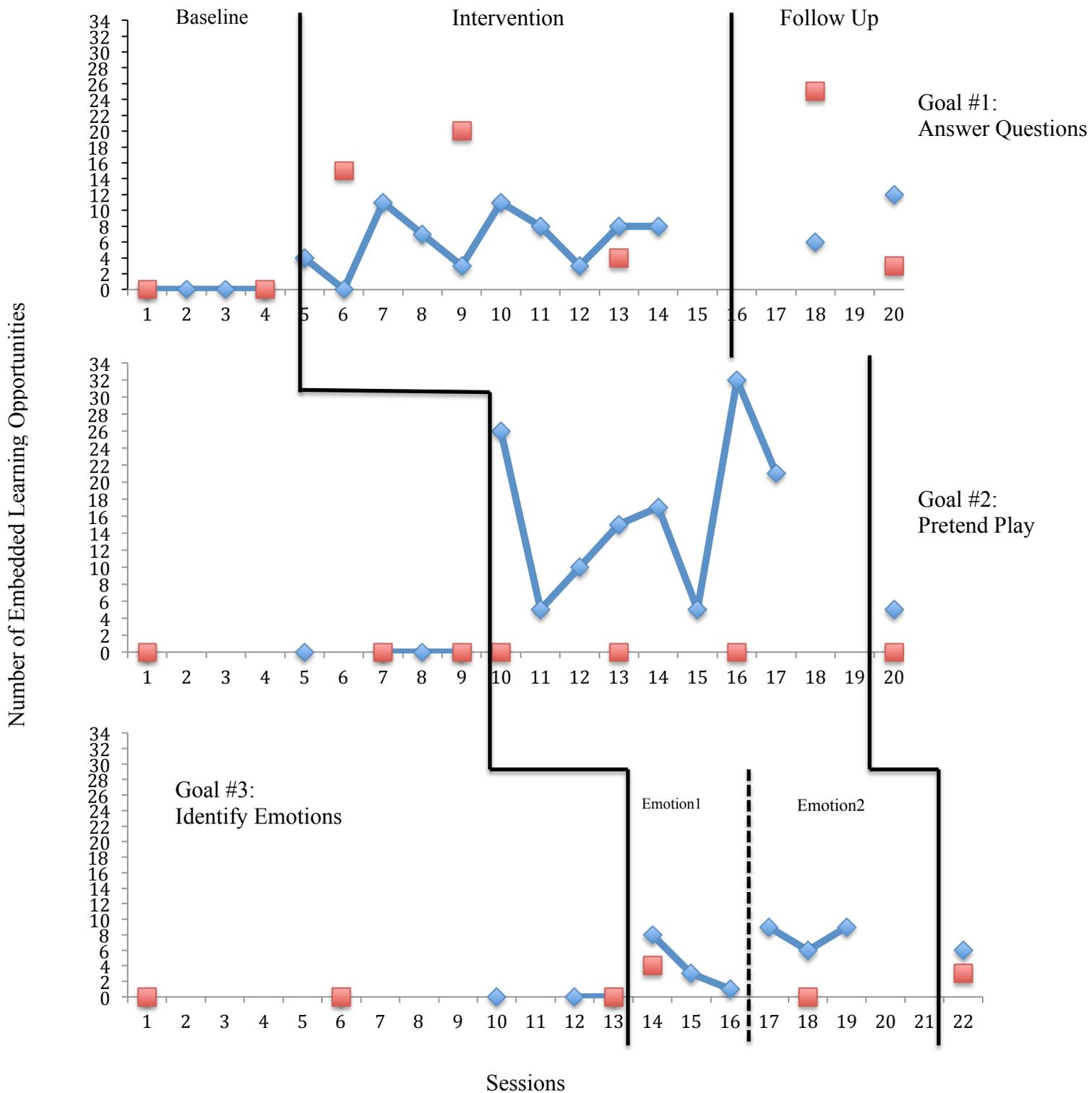


Figure 4.2

Child Correct Response – Dyad 1

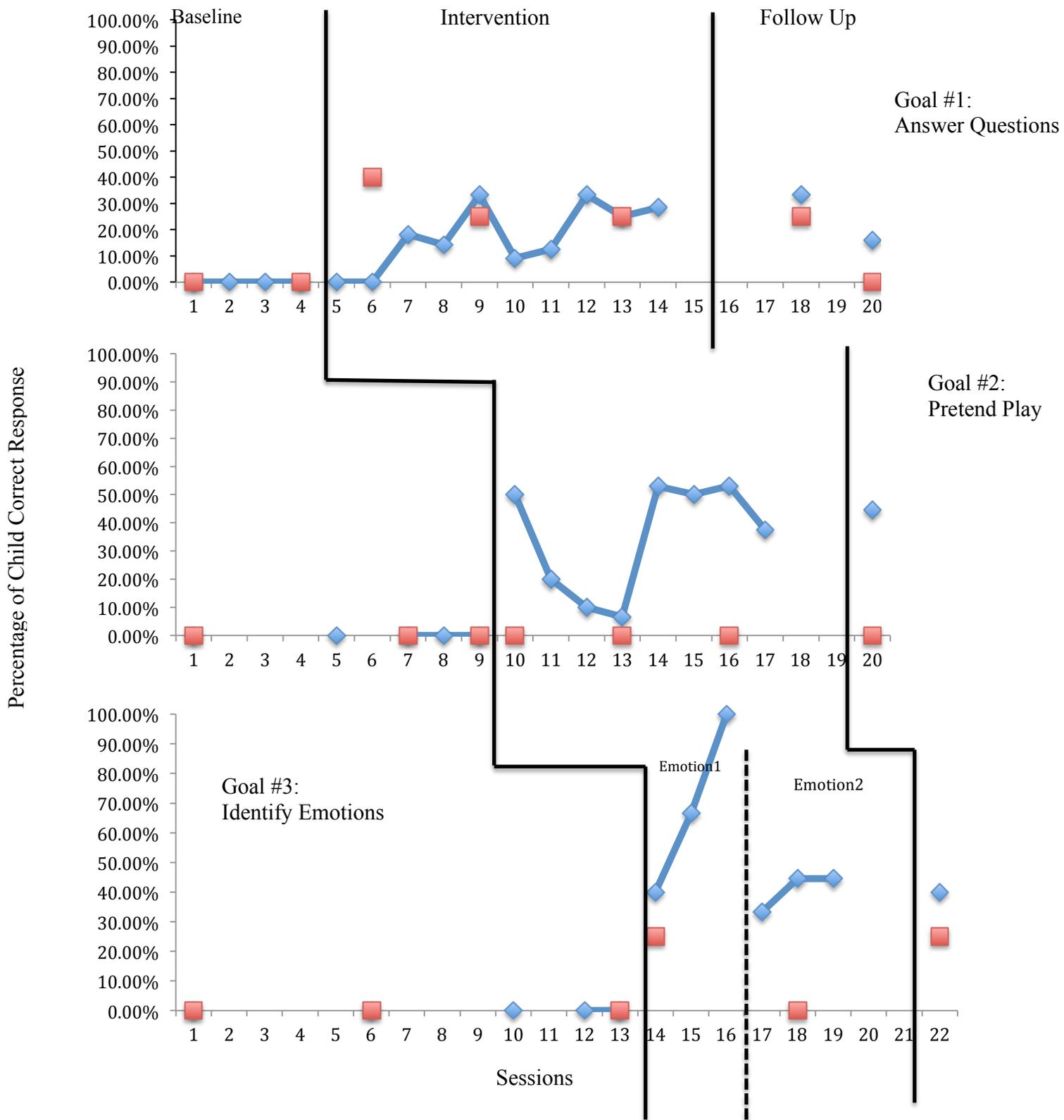


Figure 4.3

Child Engagement – Dyad 1

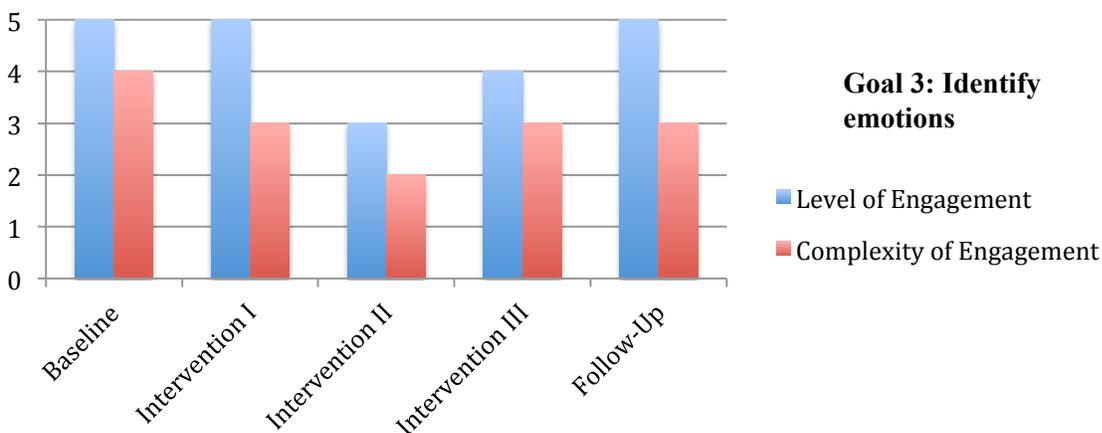
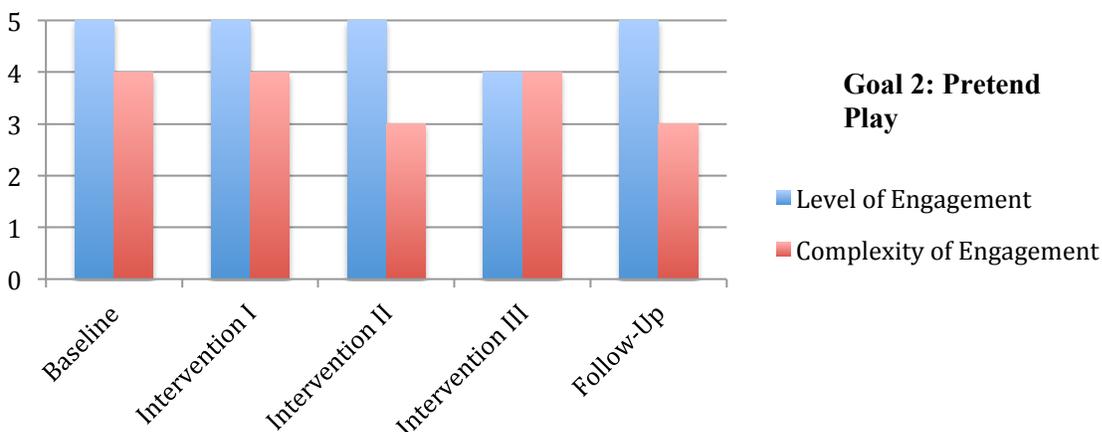
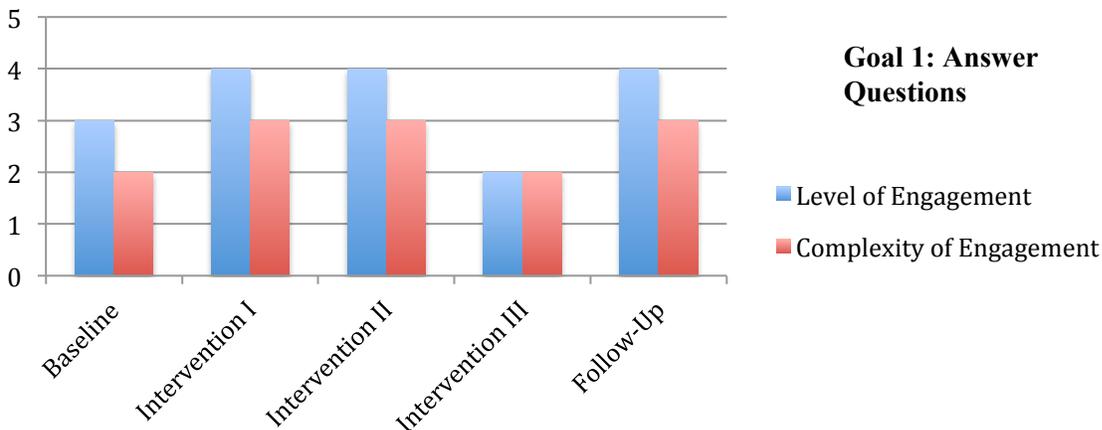


Figure 4.4
Parent's Implementation of ELO – Dyad 2

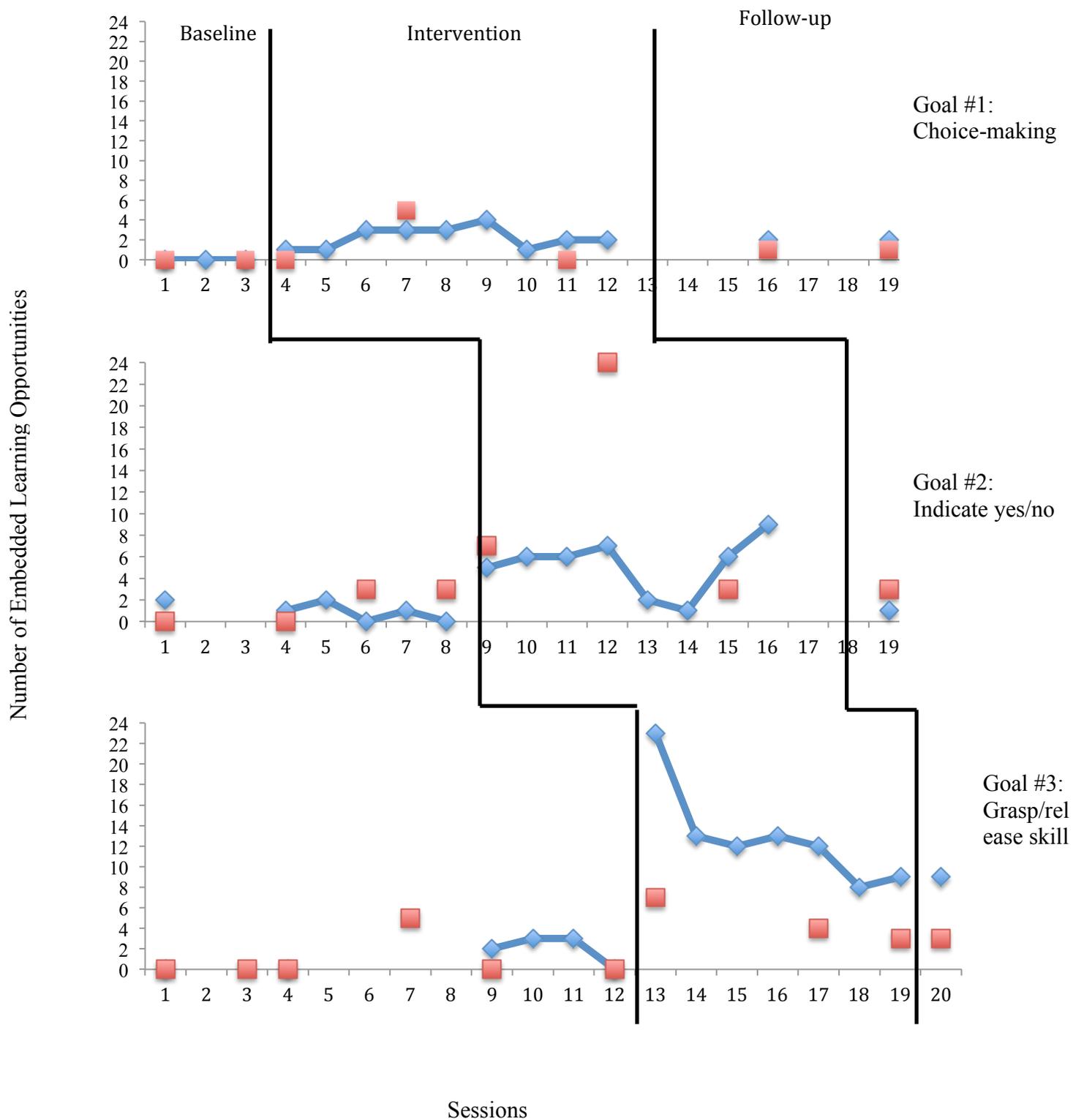


Figure 4.5

Child Correct Response – Dyad 2

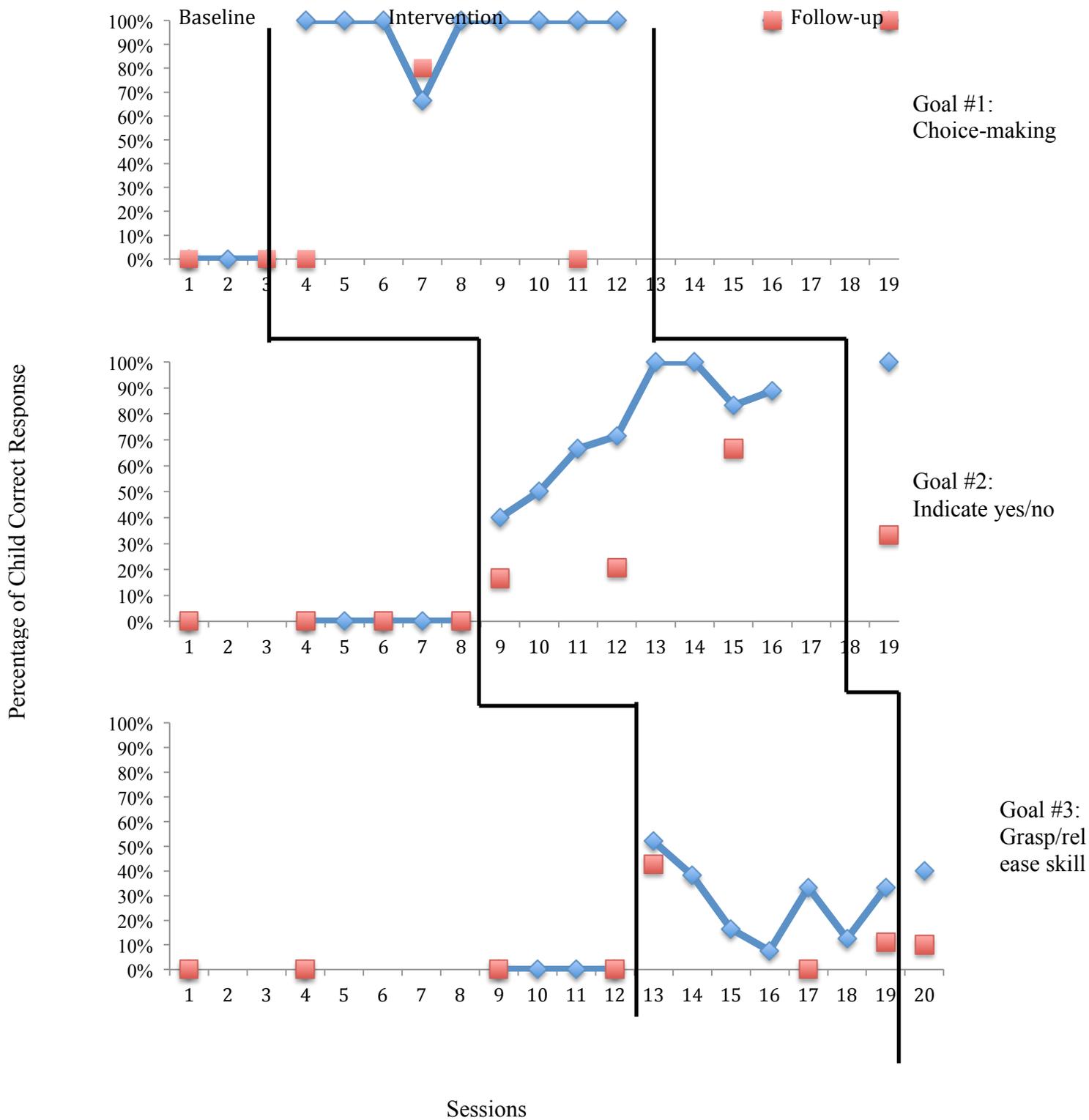


Figure 4.6

Child Engagement – Dyad 2

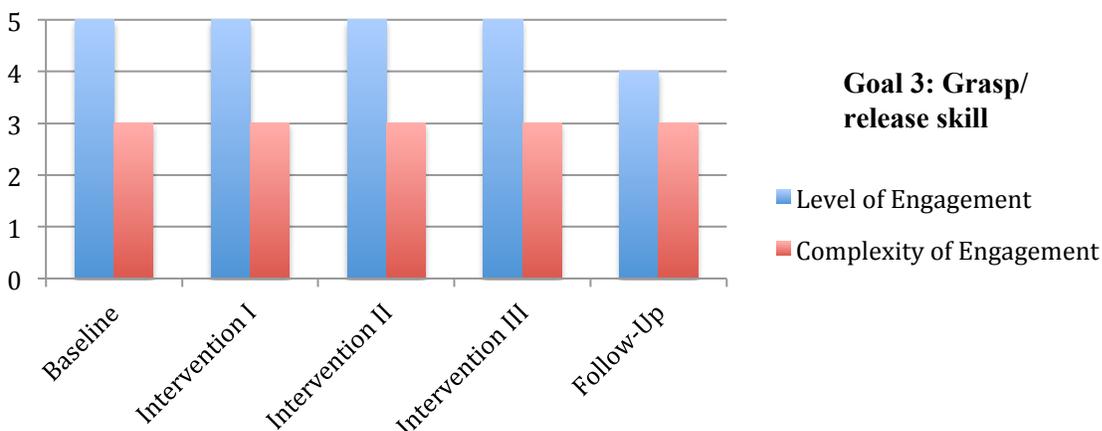
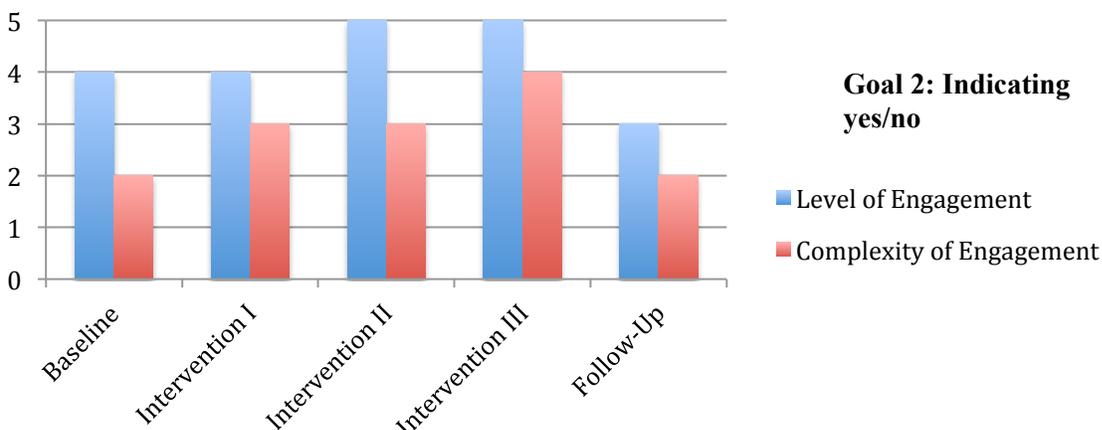
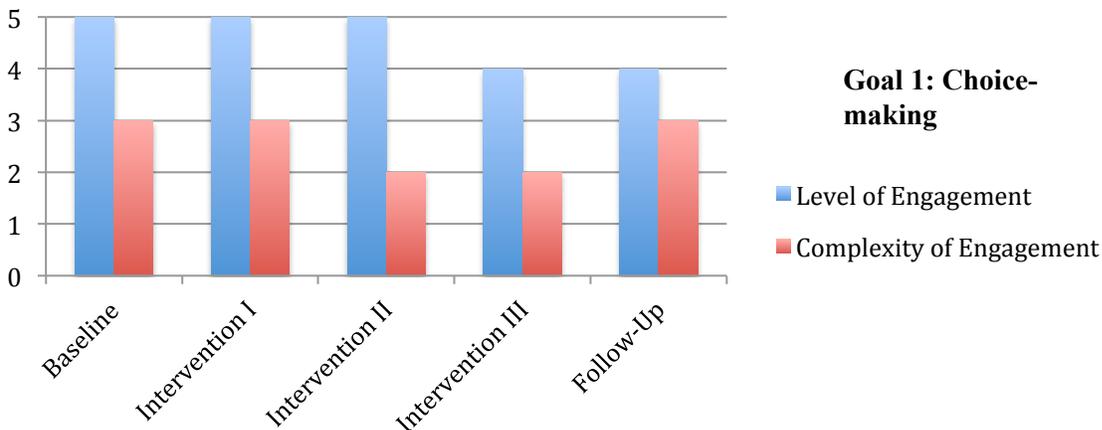


Figure 4.7

Parent's Implementation of ELO – Dyad 3

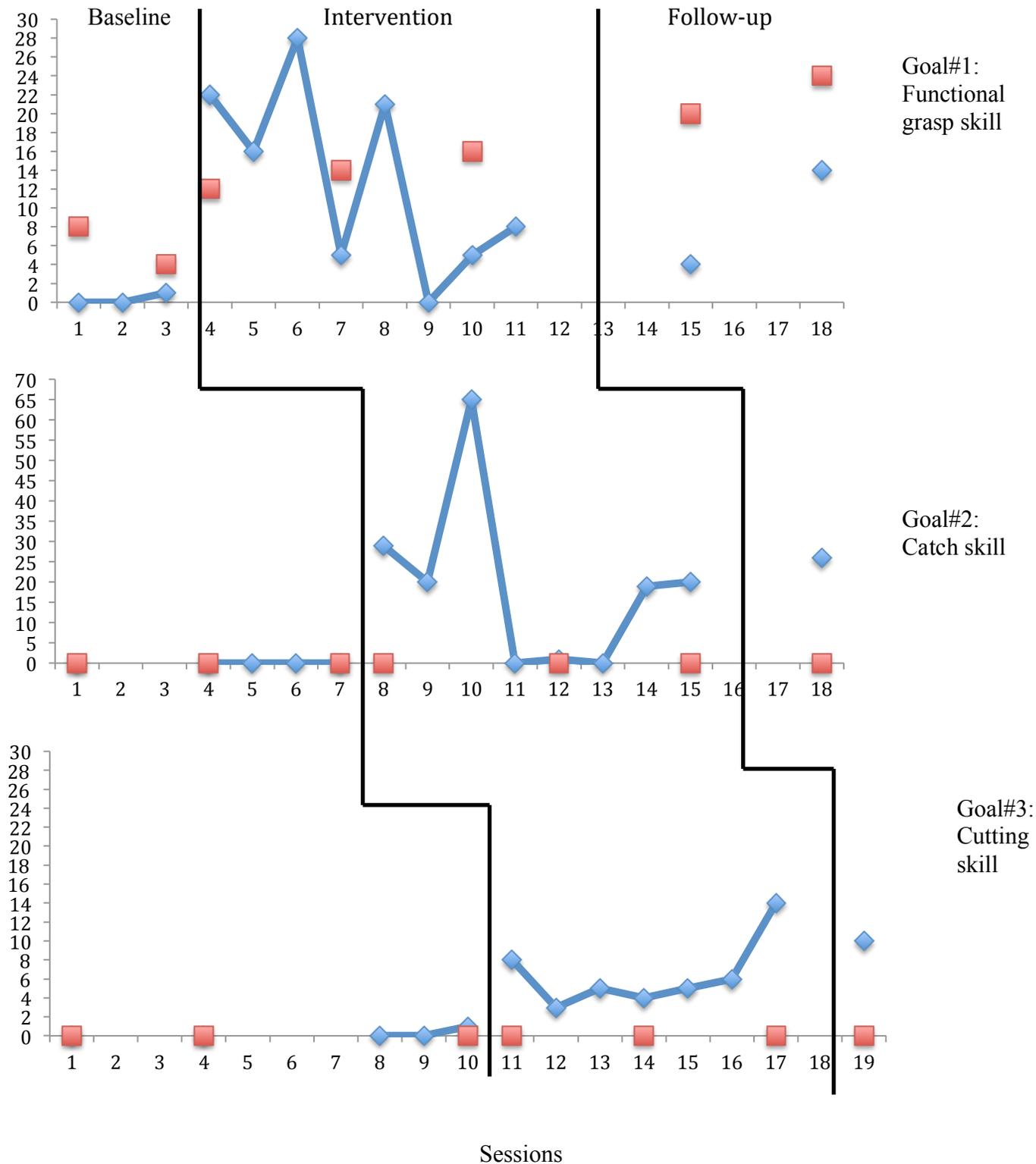


Figure 4.8

Child's Correct Behavior – Dyad 3

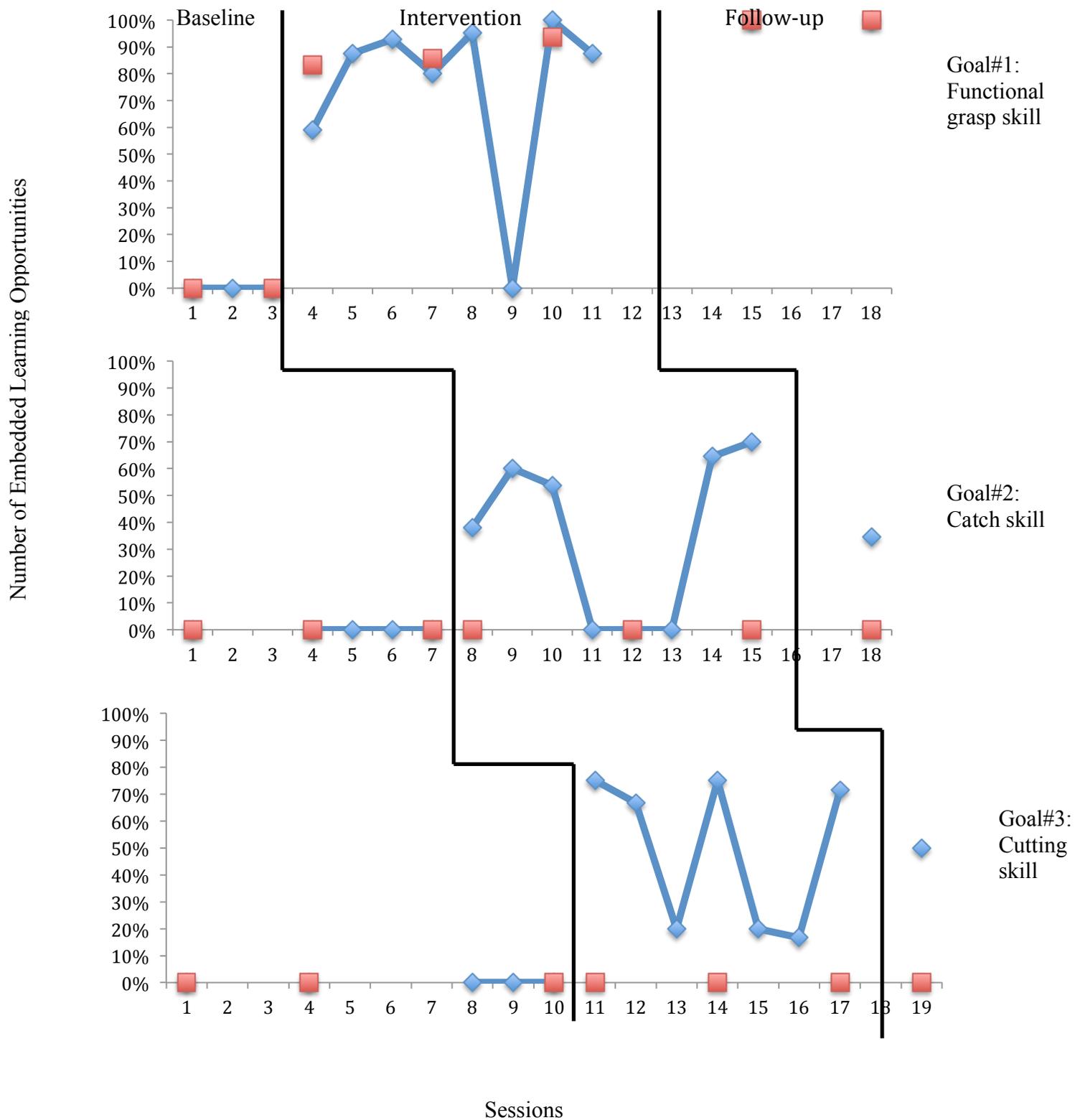
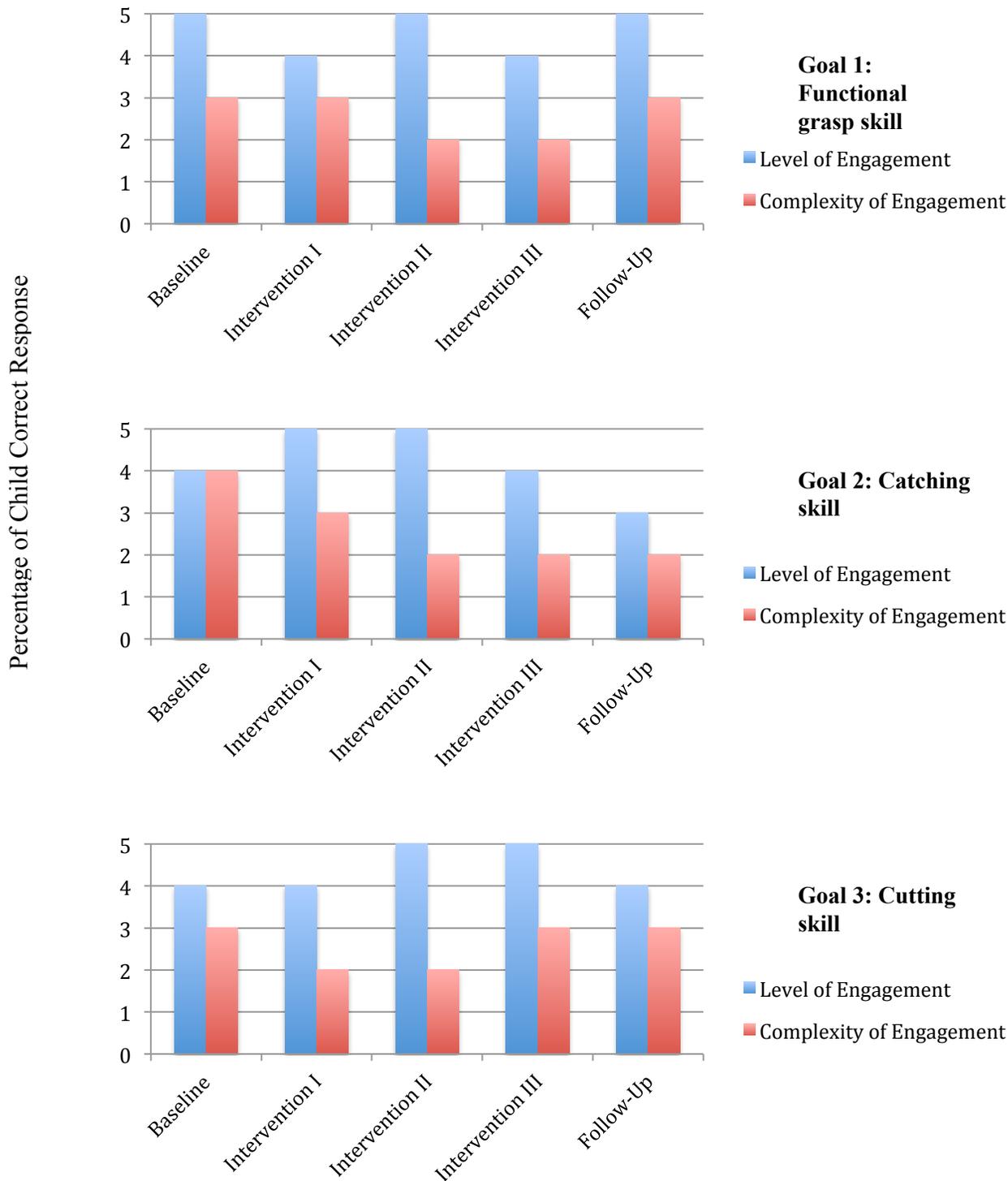


Figure 4.9

Child Engagement – Dyad 3



CHAPTER 5: DISCUSSION

The primary purpose of this study was to assess the feasibility of parents supporting their young children's learning through ELO interventions. Specifically, this study modified the original ELO intervention for classroom model (Horn et al., 2000) and through a collaborative planning strategy, a modification of McWilliam's Routines Based Interview identified family priority learning outcomes for their young child. The data from this study will not only contribute to the literature in the field but also providing guidelines for embedded instruction training for families with young children with disabilities. This chapter will first include a summary of findings aligned with the primary and secondary research questions, followed by study limitations, and implications for future research and for the field.

Summary of the Findings

The purpose of this study was to develop and implement procedures for supporting a parent's implementation of an ELO intervention to support their child's learning of important learning outcomes within family routines. Specifically, the primary research question addressed the parent's use of the trained ELO strategies and the impact on their child's three targeted goals of the parent implementation and their level of engagement. The secondary research question focused on the quality of parent-child interaction due to the parent's implementation of the ELO strategies. Thus, this section will be aligned with the research questions as the following: (a) parent outcomes; (b) child outcomes; and (c) quality of parent-child interaction.

Parent Outcomes

Overall, all three parents demonstrated substantial increases in their use of ELOs during intervention as compared to baseline as they interacted with their children during the targeted family routines. The findings revealed that parents were able to learn the ELO strategies and

embedded these strategies within a family daily routine. Parents all seemed to understand the notion of embedding and generated ideas for creating opportunities for targeted goals within the routine activity. The materials (i.e., home routine matrix; ELO-at-a-glance form, and self-progress monitoring sheet) provided for parents also served as a support for the parents as they participated in the activity with their child and created learning opportunities for the child's target skill. The parents used these materials as resources and an evaluation tool to monitor their own implementation of the intervention and to gather information on their child's progress. These findings are consistent with previous studies of parents' implementation of embedded instruction (e.g., Kashinath et al., 2006; Woods et al., 2004). Each of these investigations demonstrated that parents were able to learn to embed teaching strategies into routines/activities as a part of their natural family daily schedules. As noted earlier, both of these two studies specifically develop targeted the children's communication and language skills for the embedded instruction. Thus a unique contribution of this current study was that child goals that were targeted for embedded instruction by the family were identified together by the parent and the researcher but were based on the family's priorities for their child. The parent and the trainer then worked together to clarify the goals and developed a plan for embedding instructional episodes into a target activity. Furthermore, each parent received on-going supports for providing their child with learning opportunities and ensuring that within each opportunity the parent was providing instruction through response contingent prompting and scaffolding to their child for acquisition of the target behavior.

Generalization of the use of the ELO strategy to the identified generalization routines for all three of their children's targeted goals was noted for only one of the parent with two of the parents not using the ELO strategy for one or more of their child's goals in the generalization

routines. That is, both Mrs. Guan (Dyad 1) and Mrs. Lee (Dyad 3) were not able to embed learning opportunities into the generalization routine for two of their child's goals. One possible explanation for this failure was that the non-generalized goals were difficult to address in a natural and comfortable way for the parent as a part of the targeted generalization routines. For instance, one of the child goals for Mrs. Guan and Fan (Dyad 1) was pretend play and the generalization routine was mealtime. Though the researcher and the parent discussed some possible ways in which the parent might be able to create learning opportunities during mealtime (e.g., pretend to be a waiter to serve food for each other), the parent reported that she found it difficult to find time and ways in which to create the opportunity without disrupting the family's established manner for conducting their mealtime routine.

When asked parents' perceptions on this ELO intervention package, all parents were highly satisfied with this intervention and felt that they had increased their knowledge on ways to support their child's learning within family routines. Parents felt empowered and were excited to carry out a variety of strategies to work with their children. As Dyad 3 parent (i.e., Mrs. Lee) stated during the intervention, "I have learned so much to work with my child...I bought a lot of "teaching" toys and wanted him to improve from those toys in the past...now I know better on how to interact with him simply with the toys he has now and within our daily activities." Parents were all very proud of the gains the children had made. These results are entirely consistent with those reported from previous studies that families are in need of an access to top-tier knowledge on evidence-based practice and a "walk-to-walk" support from professionals with knowledge transforming (Turnbull et al., 2010). Through sufficient and powerful supports, parents are able to carry out their responsibilities to participate with educators in making educational decisions about their children.

The fact that all of the family participants in this study were from a non-western cultural backgrounds lead to some potentially unexpected outcomes. As a reminder, the study aim to “support” parents through collaborative planning to develop and then implement plans for enhancing their children’s learning of family identified priority learning within ongoing family routines. The basic assumption was that the collaborative planning and support provided to the families would be based on open discussion with the trainer and the parent. The researcher, however, often experienced difficulties in promoting a “discussion” with the parents. The parents were willing to share their concerns regarding their children, their thoughts of skills they would like to see their children gain, and the nature of their daily lives with their children including the challenging times and behaviors that they encountered. However, when the discussion move to planning the intervention and possible strategies that could be used to support the child’s learning of the target skills during selected routines, the parents often became silent, expecting the trainer to tell them what to do. Parents would just nod their head and said, “Ok, I’ll try.” rather than being actively involving in a two-way conversation. A potential explanation for this “disconnect” may be cultural. That is, in the Chinese cultural there is a strong believe that the parent much show their respect for the professional and the expertise they bring. This cultural value has been referred to as a “large power distance between professionals and families” cultural perspective (Ting-Toomey & Chung, 2005). It has been reported that people from large power distance cultures, which includes the Chinese culture, will use the respect for power hierarchy (i.e., age, rank, status, title, and seniority) to guide how they interact all contexts and situations. The parents in this study likely viewed the researcher as a professional and this having power. Therefore, the parents determine that their appropriate role in this context was to simply “listen” and “do” the things they were asked to do. Another potential example of the impact of

the Chinese culture in terms of the implementation of the study was that for the most part the parents were hesitate to share with the trainer or ask for assistance when things were not working for them or their child. Here again a plausible explanation may be the indirect communication style that is a part of the Chinese culture. In the majority of the Asian collectivism countries (e.g., China, Korea, Taiwan, Japan), people prefer to use indirect words or phrases to ask for favors or assistance from other and hesitate making negative responses, such as “ No” or “ I cannot do it” (Ting-Toomey & Chung, 2005).

Child Outcomes

All children showed improvements on their target goals with parents’ provision of learning opportunities and of instructional procedures for these learning opportunities. This finding was not surprising, as it confirmed what previous researchers has discovered that parent’s active involvements in their child’s development and education leads to success in child’s goal achievement (e.g., McWilliam, 2010; Turnbull et al., 2010; Xu & Filler, 2008). Up to this point, the results are also entirely consistent with those reported of positive impacts on child’s outcomes using embedded instruction or embedded learning opportunity approaches (e.g., Horn et al., 2000; Kashinath et al., 2006; Woods et al., 2004). This study, however, extends our understanding on how to effectively help parents support their children’s learning within family routines.

Furthermore, there were no significant differences were found for child’s level of engagement across three dyads. Children’s level of engagement stays high and their complexity of engagement was around average score between baseline and intervention phases for all three children. The results suggest that child’s level and complexity of engagement did not change as a

function of the ELO intervention. Future work may include additional engagement measures for careful analysis of child's engagement behaviors to produce better results.

Quality of Parent-Child Interaction

Some positive changes of quality of parent-child interaction were found for two (i.e., Dyad 1 and Dyad 3) of the three dyads. Specifically, both Mrs. Guan (Dyad 1) and Mrs. Lee (Dyad 3) showed increases on the parent facilitator domain and their children (i.e., Fan and Yi-Hua) demonstrated improvements on the child engagement domain. These findings revealed that the ELO intervention effectively helped parents to facilitate their children's engagement skills. As research suggests in the field, the quality of children's interaction with caregivers influences their learning and participation in family activities (Woods et al., 2004). The results of this study also echoes Kashinath's and colleagues' finding (2006) that embedded instruction could change the parent's interaction style by enhancing his or her use of specific teaching strategies, and on the other hand, affect the child's developmental outcomes.

Furthermore, Mrs. Guan (Dyad 1) and Mrs. Lee (Dyad 3) showed different level of generalization on their parent facilitator skills. While Mrs. Guan was able to generalize the facilitator skills across three goals, Mrs. Lee struggled with generalization whenever a new goal was implemented. This may be explained by the nature of the embedded goals, types of child disabilities, or their original parenting styles. For example, Mrs. Lee chose three motor skill goals for Yi-Hua to work on during this intervention, Yi-Hua, however, did not like to practice motor skill activities with his mother for most of time. Thus, Mrs. Lee needs to relearn how to facilitate her child's engagement skills whenever a new goal was embedded.

Limitations

There are several limitations in this study. The first limitation concerns the restrictions of the data collection process on conducting research within natural routines. Specifically, the basic promise of routine based interventions was to catch the “natural occurring” teaching moments surrounding the child within their daily routines. From a research perspective, however, it is nearly impossible for a researcher to be there to catch any possible “teaching” moments that could happen during daily routines. For example, when conducting this research, the researcher usually scheduled visits on the selected routine(s) with the parents. Families, however, often need to adjust the time of their routine based on the family needs (e.g., prepare snacks/ meals earlier if the child feels hungry already).

Second, through the whole intervention package, the researcher worked with parents to identify the most salient goals for their child and provided on-going supports to help parents successfully implement the ELO strategies. Though all parents were able to carry out the strategies to work on the targeted goals, it is hard for parents to know what is the next appropriate goal to continue to work on once the intervention ends. As Dyad 2 parent stated, “I felt I have learned a lot from the past few months...but I don’t know what to do after you leave...I really hope I can have an on-going supports from special educational professionals to work with me all the time.”

The third limitation relates to the measurement of implementation fidelity for the ELO trainer (i.e., researcher). Although the results of the implementation fidelity were very high across all three participants, the impacts of ELO training are strongly affected by the quality of the training and services parents had received. Fourth, there were no significant variations of levels of child engagement across all three dyads compared with baseline and intervention

phases. This may be due to the limited components of the selected child engagement measure (i.e., STARE-modified), thus, more works with additional child engagement measures is needed.

Furthermore, the fact that the researcher served as the primary data collector and data coder may bring some bias and affect the results of this study. Future research must consider the restriction and avoid certain bias. Last, the results of this study are restricted to 3 parents of young children with disabilities within their daily family routines. Though the findings of this study were consistent and across all dyads, the results still need to be treated with cautions. Future research is needed to replicate this study on the impacts of the ELO interventions with children of varying ages and disabilities and families with diverse characteristics.

Implications

Implications for Future Research

The results of this study lead directly to several implications for further research. First, an area of future research that should be considered is the issue related to procedural reliability and quality of the intervention. In this study, an implementation fidelity checklist and visit logs were used to ensure all aspects of the intervention were implemented. The implementation fidelity checklist, however, did not measure the quality of services the family received and the visit logs served as notes taken by the researcher during each visit. Thus, additional research needs to focus on gathering reliability data of the quality of services provided for families.

Second, the findings of this research revealed that all three parents were able to learn and use the ELO strategies and their children were benefit from this approach. In addition to a one-time ELO training in the beginning of each target goal, the most important piece of our intervention was the on-going supports for each dyad through the whole intervention. Obviously, parents need strong partner to provide continued supports to work on goal identification and

intervention planning and implementation. The findings of this study highlight the need for future research to investigate many of the above issues, and in particular, methods for training professionals to support families within their daily routines. Future research should closely review the amount of time and critical competence an early interventionist or professional need in order to work with families to embed learning opportunities or instructions within their daily routines.

Third, additional research should include longitudinal studies to measure the maintenance and generalization of parents' implementation of ELO interventions on their children's goals. As mentioned earlier, the results of this study suggested that parents were willing to carry out the ELO strategies with on-going supports from professionals but struggled with generalization into other skills or family routines. Additional research is definitely needed on investigating the specific impacts on parents' generalization skills and determining how parents' generalization could be possible accomplished.

Last but not the least, as mentioned above, since this study involved only three parent-child dyads, more research is obviously needed to extend the use of the ELO interventions with children with different ages and disabilities and families from diverse backgrounds. Furthermore, although all three families from diverse cultural backgrounds demonstrated improvements in this study, the results cannot be generalized easily due to the small sample size. Future investigation is also needed to understand the best ways to teach parents with different learning styles and from diverse backgrounds with larger populations.

Implications for Practice

While there is general agreement on the importance of providing natural learning environments for young children's development, especially for those with disabilities (Dunst,

Hamby, Trivette, Raab, & Bruder, 2000; Dunst, Bruder, Trivette, Raab, & McLean, 2001a), the Embedded Learning Opportunities (ELO) intervention appears to be a promising approach for helping families better support their children's learning within family daily routines.

Specifically, the results of this study demonstrated the positive impacts of ELO intervention on parents and their children. The evidence suggested that both parents and children were benefit from goal identification (i.e., routine-based interview) as well as strategies selection and implementation (i.e., ELO training and on going visits) processes of the whole ELO intervention package. Thus, practitioners or early interventionists working with families with young children with disabilities should consider using the basic concept (i.e., embedding) of ELO intervention or the whole intervention package to help parents learn and use strategies within family routines.

Unlike other traditional parent training, the ELO intervention of this study specifically target the most salient goals for each individual child and develop a variety of strategies for his/her parent to learn and use within their family routines. As mentioned earlier, the ELO intervention should be considered as an on-going process rather than a one-time training for parents. Research also suggested families need sufficient and powerful supports from professionals in order to be active involved in their child's education (Turnbull et al., 2010). Families were very eager to learn and try out a variety of strategies to work with their children. Therefore, it is important for practitioners or early interventionists to understand their roles and provide continued supports to help parents enhance their children's development within the naturalist learning environments.

Furthermore, research has shown that successful collaboration between both families and professionals is a crucial step on supporting families with young children with disabilities (McWilliam, 2010). The results of this study also noted some cultural influences on parenting

and interaction styles between professionals and parents. In order to build successful collaboration with families, practitioners need to have cultural awareness and sensitivity to provide effective supports for families with young children with disabilities.

In conclusion, the current state of our research on parents' implementation of ELO intervention within family routines indicates that the ELO strategies effectively supported families and made positive impacts on their children's goal achievements. Helping more practitioners and families to gain information on how to implement the intervention are important next steps to moving research into the real world of practice. In doing so, we are hoping to make differences on helping families with young children with disabilities better support their children's learning in the natural learning environments.

References

- Dunst, C. J., Hamby, D., Trivette, C. M., Raab, M., & Bruder, M. B. (2000). Everyday family and community life and children's naturally occurring learning opportunities. *Journal of Early Intervention, 23*, 151-164.
- Dunst C. J., Bruder, M. B., Trivette, C. M., Raab, M., & McLean. M. (2001). Natural learning opportunities for infants, toddlers, and preschoolers. *Young Exceptional Children, 4*, 18-25.
- Horn, E., Lieber, J., Li, S., Sandall, S., & Schwartz, I. (2000). Supporting young children's IEP goals in inclusive settings through embedded learning opportunities. *Topics in Early Childhood Special Education, 20*, 208-223.
- Kashinath, S., Woods, J., Goldstein, H. (2006). Enhancing generalized teaching strategy use in daily routines by parents of children with autism. *Journal of Speech, Language, and Hearing Research, 49*, 466-485.
- McWilliam, R. A. (2010). *Routine-based early intervention-supporting young children and their families*. Baltimore, MD: Paul H. Brookes.
- Ting-Toomey, S., & Chung, L. C. (2005). *Understanding Intercultural Communication*. Los Angeles, CA: Roxbury Publications.
- Turnbull, A., Zuna, N., Hong, J. Y., Hu, X., Kyzar, K., Obremski, S., Summers, J. A., Turnbull, R., & Stowe, M. (2010). Knowledge-to-action guide: Preparing families to be partners in making educational decisions. *Teaching Exceptional Children, 42*, 42-53.
- Woods, J., Kashinath, S., & Goldstein, H. (2004). Effects of embedding caregiver-implemented teaching strategies in daily routines on children's communication outcomes. *Journal of Early Intervention, 26*, 175-193.

Xu, Y., & Filler, J. (2008). Facilitating family involvement and support for inclusive education.

The School Community Journal, 18, 53-71.

RESEARCH PARTICIPANTS NEEDED

Are you a parent or a primary caregiver with a child with disabilities?



This is an opportunity to have you and your child participate in an intervention study with NO monetary cost. This study is designed to help parents create and embed learning opportunities for their children with disabilities at home and community.

You Will Learn:

1

What are some strategies that could be embedded in your family's routines?

2

How to create learning opportunities and embed strategies into your family's routines

3

How to improve your child's participation in family and community activities

What is Embedded Learning Opportunities (ELO)?

- ELO is a research-based Intervention that was designed to increase teaching and learning opportunities provided to the child in natural environments

Who is eligible for this study?

- Any parents or primary caregivers with a child aged 3-5:
 - With any identified disability or developmental delays
 - Currently being evaluated for special education services
 - Being considered for referral to special education evaluation

What will you and your child need to do?

- Parent will receive the ELO intervention training and implement the intervention within the family routines. Child will participate with you in the selected routines. This study may take 12 weeks.

For more information, please contact:

Hsiang-Yi Wu, PhD Candidate

Department of Special Education

University of Kansas

785-393-9739

hwu0503@gmail.com or h992w054@ku.edu

Consent Form

Using Embedded Learning Opportunities (ELO) to Enhance Participation in Family and Community Activities for Young Children with Disabilities

INTRODUCTION

The Department of Special Education at the University of Kansas supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you and your child wish to participate in the present study. You may refuse to sign this form and not participate in this study. You should be aware that even if you and your child agree to participate, you are free to withdraw at any time. If you and your child withdraw from this study, it will not affect your relationship with this unit, the services it may provide to you, or the University of Kansas.

PURPOSE OF THE STUDY

The purpose of this study are: (a) to develop procedures for supporting parents' implementation of Embedded Learning Opportunities (ELO) interventions in routine home and community activities; (b) to assess parents' use of ELO interventions; (c) to describe parent's perceptions of the feasibility of use of the ELO interventions; and (d) to assess the impact of the parent implemented ELO intervention on the child's behavior as they participate in home and community activities.

PROCEDURES

Once the consent form is signed, you will be asked to complete a questionnaire (a copy of the questionnaire is attached). The purpose of the questionnaire is to determine with you and your child member the eligibility requirements for participating in the study. The researcher will then contact you to gather more information about your family, confirm your commitment to participate in all phases of the study, discuss the potential benefit and risks of the study, and answer any questions that you may have about this study.

This study will take place in your home and other community settings. Specific settings may include your home, a friend's home, park, religious organizations, grocery stores, or recreation centers that are the part of your family routines but final selection will be based on your preferences. That is, prior to the intervention, the researcher will work with you to select appropriate and acceptable routines for you and your child. Each routine will need to occur at least three times per week. At this time we will also together select a community setting in which we can collect data on the generalization of skills. The researcher will visit your family and observe the selected routines two to three times per week. All of the visits will be scheduled based on you and your child's most convenient time. The schedule will be set on a monthly basis and remain as consistent as possible with some flexibility considering unexpected schedule changes of your family (e.g., vacations, holidays, illness). The visit will occur for approximately 45 minutes per visit for approximately 12-16 weeks (3-4 months). Notification of any appointment cancellations will be provided in advance via e-mail, text, or phone as determined based on your preference. The researcher will confirm with you at least one day before each visit again either by email, text, or phone. You are welcomed to ask any questions or discuss any concerns with the researcher through the whole process.

An initial meeting will be scheduled with you prior to the beginning of the study. During this meeting, the researcher will describe the concept of ELO interventions and conduct a routine-based interview to identify three skills or behaviors to work on with your child and your family routines in which the objectives will be reasonably addressed. The researcher will ask you to consider: (a) which skills or behaviors are priorities for your child to work on; (b) in which routines your child use the skills most

frequently; (c) which community setting might be appropriate for your child to also use the skills; and (d) when are the best times each week (2 to 3 times each week) that are best for you and your child to engage in the activity/routine and work on the skills.

The actual intervention in which we will provide you with information on how to support your child's learning of the skills will consist of three steps. First, the researcher will review the basic premise of ELO intervention to you and give some hypothetical examples to help you apply the approach. Next, the researcher will review the target skills we have selected to ensure that you understand the intent of your child learning each skill. The researcher will explain and clarify each target skill by giving a variety of examples in different settings. Finally, the researcher will use an "ELO-at-a-glance" form to help you develop specific instructional strategies to support your child learning the skill within the activities/routines. During each visit, the researcher will observe you and your child as you participate in the selected activity/routine.

Once you and your child have demonstrated clear and stable progress across several sessions, the intervention support for the target behavior will end and as will the regularly ongoing visit. The researcher, however, will arrange with your family to conduct visit two, four, and six weeks after the intervention visits have ended to collect information on how you and your child are engage in the selected routine. These visits will only involve the research observing you and your child as you participate in the selected routine.

ROLE OF PARENTS

You will receive the ELO intervention training and then implement the intervention within your designated family routines. The researcher will help you identify specific strategies embedding instruction on the skills we have targeted for your child into your family's home and/or community routines/activities. You will be encouraged to use those strategies to enhance your child's learning. For each visit, the researcher will provide you with information on your child's progress in learning the skills and your implementation of the ELO intervention. Then, the researcher will observe and videotape your interaction with your child during the selected routine.

ROLE OF CHILD

Your child will participate with you in the selected routines.

USE OF VIDEOTAPE

All visits will be videotaped. The only purpose of videotaping is to help the researcher collect and code data of the child's behavior and the parent's implementation of the intervention. Both you and your child will be videotaped. However, the videotapes will not be used for any other purpose (e.g., presentation at conferences). The researcher will have access to the recording. The researcher will use codes names instead of actual family names and the video recordings will be stored in a password protected digital storage device and/or a locked file cabinet. All videotapes will be destroyed one year after the study complete.

RISKS

The potential risks for participants may include loss of time, disruption of family activities, some uncomfortable feeling related to being videotaping, and disclosure of child's disabilities. First, you are expected to spend some extra time with the researcher to make intervention plans for your children. Second, the high frequency rate of visits each week may also cause some disruption of your family's

routines. Third, all visits will be videotaped. Some families may feel uncomfortable in with this. Finally, the researcher will learn about the child's disability and developmental status from interviewing parents and interacting with or observing the child during the research process.

BENEFITS

It is anticipated that your family will learn a variety of teaching strategies and be able to embed those strategies into your family's routines. The information and training provided at no monetary cost may help your family address your child's goals/objectives and improve his/her participation in family and community activities. Furthermore, this study may extend the current literature about the utility of ELO interventions and also provide evidence that families are able to use ELO intervention to enhance their children's learning during daily routines. The data from this study will identify the impacts of the ELO intervention in home/ community settings and develop further training for other families with young children with disabilities.

PARTICIPANT CONFIDENTIALITY

Your child's or your family's identifiable information will not be associated in any way with the information collected about your child or with the research findings from this study. Instead, the researcher will use a study number or a pseudonym rather than your child's and your name. Your child's and your family identifiable information will not be shared unless (a) it is required by law or university policy, or (b) you give written permission.

Permission granted on this date to use and disclose your information remains in effect indefinitely. By signing this form you give permission for the use and disclosure of you and your child's information, excluding your child's name, for purposes of this study at any time in the future."

REFUSAL TO SIGN CONSENT AND AUTHORIZATION

You are not required to sign this Consent and Authorization form and you may refuse to do so without affecting your right to any services you are receiving or may receive from the University of Kansas or to participate in any programs or events of the University of Kansas. However, if you refuse to sign, you and your child cannot participate in this study.

CANCELLING THIS CONSENT AND AUTHORIZATION

You may withdraw your consent for you and your child to participate in this study at any time. You also have the right to cancel your permission to use and disclose further information collected about you and your child, in writing, at any time, by sending your written request to:

Hsiang-Yi Wu, 4100 W 24th Pl, Apt# B22, Lawrence, KS 66047

If you cancel permission to use you and your child's information, the researchers will stop collecting additional information. However, the researcher may use and disclose information that was gathered before they received your cancellation, as described above.

QUESTIONS ABOUT PARTICIPATION

Questions about procedures should be directed to the researcher(s) listed at the end of this consent form.

PARTICIPANT CERTIFICATION:

I have read this Consent and Authorization form. I have had the opportunity to ask, and I have received answers to, any questions I had regarding the study. I understand that if I have any additional questions about my and my child's rights as a research participant, I may call (785) 864-7429, write to the Human Subjects Committee Lawrence Campus (HSCL), University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7568, or email irb@ku.edu.

____ I agree to have my child and me videotaped in this study

Parent/ Guardian Signature

I agree to allow my child to take part in this study as a research participant. By my signature I affirm that I am at least 18 years old and that I have received a copy of this Consent and Authorization form.

Type/Print Child's Name

Date

Parent/Guardian Signature

I agree to take part in this study as a research participant. By my signature I affirm that I am at least 18 years old and that I have received a copy of this Consent and Authorization form.

Type/ Print Adult Participant's Name

Date

Adult Participant's Signature

If you would like me to contact you for participating the study, please complete the contact information below or contact me directly.

E-mail: _____

Phone number: _____

Address: _____

Preferred contacted way and time: _____

[If signed by a personal representative, a description of such representative's authority to act for the individual must also be provided, e.g. parent/guardian.]

RESEARCHER CONTACT INFORMATION

Hsiang-Yi Wu, M. Ed
Doctoral Student
Dept of Special Education.
University of Kansas
1122 W. Campus Dr.
Lawrence, KS 66045
785 393 9739
h992w054@ku.edu

Eva Horn, Ph.D.
Faculty Supervisor
Dept of Special Education
University of Kansas
1122 W. Campus Dr.
Lawrence, KS 66045
785 864 0615
evahorn@ku.edu

Questionnaire

Directions: The following questionnaire is designed to assist in ensuring that both you and your child meet the criteria established for participation in the study. The questionnaire consists of two parts. In **Part I**, you will be asked about some basis information about you, your child and your family as a whole. Also in Part I, you will be asked to provide information about your typical family routines/activities. In **Part II**, you will provide information about your child's current engagement abilities using a more formal assessment.

All items with an * are required.

PART I

➔ Please fill out the blank or check (✓) that best matches with your answer. Thank you!

Child's Information

*1. Child's Date of Birth: _____ Child's age _____

2. What is your child's gender? _____Female _____Male

3. What is your child's race?

- | | |
|---|--|
| <input type="radio"/> American Indian or Alaska Native
<input type="radio"/> Asian Indian
<input type="radio"/> Black, African American
<input type="radio"/> Caucasian/ White
<input type="radio"/> Pacific Islander | <input type="radio"/> Korean
<input type="radio"/> Japanese
<input type="radio"/> Other Asian _____
<input type="radio"/> Vietnamese
<input type="radio"/> Other _____ |
|---|--|

*4. Has your child been diagnosed with a developmental delay or disability:

- ___ No and don't anticipate
 ___ No, has been referred for assessment but not conducted
 ___ No, still in the process of being assessed
 ___ Already been diagnosed with a disability or developmental delay

*5. My child's disability involves (please mark all that apply):

- ___ Physical limitations (for example, walking or using toys or materials with hands)
 ___ Vision impairment
 ___ Hearing impairment
 ___ Speech or language delay
 ___ Developmental delay in one or more areas of development
 ___ Attention deficit and/or hyperactivity disorder
 ___ Autism Spectrum Disorder
 ___ Social –Emotional (behavior) problems
 ___ Other (please describe): _____

6 My child is receiving (check all that apply):

- ___ Physical therapy
 ___ Occupational therapy
 ___ Speech/ Language therapy
 ___ Early childhood special education
 ___ Other, please specify _____

7. My child is receiving services in (check all that apply):

- ___ Preschool or childcare center that includes children with disabilities
 ___ Childcare provider who serves children in his or her home
 ___ Preschool serving only children with disabilities

- Clinic or medical facility (only address for therapy services not for general medical/health)
 One or more private therapists
 Other, please list: _____

Parent's Information

8. What is your age? _____ years
9. What is your gender? Female Male _____
10. What is your race?
- | | |
|--|---|
| <input type="radio"/> American Indian or Alaska Native | <input type="radio"/> Korean |
| <input type="radio"/> Asian Indian | <input type="radio"/> Japanese |
| <input type="radio"/> Black, African American | <input type="radio"/> Other Asian _____ |
| <input type="radio"/> Caucasian/ White | <input type="radio"/> Vietnamese |
| <input type="radio"/> Pacific Islander | <input type="radio"/> Other _____ |
- *11. What is your relationship to the child in this study?
- Parent (Biological, Step, or Adoptive)
 Other relative (grandparent, aunt, uncle, sibling etc.) Please specify _____
12. What is your marital status?
- Married
 Living with partner
 Single parent and Divorced, Separated, or Never Married
13. What is your employment status?
- Working full-time?
 Working part-time?
 Unemployed, but looking
 Not employed (stay at home caregiver/parent or other reason)
14. What is the highest level of education you have completed?
- No schooling completed
 Formal schooling but no diploma or GED
 High school graduate (diploma or GED)
 Some college or post-high school, but no degree
 Associate's Degree
 Bachelor's Degree
 Graduate Degree
15. What is your family's approximate income?
- Less than \$ 19,000
 Between \$20,000 and \$39,000
 Between 40,000 and \$59,000
 Between \$60,000 and \$79,000
 Over \$80,000

16. How many people are supported on this income? _____

Understanding Family Routines

*17. What are you main concerns about your child with disability? Think about questions, difficulties, or needs for both your child and your family as a whole.

*18. What are the main routines of your family's weekday (check all that apply)?

- | | |
|--|--|
| <input type="checkbox"/> Dressing | <input type="checkbox"/> Nap |
| <input type="checkbox"/> Breakfast | <input type="checkbox"/> Watch TV |
| <input type="checkbox"/> Leaving the house | <input type="checkbox"/> Preparing meals |
| <input type="checkbox"/> Household chores | <input type="checkbox"/> Evening meal |
| <input type="checkbox"/> Yard work | <input type="checkbox"/> Bath |
| <input type="checkbox"/> Lunch | <input type="checkbox"/> Bedtime |
| <input type="checkbox"/> Hanging out | <input type="checkbox"/> Other routines: _____ |

*19. What other events occur fairly regularly or during the weekend?

- | | |
|--|---|
| <input type="checkbox"/> Grocery shopping | <input type="checkbox"/> Having visitors to the house |
| <input type="checkbox"/> Going to the mall | <input type="checkbox"/> Going to doctor's visits |
| <input type="checkbox"/> Visiting relatives or friends | <input type="checkbox"/> Using public transportation |
| <input type="checkbox"/> Going to the park | <input type="checkbox"/> Going to the library |
| <input type="checkbox"/> Participating in religious services | <input type="checkbox"/> Other routines: _____ |

*20. In which routines do you and your child frequently experience some difficulties? Please indicate the specific strengths or needs that your child have in the routine.

Routine: _____

Strengths and needs:

Routine: _____

Strengths and needs:

Routine: _____

Strengths and needs:

Adapted from Summers, J. A., Palmer, S. B., Brotherson, J. A. & Erwin, E. Building Foundations for Self-Determination in Young Children with Disabilities: Family Professional Partnerships. Early Intervention & Early Childhood Special Education Goal 2: U. S. Institute of Education Sciences Goal 2 Development Project. \$918,533, Grant awarded to the University of Kansas, 2009-2012. & Children's Engagement Questionnaire. *Engagement of Every Child in the Preschool Classroom* (p. 47), by McWilliam, R. A. & Casey, A. M. (Eds.), 2008, Baltimore, MD: Paul .H. Brookes. Copyright 2008 by Paul. H. Brookes Publishing Co., Inc.

Appendix B An Example of Home Routine Matrix

Child's Name: _____ Fan _____

Date of completing the matrix: _____

Learning Goal #__1__: Fan will independently and accurately (i.e., the information provided in the response is correct) uses either English or Chinese sentences to describe events occurring or occurred in the environment (e.g., what the child is doing, what she did earlier in the day, what is happening, what she is seeing...) in response to questions (*Note: Error in syntax are acceptable; partial information is acceptable*)

Example:

- Fan uses sentences to reply with correct information independently (e.g., Fan replies “I played with puzzles” or “I play with puzzle” or “I play puzzle” when parent asks what did she play at school today (*Note: Error in syntax are acceptable*))
- Fan uses sentences to reply to different types of the first attempt of parent cue (e.g., Fan says “I saw a bear” when parent points out a picture and asks what did she see in the picture)
- Fan uses sentences to reply with correct partial information independently. (e.g., Fan replies “I saw a red see-saw” or “I saw two pigs” or “I saw two pigs playing see-saw” when parent asks what did you see in the picture. (*Note: partial information is acceptable*))

Non-example:

- When parent asks question(s), Fan replies with:
 - Words only (e.g., butterfly), or phrases only (e.g., playing puzzle)
 - Incorrect information (e.g., says “I want to eat candy” when parent asks what did she do today)
 - Other behaviors (e.g., tries to run away),
 - No responses (e.g., keeps silent or continues doing what she is doing)
 - Requires additional prompts after the question (e.g., parent needs to model the sentence, re-point out the picture/toy/book again, or uses eyes/head to give additional hints)
- **WITHOUT** any parent's questions, Fan uses words, phrases, or sentences to describe occurring or occurred events (e.g., J says “puzzle,” “playing puzzle,” or “I'm playing puzzle” **WITHOUT** any parent's questions)

Daily routine	Learning opportunities that address the goal
*Mealtime	<ul style="list-style-type: none"> • Ask specific questions to encourage Fan to share what she did during the day (<i>Note: parent can ask teachers about what the child did today so that they will be able to ask more specific questions. E.g., What art project did you make today? Which color did you use on your picture?</i>) • Ask questions on what she is seeing, doing, hearing, observing during meal time (e.g., Tell me what's your baby

	<p>sister is doing)</p> <ul style="list-style-type: none"> • Ask some inference questions (e.g., what do you think other people do during meal time?)
Snack Time	<ul style="list-style-type: none"> • Encourage Fan to describe what she had for snack (Note: since Fan really likes to eat animal crackers, parent can ask her to list the types of animal she had today)
Traveling	<ul style="list-style-type: none"> • The parent can play a game “I saw...” and ask Fan to tell them what she saw outside
Free Play	<ul style="list-style-type: none"> • Ask questions specific related to what Fan is playing or just played • Ask questions related to the toys/ movements she just played • Read a story with Fan and asked her the questions related to the story
Grocery Shopping	<ul style="list-style-type: none"> • Gives Fan a shopping list to shop for few items and asks her what she got from different food area • Talk about what she sees in the grocery stores (e.g., people, clothes, food...)

Adapted from Sandall, S.R., & Swartz, I. S. (2008). *Building blocks for teaching preschoolers with disabilities*. Baltimore: Brookes.

Appendix C

An example of ELO at a Glance Form

Child Name: __Mandy_____	Dates: _____
Goal/Objective to be Embedded: Mandy will be able to use simple words to make requests during playtime.	
Routines in which Instruction on the Goal/Objective is to be Embedded: Playtime	
Materials/Equipment if needed specific to the ELO: Mandy's favorite toys preferred activities	
Modifications needed:	
<ul style="list-style-type: none"> - Child's preference - Place/ hold desired object/material within view but out of Mandy's reach - Choice board 	
What are you going to DO? <i>This can also provide a brief description of what you will do to make sure the opportunity for the child to make the targeted response(s) will occur. This may include a form of prompt such as a gesture, model and/or physical guidance to assist the child to respond.</i>	
<ul style="list-style-type: none"> - Use choice board to ask Mandy which toys she wants. - Model how to request an object (e.g., saying "doll" and give Mandy the doll to play) - Creates multiple opportunities to ask Mandy what does she want (e.g., after Mandy playing for a few minutes, parent will step in, take away the toy, and ask Mandy again) - Make sure Mandy get the toy immediately once she say the name of the toy. 	
What are you going to SAY? <i>This specifies anything that you will say to make sure there is an opportunity for the child to engage in the targeted response(s) specific to the goal/ objective. This may include a natural direction and/or a verbal prompt.</i>	
<ul style="list-style-type: none"> - What do you want to play? - Which one do you want? 	
How will you respond?	
<ul style="list-style-type: none"> • Correctly/Appropriately: <ul style="list-style-type: none"> - Repeat the words of the expected toy and give her the objects/materials she requests - Engage in the activity with her - High five • Incorrectly/Inappropriately: <ul style="list-style-type: none"> - Model the expected behavior and wait few secs for Mandy's response (e.g., say: "I want" and wait for Mandy's response) - Give verbal prompts of the beginning sounds of the words - If Mandy starts to cry or yell, parent will ignore Mandy and ensure that she will not get what she wants. • No response: <ul style="list-style-type: none"> - Use the choice board again to ensure child's motivation - Limited Choice options if needed 	

Appendix D

Self-Progress Monitoring Sheet

Child's Name: _____ Fan _____ Date of Birth: _____

Date: Week __ (from _____ to _____)

Goal# __1__: Fan will independently and accurately (i.e., the information provided in the response is correct) uses either English or Chinese sentences to describe events occurring or occurred in the environment in response to questions

➔ Please mark ● on your answer.

		M	Tu	W	Th	F	Sa	S
Number of times** Mom asked questions	>10 times	<input type="radio"/>						
	7-9 times	<input type="radio"/>						
	5-6 times	<input type="radio"/>						
	3-4times	<input type="radio"/>						
	1-2 time	<input type="radio"/>						
	No opportunities	<input type="radio"/>						

Number of times** JG independently and accurately use sentence to answer question	>10 times	<input type="radio"/>						
	7-9 times	<input type="radio"/>						
	5-6 times	<input type="radio"/>						
	3-4 times	<input type="radio"/>						
	1-2 times	<input type="radio"/>						
	No opportunities	<input type="radio"/>						

****Definition of time: Each time should be considered as an antecedent (parent cue)(e.g., mom asks, " what do you see in this picture?). However, a follow-up question after child's response should not count as another time (e.g., mom repeats her question again right after the child shows no response.)**

➔ Please connect each dot you marked to see your progress overtime at the end of week, and answer the questions:

Did you provide enough opportunities for your child to respond to your questions?

How do you think your child is doing on responding questions across all routines this week? _____

Adapted from Summers, J. A., Palmer, S. B., Brotherson, J. A. & Erwin, E. *Building Foundations for Self-Determination in Young Children with Disabilities: Family Professional Partnerships*. Early Intervention & Early Childhood Special Education Goal 2: U. S. Institute of Education Sciences Goal 2 Development Project. \$918,533, Grant awarded to the University of Kansas, 2009-2012.

Appendix E
Quality Rating Index for Modified IPCI (Definitions & Examples)

Subdomains	Items	Definitions	Examples
Parent Facilitators	Conveys acceptance and warmth	<ul style="list-style-type: none"> Smiling Making a positive comment to or about the child Agreeing with something the child has said Indicating the child's correct behavior Confirming with the child Thanks the child for something Stating the child made a good effort 	<ul style="list-style-type: none"> Mother smiles as she says, " Good job, you made a Lego tower by yourself!" Mother picks up a crying child and in a concerned and comforting voice says, " tell me what happened?"
	Uses descriptive language	<ul style="list-style-type: none"> Adult use descriptive comments that both labels and connects objects and actions The comment labels and connects nouns and adjectives 	<ul style="list-style-type: none"> Child is reading a book and mother says " you see the chick is eating a cake!" Mother says in a playful voice " you are using a yellow bowl for your lunch today!"
	Follows child's lead	Following child's lead by noticing what the child is interested in and commenting on the child's interest	<ul style="list-style-type: none"> Child is playing Lego and mom says, " look at you! You made a big truck!
	Maintains or extends child's focus	Parent introduces materials or voice in a novel or interesting manner to maintain and/or extend the child's focus	<ul style="list-style-type: none"> Child is playing pretend play and mom says, " Can you make a cup of tea for me?"
	Uses stress reducing strategies	Parent responds appropriately through the following strategies: slowing pace, using softer voice, brief pause in interaction, or using distractions	<ul style="list-style-type: none"> A child begins to whine and cry when his mom took the phone away. Mom says in a calm voice, " That's not a toy for kids. Let's find something else to play."
Parent Interruptions	Uses criticism or harsh voice	Critical statements or harsh, sarcastic, or raised voice	<ul style="list-style-type: none"> A mom says in an angry, rough voice, " how many times do I have to tell you to...."
	Uses restrictions/intrusions	Restrictions include statements such as " No, Don't, Stop, Quit."	<ul style="list-style-type: none"> Mom takes a toy away (unnecessary because there were no safety concerns) A child is singing a song and mom says, " No, stop it! You made me headache."
	Rejects child's bid	Includes words or gestures that the parent uses that explicitly convey that the child is not to interrupt the parent or seek attentions or helps	<ul style="list-style-type: none"> Mom pushes the child away and says, " Not now, I don't want to play with you."
Child Engagement	Positive feedback	Child provides positive feedback to parent in the following way: smiling, eye contact, words, or gentle touch	<ul style="list-style-type: none"> The child smiles and says "yes, I want to play" when Mom asks if he/she wants to play with a ball.
	Sustained engagement	Child is actively engaged (e.g., reaching for, looking at, manipulating objects, etc.) in an activity for a sustained length of time	<ul style="list-style-type: none"> The child plays with toys house for at least 5 minutes before switching focus The child plays hide-and-seek with mom for at least 5 minutes
	Follows through	Child follows through by vocalizing, words, gesturing, imitating or attempting the task	<ul style="list-style-type: none"> Mom asks, " where is the policeman on the book?" and child looks for it
Child Reactivity	Irritable/fuss/cry	Child fusses, cries, or signals that change quickly and may be difficult to understand	<ul style="list-style-type: none"> Mom is reading a book to the child and the

/ Distress			child begins to fuss and whine • Child cries when he cannot find a piece on the puzzle he is playing
	External distress	Child engages in a tantrum or aggressive behavior	• Mom tries to show child book and child throws book at mom
	Frozen/ watchful/ withdrawn	Child startles, flinches, or pulls away from the parent or engages in frozen, watchful behavior without joining in the interaction	• Mom invites the child to play a game and child startles and then freezes

Note. Adapted from Indicator of Parent-Child Interaction (Baggett, Carta & Horn, 2006)

Appendix F
Indicator of Parent Child Interaction (IPCI) Rating Sheet

Child's Name: _____
 Test Date: _____

Place an X in the gray box below for each activity observed. Then proceed to record tallies in clear boxes below each activity for each item listed at the left. After observing each activity, circle your Overall rating below for each item.

Never = 0 (Never) Rarely/Mild = 1 (Once; Mild for Cg Interrupters and Child Distress) Sometimes = 2 (Inconsistently) Often/Severe = 3 (Often, Consistently; Severe for Cg Interrupters and Child Distress) No Opportunity = N/O (No Opp. to observe)		Routine	Overall
		_____	Never = 0 Rarely/Mild = 1 Sometimes = 2 Often/Severe = 3 No Opportunity = N/O
Caregiver Facilitators	(1) Acceptance/Warmth		0 1 2 3
	(2) Descriptive Language		0 1 2 3
	(3) Follows Child's Lead		0 1 2 3
	(4) Maintains and Extends		0 1 2 3
	(5) Stress Reducing Strategies		0 1 2 3
		N/O	N/O
Caregiver Interrupters	(1) Criticism/ Harsh Voice		0 1 2 3
	(2) Restrictions/ Intrusions		0 1 2 3
	(3) Rejects Child's Bid		0 1 2 3
		N/O	N/O
Child Engagement	(1) Positive Feedback		0 1 2 3
	(2) Sustained Engagement		0 1 2 3
	(3) Follow Through		0 1 2 3
		N/O	N/O
Child Reactivity/ Distress	(1) Irritable/Fuss/Cry		0 1 2 3
	(2) External Distress		0 1 2 3
	(3) Frozen/ Watchful/ Withdrawn		0 1 2 3

Appendix G

IPCI Reliability Checking Sheet

	Caregiver Facilitators	Caregiver Interrupters	Child Engagement	Child Reactivity/ Distress	TOTALS	
Primary Coder					PC _{TOTAL}	Overall % Agreement
Reliability Coder					RC _{TOTAL}	
Agreement					A _{TOTAL}	A/A+D =
Disagreement					D _{TOTAL}	
Percent						

Determining Reliability:

1. Record Primary coder scores in first line
2. Record Reliability coder scores in second line
3. Record the number on which they agreed on the third line
4. Record the number on which they disagreed on the fourth line
5. Calculate Percent Agreement for each Key Element category
6. Calculate Overall Percent Agreement using total scores
7. Calculate Average Percent Agreement across categories (add agreements and disagreements across categories (third and fourth lines))

Formula for determining percent agreement:

$$\frac{\text{Agreements}}{\text{Agreements} + \text{Disagreements}} \times 100$$

Appendix H

STARE* Modified**Instructions for Completing STARE Modified**

1. Complete first four items on the STARE Modified Observation sheet (i.e., Child Name; Date; time; and routine).
2. Observe the child for 10 minutes of the routine.
3. During observation make notes in the boxes provided to assist you in completing the rating.
4. After the 10 minutes, rate the amount of time the child is engaged in the routine using the definitions/instructions provided below.
5. Second, rate the complexity of the child's engagement using the definitions provided.
6. Finally using the *Contextual Notes* on the protocol provide your thoughts on the nature of the routine and the impact that the expectations of the routine, and other family members (e.g., siblings) who may have impacted the child's engagement.

*Adapted from McWilliams, R. A. (2000). Scale for Teachers' Assessment of Routines Engagement (STARE). Chapel Hill: Frank Porter Graham Child Development Center, University of North Carolina at Chapel Hill.

Guide to Rating the Amount of Time Spent Engaged in Family Routine

1) Make notes in the comments section of the protocol regarding the child's engagement/non-engagement using the following definitions/observable behaviors

- **Engaged** – eyes on adult(s); responding verbally or nonverbally to adult's questions; following adult's directions; nodding head, shaking head, participating in the routines after receiving the parent's cue.
- **Nonengaged** – unoccupied behaviors such as wandering physically and/or visually; staring into space; engaged in inappropriate behaviors such as aggression, crying etc.; repetitive vocalizations and or physical behaviors; unrelated to routine; casually looking around.

2) At the end of 10 minute observation make an estimate of the % of time that the child was engaged in the routine using the 5 point scale and circle appropriate item on protocol

Rating	Description of Rating
1 – Almost None of the Time	Less than 30 seconds (approximately 5%)
2 – Little of the Time	45 seconds (approximately 7.5%) to 4 minutes (approximately 39%)
3 – Half of the Time	4 minutes (approximately 40%) to 5 minutes (50%)
4 – Much of the Time	5 minutes (approximately 51%) to 8 minutes (80%)
5 – Almost all of the Time	Over 8 minutes (more than 80% of the time)

Guide to Rating the Complexity of Engagement in Family Routine

1) Make notes on the comments section of the protocol regarding the characteristics of the child's engagement during the observation.

2) At the end of the 10-minute session rate the child's complexity of engagement using the following 4 point scale and definitions.

Rating	Description of Rating
<p>1 - Nonengaged Unoccupied behaviors or behaviors that interfere with engagement with activity.</p>	<ul style="list-style-type: none"> • No/limited eye contact with the adult and/or prolonged looking at other, non-related activities (e.g. other areas of the environment) • Unoccupied behaviors such as wandering • Behaviors that are interfering with participating (e.g. crying, repeatedly getting up, spacing out)
<p>2 - Unsophisticated Basic level of engagement that sets the occasion for being engaged</p>	<ul style="list-style-type: none"> • Stays in the routine settings • Limited responses to questions posed by the parent and/or answers with responses that are off target • Limited/basic responses actions/behavioral expectations of activity
<p>3 - Average In general if child is doing what is expected of him or her (use developmental appropriate expectations here)</p>	<ul style="list-style-type: none"> • Shows interests in participating in the routine • Follows directions • Participating appropriately with expectations of the routine • Makes eye contact with the adult • Responds appropriately to the routine.
<p>4 - Advanced Child initiates questions about activity or materials</p>	<ul style="list-style-type: none"> • Shows excitement for the routine • Makes predictions about the procedures of the routine • Be able to answer questions or initiate conversations • Interacting appropriately with adults or other family members

Scale of Teacher's Assessment of Routines Engagement (STARE) Modified*

Child Name:		Date:		Time:	
Routine:					
Amount of Time Engaged in the Routine	Almost none of time 1	Little of the Time 2	Half of the Time 3	Much of the Time 4	Almost all of time 5
Comments:					
Complexity of Engagement	Nonengaged 1	Unsophisticated 2	Average 3	Advanced 4	
Comments:					
Contextual Notes:					

Appendix I
Implementation Fidelity Checklist

Child's name: _____

Date: _____

Observer: _____

PART I – Understanding Family Needs	
<i>Directions: Please check "✓" on the item(s) in which you observe the investigator has completed.</i>	
VIDEO #1	
Component 1 – Conducting a Routine-Based Interview	Completed?
The researcher conducts a Routine-Based Interview with the parent; specifying:	
<ul style="list-style-type: none"> • What does everyone do during the family routine 	
<ul style="list-style-type: none"> • What does the child do 	
<ul style="list-style-type: none"> • How does the child participate in the routine 	
<ul style="list-style-type: none"> • What does the child do by him- or herself? 	
<ul style="list-style-type: none"> • How does the child communicate and interact with other family members during the routine 	
<ul style="list-style-type: none"> • How satisfied are you with the routine 	
Component 2 – Selecting the objective(s)	Completed?
The researcher helps the parent select the three objective(s) by considering	
<ul style="list-style-type: none"> • The child's learning needs 	
<ul style="list-style-type: none"> • The family's needs 	
<ul style="list-style-type: none"> • The priority for the child to work on 	
<ul style="list-style-type: none"> • The home routines which could be logically address the goal (s) 	
<ul style="list-style-type: none"> • The community setting which could be logically generalize the goal (s) 	
<ul style="list-style-type: none"> • The parent's available time 	
VIDEO #2	
Component 3 – Providing overview of ELO	Completed?
The researcher provides an overview of ELO; specifying:	
<ul style="list-style-type: none"> • The basic concept of ELO 	
<ul style="list-style-type: none"> • The key features of learning opportunities 	
<ul style="list-style-type: none"> • The procedures of ELO 	
<ul style="list-style-type: none"> • The hypothetical examples 	

PART II – ELO Training

Directions: Review the videos for the target objectives and check “✓” on the item(s) in which you observe the investigator has completed. Video#3 → Goal 1; Video#4 → Goal 2; Video#5 → Goal 3

Step 1 – Clarifying the learning objective(s)	Completed?		
	Goal 1	Goal 2	Goal 3
The researcher reviews the objective(s) with the parent by:			
<ul style="list-style-type: none"> • Ensure parent’s understanding of the intent of objective(s) and working toward clarifying objective(s) such that they can be used by the child across materials and contexts. 			
<ul style="list-style-type: none"> • Discussion of creating multiple opportunities for child to demonstrate the objective within and across activities. 			
<ul style="list-style-type: none"> • Rewrite the objective(s) as need to ensure that multiple opportunities within and across activities can be provided. 			
Step 2 – Selecting specific teaching strategies			
The researcher helps the parent develop an ELO and select specific teaching strategies::			
<ul style="list-style-type: none"> • What modification(s) will be used during the routine(s) 			
<ul style="list-style-type: none"> • What going to say/do to set the occasion for the learning objective (cue) 			
<ul style="list-style-type: none"> • What, if any, help to provide (prompt) 			
<ul style="list-style-type: none"> • What the child should say or do (child response) 			
<ul style="list-style-type: none"> • How he/she will respond child’s correct response 			
<ul style="list-style-type: none"> • How he/she respond to the child’s incorrect response 			
<ul style="list-style-type: none"> • How he/she will respond to child’s no response 			
Step 3 – Practicing the strategies			
<ul style="list-style-type: none"> • The researcher encourages the parent to practice the selecting strategies with the child 			
<ul style="list-style-type: none"> • The researcher provides feedback or suggestions based the parent and child interaction 			
Step 4 – Discussing & Reflecting			
The researcher discusses and reflects upon what they have learned today; specifying:			
<ul style="list-style-type: none"> • What are parent’s feeling and thoughts of the strategies she just learned? 			
<ul style="list-style-type: none"> • What are some possible barriers as she anticipates when implementing? 			
<ul style="list-style-type: none"> • What are some strategies to address those barriers? 			
Step 5 – Monitoring Progress			
<ul style="list-style-type: none"> • The researcher explains to the parent how to monitor the child’s progress on the target behavior 			

Appendix J

Exit Survey

Directions: Please take a moment to tell us your thoughts about the study. Check the box that best match your opinion for each statement. Please add any additional comments as well. We thank you for all your feedback and work over the past weeks.

1. This study has increased my knowledge and understanding of my child strengths, abilities, and needs.

- Strongly Agree
- Somewhat Agree
- No Opinion
- Somewhat Disagree
- Strongly Disagree

2. As a result of this study, I have increased my knowledge on ways to support my child's participation and learning during our family routines.

- Strongly Agree
- Somewhat Agree
- No Opinion
- Somewhat Disagree
- Strongly Disagree

3. As a result of this study, I have learned new skills in how to help my child in participating family activities.

- Strongly Agree
- Somewhat Agree
- No Opinion
- Somewhat Disagree
- Strongly Disagree

4. As a result of this study, my child has increased their active participation in our family and community activities and learned new skills practiced during the activities.

- Strongly Agree
- Somewhat Agree
- No Opinion
- Somewhat Disagree
- Strongly Disagree

5. Please indicate how useful you found each of the components of this study.

Components	Very Useful	Somewhat Useful	No Opinion	Not very useful	Not useful at all
1. Gathering information (Routine-Based Interview)					
2. Selecting objective(s)					
3. Providing overview of ELO					
4. Clarifying the learning objective(s)					
5. Developing specific strategies					
Please share any additional comments or thoughts about these key study steps:					

6. What did you learn about yourself through this experience?

7. What did you learn about your child that you did not know before?

8. What did you gain from being a part of this research process?

9. What was the most challenging part of participating in this study?

10. Anything else you would like to share about this study? Please feel free to share any thoughts you may have on how we can improve this study.

Adapted from Summers, J. A., Palmer, S. B., Brotherson, J. A. & Erwin, E. Building Foundations for Self-Determination in Young Children with Disabilities: Family Professional Partnerships. Early Intervention & Early Childhood Special Education Goal 2: U. S. Institute of Education Sciences Goal 2 Development Project. \$918,533, Grant awarded to the University of Kansas, 2009-2012.

Appendix K

Real Time Observational Data Coding

Dyad # 1

Child's goal# 1: Fan will independently and accurately (i.e., the information provided in the response is correct) use either English or Chinese sentences to describe events occurring or occurred in the environment (e.g., what the child is doing, what she did earlier in the day, what is happening, what she is seeing...) in response to questions within 2 secs (*Note: Error in syntax are acceptable; partial information is acceptable*)

Parent Cue

Parent will use either English or Chinese to ask questions related to the events occurring or occurred to Fan in the environment.

Examples:

- The parent asks questions on occurred events to Fan (e.g., "What did you do today?" "What did you eat for snack today?" " what did you see in your book?" " Who did you play with?")
- The parent asks questions on occurring events to Fan (e.g., "Tell me what you are making" " what are you doing?" " What color is it?" "Who is playing puzzle in this picture?")
- The parent asks follow-up questions when the child **INITIATE** to describe the occurred or occurring events in the environment (e.g., the child says , " I drew a picture today." The parent asked "so what did you draw on your picture?")
- The parent asks follow-up questions **AFTER** the child response to the parent's expansion questions (e.g., child responds to parent's first question by saying, "Dad is eating an apple", then the parent ask another follow-up question, " what's the color of the apple?")

Non-examples:

- The parent asks the child to do something (e.g., let's eat! Clean up!)
- The parent asks the child "yes/no" questions (e.g., do you want to eat broccolis?)
- The parent asks questions which is not related to the occurring or occurred events in the environment (e.g., what day is today? What do you need to do after taking shower? What do you want to eat?)
- The parent makes comments to the child's behavior (e.g., you like to sleep with mommy)
- The parent asks follow-up questions when the child did not respond to her initial questions (e.g., parent asks " what are you eating?" the child did not respond, then the parent asks " Are you eating animal crackers or peanuts?)

Codes	Definitions	Examples
V Verbal Cue	Parent verbally requests the behavior from the child	<ul style="list-style-type: none"> • What did you do with your friend? • What are you playing now? • Where did you go shopping today? • What did you eat for snack? • Tell me what did you do at school today
NV Non-	Parent provides non-verbal prompt to cue the child	<ul style="list-style-type: none"> • Eye contact • Facial expression (e.g., inviting smile) • Lean the body forward to the child

cue		
G Gesture	Parent uses gesture to indicate the behavior need to be presented	<ul style="list-style-type: none"> • Point the toy(s) J played earlier when asking question(s) • Point the pictures or book pages J is reading when asking question(s)
V Visual cue	Parent uses pictures/objects to prompt the behavior	<ul style="list-style-type: none"> • Use the art project J made earlier when asking question(s) • Use the pictures or book pages J is reading when asking question(s)

Child Behavior

Fan will independently and accurately (i.e., the information provided in the response is correct) uses either English or Chinese phrases (i.e., V+O, adj+N) or sentences (i.e., S+V+O) to describe events occurring or occurred in the environment (e.g., what the child is doing, what she did earlier in the day, what is happening, what she is seeing...) in response to questions within 2 secs (*Note: Error in syntax are acceptable; partial information is acceptable*)

Example:

- Fan uses sentences to reply with correct information independently (e.g., Fan replies “I played with puzzles” or “I play with puzzle” or “I play puzzle” when parent asks what did she play at school today (*Note: Error in syntax are acceptable*))
- Fan uses sentences to reply to different types of the first attempt of parent cue (e.g., Fan says “I saw a bear” when parent points out a picture and asks what did she see in the picture)
- Fan uses sentences to reply with correct partial information independently. (e.g., Fan replies “I saw a red see-saw” or “I saw two pigs” or “I saw two pigs playing see-saw” when parent asks what did you see in the picture. (*Note: partial information is acceptable*))

Non-example:

- When parent asks question(s), Fan replies with:
 - Words only (e.g., butterfly), or phrases only (e.g., playing puzzle)
 - Incorrect information (e.g., says “I want to eat candy” when parent asks what did she do today)
 - Other behaviors (e.g., tries to run away),
 - No responses (e.g., keeps silent)
 - Requires additional prompts after the question (e.g., parent needs to model the sentence, re-point out the picture/toy/book again, or uses eye gaze/head to give additional hints)
- **WITHOUT** any parent’s questions, J uses words, phrases, or sentences to describe occurring or occurred events (e.g., J says “puzzle,” “playing puzzle,” or “I’m playing puzzle” **WITHOUT** any parent’s questions)

Codes	Definitions	Examples
YR Correct Response	The child independently produces the correct target behavior following the parent’s question	<ul style="list-style-type: none"> • Parent: What are you playing? Child: I’m playing puzzle • Parent: What did you eat for snack? Child: I ate nuts
PYR Partial Correct Response	The child independently produces one or more word response but response does not meet definition of simple sentence (i.e., S+V+O)	<ul style="list-style-type: none"> • The child only says a word (e.g., tiger) or a phrase (e.g., eat cookie)
PR Prompted Response	The child requires additional prompts) beyond the original cues in order to correctly produce the target behavior	<ul style="list-style-type: none"> • The child needs parent to model the answer for her (e.g., say “I played puzzle)
NR No Response	The child does not response the parent cues to perform the target behavior	<ul style="list-style-type: none"> • The child keeps silent after hearing parent’s question. • The child just idling, wandering, or looking around

		<p>after receiving a cue</p> <ul style="list-style-type: none"> • The child keeps doing what he/she was doing (e.g., keep playing the toys)
IR Incorrect Response	The child responds to the parent's verbal or gestural cue but performs the target behavior incorrectly	<ul style="list-style-type: none"> • The child gave the wrong information (e.g., says "book" while she is actually playing lego) • The child shows any inappropriate or challenging behaviors (e.g., crying, yelling, kicking)

Real Time Observational Data Coding

Dyad #1

Child's goal# 2: Fan will engage in pretend plays using real objects*, object substitutions**, and/or imagining absent objects*** in response to her parent's cues within 2 secs.

*Real Object: nonliteral use of actual (e.g., real telephone, bowl) or miniature objects (toy telephone, toy plate) in the manner in which they were intended without the reality-based outcome (e.g., putting an empty spoon up to your mouth or feeding a doll with a plastic bottle)

**Object substitution: use of an object as if it were a different object (e.g., pretending a block as a bowl)

***Imagining absent object: performing an action as if an object was present in the object's absence (e.g., putting first to your mouth and chewing (as if holding a spoon))

Parent Cue

Parent will create a theme or familiar routine/ make requests or comments/ participate the play to engage the child in pretend play

Examples:

- Parent provides real bowls/plates/utensils/cups, ask her to make a lunch for you or her dolls
- Parent demonstrates pretending actions (e.g., make tea with a spoon and a cup) and ask the child to carry out the same action
- Parent acts as a play partner to participate in the pretend play (e.g., pretending as a cashier when pretending grocery shopping)

Non-examples:

- Parent asks the child to do the "real" work (e.g., ask the child to pick up books on the floor)
- Parent simply plays with the child without engaging in any types of pretend play (e.g., read a book together with the child without pretending any characters in the story)
- Parent works together with the child on her assignments (e.g., drawing together; completing questions on the sheet)

Codes	Definitions	Examples
NV Non-Verbal	Parent provides non-verbal prompt to cue the child	<ul style="list-style-type: none"> • Facial expression (e.g., inviting smile) • Lean the body forward to the child
V Verbal cue	Parent verbally requests the behavior from the child	<ul style="list-style-type: none"> • "Feed Kitty" • "Make lunch for mommy" • "Let's play slide with your Kitty doll"
G Gesture	Parent uses gesture to indicate the behavior need to be presented	<ul style="list-style-type: none"> • Point to her animal objects • Point to the objects that parent wants J to carry out
V Visual cue	Parent uses pictures/objects to prompt the behavior	<ul style="list-style-type: none"> • Show her the action picture that parent wants J to do (e.g., show her the washing hair steps while helping Kitty wash her hair) • Show her the book page with the theme or routine parent was trying to act out
M Model	Parent models the completed or partial expected behavior	<ul style="list-style-type: none"> • Model a series of pretend play behavior "pouring tea, serving tea, and drinking tea" • Model partial of pretend play behavior " holding the toy cellphone"

Child Behavior

Fan will engage in pretend using real objects*, object substitutions**, and/or imagining absent objects*** follow by parent's provision of opportunities.

*Real Object: nonliteral use of actual (e.g., real telephone, bowl) or miniature objects (toy telephone, toy plate) in the manner in which they were intended without the reality-based outcome (e.g., putting an empty spoon up to your mouth or feeding a doll with a plastic bottle)

**Object substitution: use of an object as if it were a different object (e.g., pretending a block as a bowl)

***Imagining absent object: performing an action as if an object was present in the object's absence (e.g., putting first to your mouth and chewing (as if holding a spoon))

Examples:

- Fan does pretend play with or without parent cue. The pretend play may includes:
 - Fan uses a real, toy or cell phone, or her hand to pretend talking to the phone, or hang up the phone
 - Fan uses real bowls, toy bowls, or juice containers to pretend making food and serving to others
 - Fan pretends grocery shopping using real food items, empty cereal boxes in a logical sequence (i.e., pick up food, put on her basket, and pay the bill)
 - Fan holds her kitty doll, gives Kitty a good night kiss, and puts Kitty on the bed.
 - Fan arranges seats for her animal objects, feeds and uses tissue to wipe them.
 - Fan pretends to bath play animal (e.g., put them on the sink, put soap on them, and rinse them)

Non-examples:

- Fan does not engage in pretend play (e.g., hold her animal objects and label them; simply repeat parent's questions)
- Fan needs additional prompts for the pretend play actions
- Fan shows any challenging behavior (e.g., crying, kicking, screaming)

Codes	Definitions	Examples
YR Correct Response	The child correctly produces the target behavior as defined independently following the parent's original cue	<ul style="list-style-type: none"> • After parent says, "Make tea for Mommy," the child pretends to pour tea in the cup, stir it and serve it to mother • After parent points out a toy cellphone, the child picks up the phone, says "hi" "bye-bye," and hands up the phone.
PR Full or partial Direct Prompted Response	The child requires additional prompts (i.e., model, physical, repeated verbal prompts) beyond the verbal and/or gestural cues in order to correctly produce the target behavior	<ul style="list-style-type: none"> • F needs parent to model pretending to serve food for her Kitty doll • F needs parent to hold her hand to pick up cereal box while they're pretending doing grocery shopping • F needs parent to verbally remind her again for the next step (e.g., parent says, "F, serve the food to Kitty")
NR No Response	The child does not respond the parent cues to perform the target behavior	<ul style="list-style-type: none"> • The child keeps silent after hearing parent's request. • The child just idling, wandering, or looking around after receiving a cue • The child keeps doing what he/she was doing (e.g., keep playing the toys on his own way)
IR Incorrect Response	The child responds to the parent's verbal or gestural cue but performs the target behavior incorrectly	<ul style="list-style-type: none"> • F does not show a logical sequence of a certain routine or theme (e.g., saying "bye-bye" when she just picks up the phone) • F does not engage in pretend play (e.g., hold her animal objects and label them; simply repeat parent's questions) • F shows any inappropriate or challenging behaviors (e.g., crying, yelling, kicking)

Real Time Observational Data Coding

Dyad #1

Child's goal# 3: Fan will independently and appropriately (i.e., the information provided in the response is correct) use either English or Chinese to describe her or other's feelings either by labeling them or by responding appropriately (e.g., saying "yes/no") to a question asking her about a specific feeling within 2 secs (*Note: Error in syntax is acceptable*)

Parent Cue

Parent will use either English or Chinese to ask questions about J or other's feelings.

Examples:

- The parent asks questions about Fan's or other's feelings on the occurring events (e.g., how do you feel when you play with daddy? How does daddy feel now?)
- The parent asks questions about Fan's or other's feelings on the occurred events (e.g., how do you feel after mommy blamed you?)
- The parent asks questions about Fan's or other's feeling on books or pictures (e.g., how do you think Teddy feel after he lost his toy?)

Non-examples:

- The parent asks questions that were not related to any emotions or feelings questions

Codes	Definitions	Examples
V Verbal cue	Parent verbally requests the behavior from the child	<ul style="list-style-type: none"> • How do you feel when playing with daddy? • What do you think mommy feel now?
NV Non- Verbal	Parent provides non-verbal prompt to cue the child	<ul style="list-style-type: none"> • Eye contact • Facial expression (e.g., inviting smile) • Lean the body forward to the child
G Gesture	Parent uses gesture to indicate the behavior need to be presented	<ul style="list-style-type: none"> • Point to the person's face when asking question(s) • Point the pictures or book pages J is reading when asking question(s)

Child Behavior

J will independently and appropriately (i.e., the information provided in the response is correct) use either English or Chinese to describe her or other's feelings either by labeling them or by responding appropriately (e.g., saying "yes/no") to a question asking her about a specific feeling within 2 secs.

Example:

J can say "I'm happy" after drinking her favorite soymilk. J can say "yes" when her parent asks her if she is happy when playing with them. J can say "Mommy is angry" when J didn't follow the rules on the dining table. J can answer "yes" when her parent asks her if she is sad when she is not allowed to eat her snack before meal.

Non-examples: J does not express her or other's feelings correctly (e.g., says she is angry when she actually had a good time playing with others). J does not respond to parent's questions related to her or other's feelings.

Codes	Definitions	Examples
YR Correct Response	The child independently produces the correct target behavior following the parent's question	<ul style="list-style-type: none"> Parent: How do you feel now? Child: happy! Or I feel happy. Parent: Do you feel angry when you drop your ice cream? Child: yes.
PR Full or partial Direct Prompted Response	The child requires additional prompts (i.e., model, physical, repeated verbal prompts/instruction) beyond the verbal and/or gestural cues in order to correctly produce the target behavior	<ul style="list-style-type: none"> The child needs parent to model the answer for her (e.g., say "yes, I feel happy.")
NR No Response	The child does not respond the parent cues to perform the target behavior	<ul style="list-style-type: none"> The child keeps silent after hearing parent's question. The child just idling, wandering, or looking around after receiving a cue The child keeps doing what he/she was doing (e.g., keep playing the toys)
IR Incorrect Response	The child responds to the parent's verbal or gestural cue but performs the target behavior incorrectly	<ul style="list-style-type: none"> The child gave the wrong information The child shows any inappropriate or challenging behaviors (e.g., crying, yelling, kicking)

Real Time Observational Data Coding

Dyad #2

Child's goal# 1: Xiao-An will be able to make decision about a preferred item or activity through eye gaze, facial expression, reaching, or body movements in response to his parent's cues within 5 secs.

Parent Behavior

The parent provides preferred/non-preferred objects or toys to Xiao-An and asks Xiao-An to make a choice.

Examples :

- The parent hold up toys/books/ball and ask Xiao-An which one he wants to play with first
- The parent ask the child where he wants to play (bed or floor)
- When Xiao-An doesn't want to play anymore, the parent asks him, " do you want to keep playing or are you all done?"

Non-examples :

- The parent makes decisions for Xiao-An without asking him (e.g., hands him the ball directly)
- The parent does not wait for Xiao-An for up to 5 secs and makes decisions for him directly

Codes	Definitions	Examples
V Verbal cue	Parent verbally requests the behavior from the child	<ul style="list-style-type: none"> • Asking choice-making questions (e.g., "do you want to read "no, David" or " three little pigs?" " do you want to play again or all done?" " do you want to eat rice or carrot?")
G Gesture	Parent uses gesture to indicate the behavior need to be presented	<ul style="list-style-type: none"> • Point to the toy he picks

Behavior (Child)

Xiao-An will be able to make decision about a preferred item or activity through eye gaze, facial expression, reaching, or body movements in response to his parent's cues within 5 secs.

Examples:

- When mom gives two choices of toys/activities/foods/books/items, Xiao-An looks at and/ or reach for his preferred item from the offered choices
- When mom asks whether he wants to play more or all done, Xiao-An looks at, smiles, or reach the object which represent either play more or all done

Non-examples:

- When mom gives two choices of toys/activities/foods/books/items, Xiao-An looks around or tries to reach for something else
- When mom asks whether he wants to play or all done, Xiao-An doesn't looks at or reach for the items he wants

Codes	Definitions	Examples
YR Correct Response	The child correctly produces the target behavior as defined independently following the parent's cue	<ul style="list-style-type: none"> • When mom gives two choices of toys/activities/foods/books/items, Xiao-An looks at and/ or reach for his preferred item from the offered choices • When mom asks whether he wants to play more or all done, Xiao-An looks at, smiles, or reach the object which represent either play more or all done
PR Full or partial Direct Prompted Response	The child requires additional prompts (i.e., model, physical, repeated verbal prompts/instruction) beyond the verbal and/or gestural cues in order to correctly produce the target behavior	<ul style="list-style-type: none"> • When mom gives two choices to Xiao-An, he needs additional prompts (e.g., show him the options again, ask him again, hold his hand) to make a decision
NR No Response	The child does not response the parent cues to perform the target behavior	<ul style="list-style-type: none"> • The child keeps silent after hearing parent's question. • The child just idling, wandering, or looking around after receiving a cue • The child keeps doing what he/she was doing (e.g., keep playing the toys)
IR Incorrect Response	The child responds to the parent's verbal or gestural cue but performs the target behavior incorrectly	<ul style="list-style-type: none"> • The child gave the wrong information (e.g., picks up one toy but keeps looking at another one) • The child shows any inappropriate or challenging behaviors (e.g., crying, yelling, kicking)

Real Time Observational Data Coding

Dyad # 2

Child's goal# 2: Xiao-An will be able to use body movements, eye contact, and/or vocalizations to indicate his yes/no intention in response to his parent's cue within 5 secs

Parent Cue

The parent asks Xiao-An "yes/no" questions regarding to his needs or preferences

Examples:

- The parent hold up toys/books/ball and ask Xiao-An if he still wants to play
- After the parent asks choice-making questions, the parent confirms with Xiao-An with yes/no question (e.g., " you want to read the card, aren't you?")
- When Xiao-An doesn't want to play anymore, the parent asks him, " are you all done?"

Non-examples :

- The parent asks questions which are not yes/no questions (e.g., "where is your ball?")
- The parent does not wait for Xiao-An for up to 5 secs and makes decisions for him directly

Codes	Definitions	Examples
V Verbal cue	Parent verbally requests the behavior from the child	<ul style="list-style-type: none"> • Asking yes/no questions (e.g., "do you want to read this book?" " do you still want to play it again?" " do you want to eat rice?")
G Gesture	Parent uses gesture to indicate the behavior need to be presented	<ul style="list-style-type: none"> • Point to the toy he picks

Behavior (Child)

Xiao-An will be able to use body movements, eye contact, and/or vocalizations to indicate his yes/no intention in response to his parent's cue within 5 secs.

Examples:

When mom feeds Xiao-An, he can turn his head or body away, or push away to indicate that he doesn't want the food anymore

After Xiao-An makes a choice of toys he wants, mom asks him "do you want to read a book?" Xiao-An can look at her, reach for toy, or give some other sign so that mom knows he wants the toy.

After Xiao-An makes a choice of book he wants, mom intentionally gives him another and ask him, "do you want to play ball now?" Xiao-An then can turn his head away, look at book he wants to read, push the ball away, and/or give some other signs so that mom knows he wants the book rather than the ball now.

Non-examples:

Xiao-An doesn't give any sign to tell mom if he wants to continue or stop

Xiao-An uses inappropriate way (e.g., crying) to indicate his yes/no intension

Xiao-An gives wrong answer (e.g., shaking his head but after the mom took his toys away he cries)

Codes	Definitions	Examples
YR Correct Response	The child correctly produces the target behavior as defined independently following the parent's cue	<ul style="list-style-type: none"> When mom feeds Xiao-An, he can turn his head or body away, or push away to indicate that he doesn't want the food anymore After Xiao-An makes a choice of the toys he wants to play, mom asks him "do you want to read a book today?" Xiao-An can look at her, reach for the toy, or give some other sign so that mom knows he wants the toy. After Xiao-An makes a choice of the book he wants to read, mom intentionally gives him another book/toy and ask him, "do you want to play ball now?" Xiao-An then can turn his head away, look at the book he wants to read, push the ball away, and/or give some other signs so that mom knows he wants the book rather than the ball now.
PR Full or partial Direct Prompted Response	The child requires additional prompts (i.e., model, physical, repeated verbal prompts/ instruction) beyond the verbal and/or gestural cues in order to correctly produce the target behavior	<ul style="list-style-type: none"> Xiao-An needs additional prompts (e.g., show him the options again, ask him again, model the expected movement) to indicate his yes/no intension
NR No Response	The child does not response the parent cues to perform the target behavior	<ul style="list-style-type: none"> The child keeps silent after hearing parent's requests. The child just idling, wandering, or looking around after receiving a cue The child keeps doing what he/she was doing (e.g., keep playing the toys)
IR Incorrect Response	The child responds to the parent's verbal or gestural cue but performs the target behavior incorrectly	<ul style="list-style-type: none"> The child gave the wrong information (e.g., picks up one toy but keeps looking at another one) The child shows any inappropriate or challenging behaviors (e.g., crying, yelling, kicking)

Real Time Observational Data Coding

Dyad # 2

Child's goal# 3: Xiao-An will be able to release objects/items/toys/books with appropriate control for the activities or games following by his parent's cue within 5 secs

Parent Cue

The parent asks Xiao-An to place objects/items/toys/books into box/basket/bowl/desk/mother's hand

Examples:

- The parent asks Xiao-An to clean up his toys by putting toys into a toy box
- The parent asks Xiao-An to place sliced fruits into the bowl

Note: Each time when the child picks one piece of toys or fruits, it counts as one time

Non-Examples:

- The parent doesn't offer any opportunities to Xiao-An and just clean up for him directly
- The parent offers toys to Xiao-An but doesn't ask him to "release" it

Codes	Definitions	Examples
V Verbal cue	Parent verbally requests the behavior from the child	<ul style="list-style-type: none"> • The parent asks the child to place items into different container
G Gesture	Parent uses gesture to indicate the behavior need to be presented	<ul style="list-style-type: none"> • The parent points to the basket or objects
M Model	Parent model the expected behavior	<ul style="list-style-type: none"> • The parent models how to place toys into a container

Behavior (Child)

Xiao-An will be able to release objects/items/toys/books with appropriate control for the activities or games following by his parent's cue within 5 secs

Example:

- After Xiao-An grabs objects/items/toys/books on his hand, he is able to release it into a container/ holes and slots/ waiting hand

Non-example:

- After Xiao-An grabs objects/items/toys/books on his hand, he simply drop it on the floor without control
- After Xiao-An grabs objects/items/toys/books on his hand, he couldn't drop the item into the container/holes and slots/ waiting hand

Codes	Definitions	Examples
YR Correct Response	The child correctly produces the target behavior as defined independently following the parent's cue	<ul style="list-style-type: none"> • After Xiao-An grabs objects/items/toys/books on his hand, he is able to release it into a container/ holes and slots/ waiting hand
PR Full or partial Direct Prompted Response	The child requires additional prompts (i.e., model, physical, repeated verbal prompts/instruction) beyond the verbal and/or gestural cues in order to correctly produce the target behavior	<ul style="list-style-type: none"> • Xiao-An needs mom to hold his hand to place toys into basket
NR No Response	The child does not respond to the parent cues to perform the target behavior	<ul style="list-style-type: none"> • The child keeps silent after hearing parent's requests. • The child just idling, wandering, or looking around after receiving a cue • The child keeps doing what he/she was doing (e.g., keep playing the toys)
IR Incorrect Response	The child responds to the parent's verbal or gestural cue but performs the target behavior incorrectly	<ul style="list-style-type: none"> • The child gave the wrong information (e.g., picks up one toy but keeps looking at another one) • The child shows any inappropriate or challenging behaviors (e.g., crying, yelling, kicking)

Real Time Observational Data Coding

Dyad # 3

Child's goal# 1: Yi-Hua will independently and appropriately use functional grasp with a variety of tools (cooking tools, plates, cups, scissor, glue, tape), utensils (e.g., writing implement, eating utensils) or materials (e.g., toys, beads, play dough, books, paper, buttons) in response to parent's cues within 2 secs

Parent Cue

Mom asks Yi-Hua to use hands to practice with a variety of tools, utensils, or materials

Examples:

- Mom asks Yi-Hua to draw or write with crayon, marker, pencil, or other writing instruments with three-finger grasp
- Mom asks Yi-Hua to use three-finger to eat or drink soup
- Mom asks Yi-Hua to hold mug with two or three finger grasp
- Mom asks Yi-Hua to pick up objects with appropriate finger grasp based on the size of the objects

Note: Each time when Yi-Hua picks up an object, it count as one cue

Non-examples:

- Mom's requests are not related to any hand grasp activities

Codes	Definitions	Examples
NV Non- cue	Parent provides non-verbal prompt to cue the child	<ul style="list-style-type: none"> • Eye contact • Facial expression (e.g., inviting smile) • Lean the body forward to the child
V Verbal cue	Parent verbally requests the behavior from the child	<ul style="list-style-type: none"> • Mom asks Yi-Hua to use hands with different tools, utensils, or materials
G Gesture	Parent uses gesture to indicate the behavior need to be presented	<ul style="list-style-type: none"> • Point to the toy he picks
V Visual Prompt	Parent uses pictures/objects to prompt the behavior	<ul style="list-style-type: none"> • Show him the item he picks

Behavior (Child)

Yi-Hua will independently and appropriately use functional grasp with a variety of tools (cooking tools, plates, cups, scissor, glue, tape), utensils (e.g., writing implement, eating utensils) or materials (e.g., toys, beads, play dough, books, paper, buttons) in response to parent's cues within 2 secs

Example:

- YH draws or writes with crayon, marker, pencil, or other writing instruments using three-finger grasp
- YH eats food or drinks soup with fork or spoon using three-finger grasp
- YH holds mug with two or three finger grasp and then drinks
- YH picks up objects with appropriate finger grasp based on size of the objects to do the activity

Non-examples:

- YH draws or writes with crayon, marker, pencil, or other writing implement using whole hand grasp
- YH eats food or drinks soup with fork or spoon using whole hand grasp
- YH holds mug with whole hand grasp
- YH picks up objects with inappropriate finger grasp (e.g., using whole hand grasp rather than triceps grasp with a pencil)

Codes	Definitions	Examples
YR Correct Response	The child correctly produces the target behavior as defined independently following the parent's cue	<ul style="list-style-type: none"> • YH draws or writes with crayon, marker, pencil, or other writing instruments using three-finger grasp • YH eats food or drinks soup with fork or spoon using three-finger grasp • YH holds mug with two or three finger grasp and then drinks • YH picks up objects with appropriate finger grasp based on size of the objects to do the activity
PR Full or partial Direct Prompted Response	The child requires additional prompts (i.e., model, physical, repeated verbal prompts/instruction) beyond the verbal and/or gestural cues in order to correctly produce the target behavior	<ul style="list-style-type: none"> • YH needs mom to hold his hand to do the appropriate grasping
NR No Response	The child does not respond to the parent cues to perform the target behavior	<ul style="list-style-type: none"> • The child keeps silent after hearing parent's requests. • The child just idling, wandering, or looking around after receiving a cue • The child keeps doing what he/she was doing (e.g., keep playing the toys)
IR Incorrect Response	The child responds to the parent's verbal or gestural cue but performs the target behavior incorrectly	<ul style="list-style-type: none"> • The child gave the wrong information (e.g., picks up one toy but keeps looking at another one) • The child shows any inappropriate or challenging behaviors (e.g., crying, yelling, kicking)

Real Time Observational Data Coding

Dyad # 3

Child's goal#2: Yi-Hua will be able to catch different types of objects/items (e.g., balloon, kids size volleyball, small plastic color ball, small and big yoga ball, bean bag, pillow, stuffed animals, clothes) that were thrown, rolled, bounced, or dropped to him within 2 secs

Parent Cue

The parent asks Yi-Hua to do activities with catching

Examples:

- Mom asks Yi-Hua to play ball catching games
- Mom throws balls or toys to Yi-Hua and asks him to catch it with hands or basket

Note: Each time when mom throws once, it count as one opportunity

Non-examples:

- Mom hands the ball or toys to Yi-Hua directly
- Mom throws the ball or toys to Yi-Hua's basket directly, so Yi-Hua doesn't need to move at all

Codes	Definitions	Examples
NV Non-verbal cue	Parent provides non-verbal prompt to cue the child	<ul style="list-style-type: none"> • Eye contact • Facial expression (e.g., inviting smile) • Lean the body forward to the child
V Verbal cue	Parent verbally requests the behavior from the child	<ul style="list-style-type: none"> • Mom asks Yi-Hua to play catching game (e.g., "Let's play throwing a ball together")
G Gesture	Parent uses gesture to indicate the behavior need to be presented	<ul style="list-style-type: none"> • Point to the ball or toys
M Model cue	Parent models the expected behavior	<ul style="list-style-type: none"> • Show him with catching skill

Behavior (Child)

Yi-Hua will be able to catch different types of objects/items (e.g., balloon, kids size volleyball, small plastic color ball, small and big yoga ball, bean bag, pillow, stuffed animals, clothes) that were thrown, rolled, bounced, or dropped to him within 2 secs

Example:

- YH uses both hands/ one hands to catch the objects/ items successfully
- YH uses bucket, cone, cup to catch the objects/items successfully
- After bounce (before the ball completely stop bouncing or rolling), YH can catch the ball

Non-examples:

- YH doesn't catch the objects/items successfully
- YH uses his leg or other body parts rather than his hands to catch the objects/items

Codes	Definitions	Examples
YR Correct Response	The child correctly produces the target behavior as defined independently following the parent's cue	<ul style="list-style-type: none"> • YH uses both hands/ one hands to catch the objects/ items successfully • YH uses bucket, cone, cup to catch the objects/items successfully • After bounce (before the ball completely stop bouncing or rolling), YH can catch the ball
PR Full or partial Direct Prompted Response	The child requires additional prompts (i.e., model, physical, repeated verbal prompts/instruction) beyond the verbal and/or gestural cues in order to correctly produce the target behavior	<ul style="list-style-type: none"> • Mom holds Yi-Hua's hand to catch the items his sister throws to him
NR No Response	The child does not respond to the parent cues to perform the target behavior	<ul style="list-style-type: none"> • The child keeps silent after hearing parent's requests. • The child just idling, wandering, or looking around after receiving a cue • The child keeps doing what he/she was doing (e.g., keep playing the toys)
IR Incorrect Response	The child responds to the parent's verbal or gestural cue but performs the target behavior incorrectly	<ul style="list-style-type: none"> • The child gave the wrong information (e.g., picks up one toy but keeps looking at another one) • The child shows any inappropriate or challenging behaviors (e.g., crying, yelling, kicking)

Real Time Observational Data Coding

Dyad # 3

Child's goal# 3: Yi-Hua will be able to use scissor in a correct way to cut out different shapes or materials following by parent's cue within 2 secs

Parent Cue

Mom asks Yi-Hua to do cutting activities

Example:

- Mom asks YH to cut out simple shapes from different types of papers
- Mom asks YH to cut out shapes on play dough
- Mom asks YH to cut out shapes on bread or fruit.

Non-Example:

- Mom does not asks YH to do cutting activities

Codes	Definitions	Examples
NV Non-verbal cue	Parent provides non-verbal prompt to cue the child	<ul style="list-style-type: none"> • Eye contact • Facial expression (e.g., inviting smile) • Lean the body forward to the child
V Verbal cue	Parent verbally requests the behavior from the child	<ul style="list-style-type: none"> • Mom asks Yi-Hua to play cutting game (e.g., "Let's cut a Thomas train together")
G Gesture	Parent uses gesture to indicate the behavior need to be presented	<ul style="list-style-type: none"> • Point to the paper or things for cutting
M Model cue	Parent models the expected behavior	<ul style="list-style-type: none"> • Show him how to cut

Behavior (Child)

Yi-Hua will be able to use scissor in a correct way to cut out different shapes or materials following by parent's cue within 2 secs

Example:

- YH cuts out simple shapes from different types of papers
- YH cuts out shapes on play dough
- YH cuts out shapes on bread or fruit.

Non-Example:

- YH uses incorrect way to use scissor to cut (e.g., hold scissor in a wrong direction)
- YH does not finish the shapes he cuts before
- YH does not use scissor to cut (e.g., try to use his hand or other equipment)

Codes	Definitions	Examples
YR Correct Response	The child correctly produces the target behavior as defined independently following the parent's cue	<ul style="list-style-type: none"> • YH cuts out simple shapes from different types of papers • YH cuts out shapes on play dough • YH cuts out shapes on bread or fruit.
PR Full or partial Direct Prompted Response	The child requires additional prompts (i.e., model, physical, repeated verbal prompts/instruction) beyond the verbal and/or gestural cues in order to correctly produce the target behavior	<ul style="list-style-type: none"> • YH needs mom to hold his hand to cut • YH needs mom to tell him how to cut
NR No Response	The child does not respond to the parent cues to perform the target behavior	<ul style="list-style-type: none"> • The child keeps silent after hearing parent's question. • The child just idling, wandering, or looking around after receiving a cue • The child keeps doing what he/she was doing (e.g., keep playing the toys)
IR Incorrect Response	The child responds to the parent's verbal or gestural cue but performs the target behavior incorrectly	<ul style="list-style-type: none"> • The child gave the wrong information (e.g., picks up one toy but keeps looking at another one) • The child shows any inappropriate or challenging behaviors (e.g., crying, yelling, kicking)