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## THE EFFECTIVEMESS OF TEACHING BY SIBLINGS OF MANUAL SIGN LANGAUAGE

Heather C. Robinson-Curtis

*University of Kentucky*, [hcrobinson@uky.edu](mailto:hcrobinson@uky.edu)

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Heather C. Robinson-Curtis, Student

Dr. Katherine McCormick, Major Professor

Dr. Robert McKenzie, Director of Graduate Studies

The Effectiveness of Teaching by Siblings of Manual Sign Language

Heather Robinson-Curtis

The Graduate School

University of Kentucky

2012

THE EFFECTIVENESS OF TEACHING BY SIBLINGS  
OF MANUAL SIGN LANGUAGE

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THESIS

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A thesis submitted in partial fulfillment of the  
Requirements for the degree of Master of Science in the  
College of Education  
At the University of Kentucky

By

Heather Robinson-Curtis

Lexington, Kentucky

Director: Dr. Katherine McCormick, Professor of Special Education

Lexington, Kentucky

2012

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## ABSTRACT OF THESIS

### THE EFFECTIVENESS OF TEACHING BY SIBLINGS OF MANUAL SIGN LANGUAGE

There has been little published research literature that has focused on using siblings to teach their non-verbal siblings a manual sign to communicate using the mand-model procedure. The mand-model procedure is a naturalistic teaching strategy which has been demonstrated to improve communication and social outcomes for children with disabilities. This study investigated sibling tutors teaching their sibling tutees to use the manual sign “more” to request a want or need. The four sibling tutees were between the ages of 25 and 26 months and their sibling tutors were between the ages of 9 and 14 years. A multiple probe design across subjects was used for this study. The mand-model procedure, the independent variable, was used by the sibling tutors to teach the sibling tutees the manual sign “more.” The effectiveness of the use of the manual sign “more” was the independent variable. All four of the sibling tutees were able to successfully learn the manual sign and used the sign across maintenance and generalization phases.

**KEY WORDS:** mand-model procedure; sibling dyads; developmental delay; speech delays, manual sign language

Heather Robinson-Curtis

June 14, 2012

THE EFFECTIVENESS OF TEACHING BY SIBLINGS  
OF MANUAL SIGN LANGUAGE

By

Heather Robinson Curtis

Katherine McCormick, Ph.D.  
Director of Thesis

Robert McKenzie, PhD  
Director of Graduate Studies

June 14, 2012  
Date

## TABLE OF CONTENTS

List of Tables .....	iii
List of Figures .....	iv
Chapter One: Introduction .....	1
The Importance of Language .....	1
Chapter Two: Literature Review .....	4
Peer/Sibling Studies .....	4
Family Importance .....	6
Embedding Instruction.....	8
Use of Sign Language and the Mand-Model Procedure.....	10
Rationale for Study .....	11
Chapter Three: Methods .....	13
General Procedures .....	13
Participants.....	16
Tutors and Tutees.....	16
Others .....	20
Prerequisite Skills .....	21
Precautions for Program Implementation .....	22
Instructional Setting and Arrangement .....	22
Materials and Equipment .....	23
Sibling Tutor Training .....	23
Chapter Four: Procedures .....	25
Probe Procedures .....	25
Instructional Procedures.....	26
Maintenance Procedures .....	31
Generalization Procedures .....	31
Experimental Design.....	32
Chapter Five: Results .....	34
Effectiveness Data .....	34
Reliability.....	36
Social Validity .....	37
Chapter Six: Discussion.....	39
Significance of the Study .....	39
Implications for Research .....	41
Limitations .....	42
Conclusions.....	43

Appendices.....	45
Laminated Card for Sibling Tutor for “More” at Mealtime .....	45
Laminated Card for Sibling Tutor or “More” at Play .....	47
Manual Sign for More.....	49
Probe Session Data Sheet.....	50
Instructional / Maintenance /Generalization Data Sheet .....	52
Probe Session Reliability Data Sheet.....	54
Instructional and Maintenance Reliability Data Sheet.....	56
Social Validity Questionnaire .....	58
References.....	60
Vita.....	64



LIST OF TABLES

Table 1, Results of Battelle Developmental Inventory Communication Domain for  
Sibling Tutees .....17

## LIST OF FIGURES

Figure 1, The Correct Use of the Manual Sign “More” Across Sibling Tutees .....	30
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## Chapter One

### **Introduction**

#### **The importance of language**

Language is a formalized code used by a group of people to communicate with one another (Heward, 2009). Language is also a way for people to express their wants, their needs and to be social. As a child develops and grows so does their language and their language abilities (Grisham-Brown, Hemmeter, & Pretti-Frontczak, 2006). At birth, babies are ready to communicate through establishing and terminating eye contact (Berk, 2006). They cry to communicate. As different forms of crying develop, infants learn to make comfort sounds, vowel sounds and to look for sounds (Heward, 2009). At about twelve months, infants start to develop a skill known as joint attention. Joint attention refers to the joint attention to an action, event, or object by both a child and a caregiver (Berk, 2006). This is an important skill because children learn to imitate their caregiver, through joint attention, in both verbal and physical interaction and play (Grisham-Brown, et al., 2006). By 18 months, most children have learned to use several words with appropriate meaning. They also communicate desires or needs through non-verbal gestures such as pointing (Heward, 2009). Also during this time, children are learning comprehension, which develops prior to verbal language production (Berk, 2006). By 18 to 24 months, some children demonstrate an understanding of simple concepts such as “soon” and “later”, verbally imitate many of the words and sounds they hear and possess a receptive understanding of 1000 words or more (Heward, 2009). This development of language, both receptive and expressive is an important part of early childhood development (Grisham-Brown, et al., 2006).

Children learn language and other knowledge and behavior through meaningful experiences (Grisham-Brown, Schuster, Hemmeter, & Collins, 2000). The majority of these experiences occur in a child's natural environment with their family present. Communicative behavior and social interaction between a parent and child often begins with turn taking games such as pat-a-cake and peek-a-boo (Berk, 2006). As the child develops, they become more of an active participant in the games, often by hiding their face to initiate peek-a-boo or clapping their hands to play pat-a-cake. By 12 months, children are starting to trade roles with their caregiver. This allows the child to practice the turn taking pattern that occurs in natural conversation with others (Berk, 2006). The family helps develop this integral part of communication through consistent interaction of simple and repetitive play with their child (Hancock & Kaiser, 1996). Furthermore, parents who respond sensitively and who involve infants and children in dialogue and interactive exchanges encourage early language (Berk, 2006). In short, family involvement and social interaction is crucial in the development of early language (Grisham-Brown et al., 2006).

Family involvement is even more important for a child with a disability. Families of children with communication disabilities support and encourage expressive and receptive communication in the infancy and toddler years. However, sometimes expressive speech does not develop, often for unknown reasons (Berk, 2006). An expressive speech delay may be linked to later diagnosis of learning disabilities, poor self-esteem, personal-social delays, behavioral difficulties and negative emotional health (Heward, 2009). When a speech delay is diagnosed the family may seek alternate ways for the child to express his wants and needs which support communication in verbal and

non-verbal forms. One simple form of non-verbal communication is American Sign Language, ASL.

ASL is a visual-spatial language in which the shape, location and movement patterns of the hands, the intensity of motions and the signer's facial expressions all communicate meaning and context (Heward, 2009). Using ASL or manual signs affords a family another way to support the communication of a child who does not verbally express themselves. This is especially important to decrease frustration (Grisham-Brown et al., 2006). When a person is able to communicate and have a want or need met, there is value placed on that communication (Berk, 2006). The same is true when you are communicating with someone, especially a family member. Reciprocal conversation, within a family, can emphasize the importance of each member, letting them know their communication is worthwhile (Grisham-Brown et al., 2006). The emphasis on family as the child's most consistent communication partner and support system in a young child's life highlights the importance of using resources and strategies both within and outside the family to positively impact the child (Mobayed, Collins, Strangis, Schuster, & Hemmeter, 2000). The importance of family in child development and in the development of language and communication led to the formation of the research questions and research study. In the literature review, the following studies will be included: peer and sibling studies, family importance in early childhood, embedding instruction in routines and the mand-model procedure to support the use of a sibling tutor to teach their non-verbal sibling a manual sign for communicating a want and need.

## **Chapter Two**

### **Literature Review**

Using siblings as teachers, acknowledging the importance of family in early childhood development and embedding instruction into daily routines are all important variables when addressing how a family can help meet the needs of a child who has a developmental delay. This literature review will start with addressing peer and sibling studies.

#### **Peer/sibling studies**

Being unable to communicate can cause many difficulties in early childhood. One major difficulty is disruptive behavior and frustration. Learning to communicate can directly decrease this frustration and increase positive behavior (Grisham-Brown et al., 2006). However, communication can be very difficult for a child who has a developmental delay. The learning of a new skill by a young child with disabilities is often dependent on the number of opportunities the child has to acquire and demonstrate the newly learned skill or behavior and the ability the child has to perform the skill. There is no more important skill than learning to communicate, especially in a child's natural environment. Research suggests that learning is increased when it takes place in natural settings with natural partners (Grisham-Brown, et al., 2000). This is especially true in learning communication skills. One strategy to increase the opportunities for communication is to use partners within the natural environment. These partners include friends and family members.

Using peers as learning partners and tutors is not a new concept. Tekin & Iftar (2002) researched the effectiveness of peer tutors in a delivery of simultaneous prompting

procedures to three students, ages seven to ten, with mild to moderate mental retardation. Tefkin & Iftar (2002) found that peer tutors were able to successfully implement a constant time delay procedure and simultaneous prompting procedure to teach animal names to the study children effectively and efficiently. The research also supported results from Godsey, Schuster, Lingo, Collins, & Kleinert (2008), which found that peer tutors were able to teach students, ages 15 to 20 with moderate mental retardation, to expressively identify community signs and embed instructive feedback (i.e., definitions of the signs). The study demonstrated the positive effects of peer tutoring with a high level of reliability with high maintenance levels built into the study (Godsey et al., 2008).

Blew, Schwartz, & Luce, (1985), also found that two students diagnosed as children with autism, ages five and eight, acquired and maintained more skills when peer tutors used modeling. This study provided evidence that modeling by a peer tutor resulted in learning and maintenance of functional community skills. Haring, Breen, Pitts-Conway, and Gaylord-Ross, (1987), found that both peer tutoring and a special friend program increased positive social interactions in students with autism, ages nine and ten. This study recognized the social importance and impact peers can have.

In summary, these studies demonstrate that peers can be teachers. With this recognition, researchers began researching and collecting data on the effectiveness of family members as teachers (Miracle, Collins, Schuster, and Grisham-Brown, 2001). These studies were further supported by the numerous benefits that Powell & Gallagher (1983), found involving siblings as peer tutors that included enhancing and promoting positive interactions between siblings and providing instruction in more natural environments. However, while the research supports using tutors for older children there

is little research that supports using sibling or peer tutors for younger children ages two to five.

### **Family importance**

The parent is the child's first teacher and it is commonly recognized that a family knows their child best (Grisham-Brown, et al., 2006). This is most often recognized during the early childhood years when the family is the child's first teacher and primary source for information. For many children, during the first 3 years of life, the family is the center and context of the child's life. The impact the family has on the child is enormous (Grisham-Brown et al., 2006). The nature and dynamics of children's and adolescents' relationships with both siblings and parents serve as foundation for cognitive, social and emotional development (Dunn, 1983; Jenkins & Updegraff, 2009). High levels of involvement with parents and siblings may be linked to more positive well-being during childhood (Jenkins & Updegraff, 2009). Therefore it is natural to think of the family as the most important teacher.

Grisham-Brown et al., (2006) stated

Family involvement seems especially important for young children as it is in the context of interactions with their families and other significant caregivers that children develop the social and emotional competencies that are critical for their ongoing success in school and life. The family provides a base of support over time that helps children navigate transitions and life events (p. 52).

This fundamental base of support, the family, is most important in early childhood, especially for children who have developmental delays and require intervention. However, including the family in their child's treatment and intervention is



a practice that is not broadly utilized. Family members know what their child can do and what concerns them about what the child cannot do (Wood & McCormick, 2002).

Without this valuable knowledge intervention cannot be concise and individualized for each child. Of equal importance is the family's information regarding when, where, how and with whom the child participates in the skill or behavior so that the intervention may be functional (Woods & McCormick, 2002). This is especially true when partnering with siblings and family members to determine who would work best with the child in what activity for embedded instruction. Supporting the family's roles of decision maker, team member and contributor greatly enhances the capacity of the team to develop individualized and effective instruction (Woods & McCormick, 2002). Still, the level of involvement of families differs greatly among practitioners and teachers. Although teachers espouse the belief that families are important, families are all too often involved only as recipients of information (Grisham-Brown, et al., 2006). Families are not only capable of being "receivers" of information they are also able to be "givers" of information.

Information critical to understanding the child and to determining the context for intervention can be derived from all members of the family, including siblings.

Sometimes the information that is derived from the family can make the difference in what is successful in intervention for a child and what is not. This relationship between family and sibling and sibling to sibling is invaluable (Tucker & Updegraff, 2009).

Welcoming families, and siblings, as partners recognizes that families are experts and know more about their children than anyone else (Woods & McCormick, 2002).

Furthermore, embedding instruction within family routines and interactions increases the effectiveness and efficiency of intervention goals and child progress.

### **Embedding instruction**

The reciprocal relationship between a teacher and family can maximize a child's potential through the sharing and embedding of intervention ideas into a child's daily routine. This concept is known as embedding instruction. Embedding skill instruction into daily routines provides children with the opportunity to learn and practice important skills in meaningful contexts (Daughtery, Grisham-Brown, & Hemmeter, 2001).

Embedding instruction is described as "a procedure in which children are given opportunities to practice individual goals and objectives that are included within an activity or event that expands, modifies or adapts the activity / event while remaining meaningful and interesting to children (Bricker, & Cripe, 1997; Daughtery et al., 2001; Grisham-Brown, et al., 2006; Grisham-Brown, Schuster, Hemmeter, & Collins, 2000).

Embedding instruction is a successful tool for mastery of skills in a child's natural environment, such as their home. The embedding of naturalistic skill instruction can involve siblings who could be the most important member (Grisham-Brown et al., 2000).

In many types of intervention typically developing siblings have been regarded as the most powerful agents of behavioral change in social settings for children with disabilities (Stormshak, Bullock, and Falkenstein, 2009). Most children spend more time interacting with their siblings than with their parents. Furthermore, children with disabilities interact with their siblings every day in multiple ways within multiple family routines (Dunn, 1983; McHale, Crouter, and Tucker, 1999; Stormshak et al., 2009). A recent study of sibling quality and time, in play and daily routines, revealed that siblings spend an

average of 10 hours together per week in both constructive and unstructured activities (Bullock & Falkenstein, 2009; Stormshak, et al., 2009). Constructive activities are organized events or routines that are defined by the family and part of a daily routine. In a study of sibling dyad's Colletti and Harris (1977) found siblings can have a positive impact on all areas of child development. For example, several studies have demonstrated that older siblings can implement intervention strategies resulting in positive outcomes for their sibling with development delays (Hancock & Kaiser, 1996; Scheribman, O'Neill, & Koegel, L., 1983). Similar positive results were demonstrated for the use of older siblings as interventionists for their younger siblings with delays in social interaction (Hancock & Kaiser, 1996; James & Egel, 1986; Powell & Ogle, 1985). In typically developing sibling dyads the younger child assumes the role of imitator and observer while the older child assumes the role of manager and model (Abramotivch, Pepler & Corter, 1982; Baskett, 1984; Hancock & Kaiser, 1996). During the early years the sibling relationship can provide a powerful context for learning and language skills (Hancock & Kaiser, 1996; Powell & Ogle, 1985). However, naturally occurring modeling, an incidental teaching of language model, may be disrupted when one of the siblings has a developmental disability. Because learning problems exhibited by children with disabilities may make it more difficult for them to learn incidentally their sibling tutors or partner may need more structured strategies to support social interaction and language development of their siblings with a disability (Hancock & Kaiser, 1996; Powell & Ogle, 1985.) The greater demands required by a communicative partner for a child with a disabilities may be more easily met by an older sibling. Therefore it is logical to think that an older sibling would be a perfect teacher for their younger sibling.

## **Use of sign language and the mand-model procedure**

One strategy to increase communication between siblings who have communication delays and are non-verbal and their families is through the use of manual sign language. Sign language directly links a specific word to a specific manual hand signal that is used for communication purposes. These specific signs can be embedded in play interactions, which are a natural context for sibling interactions. Sign language uses modeling and imitation which are natural occurring behaviors in sibling interactions (Hancock & Kaiser, 1996). In sign language training children may be taught to request preferred items, engage in conversation, and emit verbal behavior under the control of various stimulus conditions (Sundberg & Partington, 1998). Within the literature in communication intervention and naturalistic teaching strategies this request is identified as a mand (Warren, McQuarter & Rogers-Warren, 1984). This teaching strategy is part of a group of naturalistic teaching procedures often referred to as Milieu teaching (Hancock & Kaiser, 1996). These naturalistic or Milieu teaching strategies combines teaching procedures that are used consistently in naturalistic teaching models and have been demonstrated to be effective (Warren, McQuarter & Rogers-Warren, 1984). The four procedures that make up milieu teaching are (a) model, (b) mand-model, (c) time delay and (d) incidental teaching techniques (Mobayed et al., 2000).

The mand-model procedure is typically used to increase the amount of communicative responses related to the activity in which the child is engaged (Hawkins & Schuster, 2007) and has previously been used to teach sign language and communication skills (Kaiser, 1993). The mand-model procedure can help increase a child's ability to communicate, therefore increasing the child's initiation to communicate

when their needs are met through requests. The mand-model takes place when an adult approaches the child and delivers a mand (i.e. a non yes-no question or direction) and if the child does not respond to the mand, the adult provides a model to elicit the target response (Hawkins & Schuster, 2007). When the student produces the sign before or following the mand the request is granted.

Research has shown that using naturalistic teaching strategies in everyday environments can be beneficial for children with disabilities (Hemmeter, Ault, Collins, and Meyers, 1996). For children with disabilities, natural modeling and incidental teaching of language maybe disrupted making it difficult for them to learn incidentally (Powell & Ogle, 1985). Therefore siblings can be utilized through play to teach manual sign language skills to enforce independent communication.

The current study examined the effects of using an older sibling as a tutor to teach their younger, non-verbal sibling, to communicate their wants and needs by using the manual sign more.

### **Rationale for study**

The target intervention is beneficial because it has the potential to decrease the subject's behavioral outbursts and increase their ability to communicate through requesting wanted items or needs in a socially appropriate and intentional action – a manual sign. All people must have a means to request wanted items or to fulfill a need or desire and to decrease or eliminate frustration (Daugherty et al., 2001).

Using siblings as teachers can help facilitate skill in the routines of their younger siblings through embedded instruction. Embedding instruction occurs when a skill or task is taught during a child's daily routine (Grisham-Brown et al., 2006). Embedding

intervention in natural routines across the day has the potential to increase a child's chance of receiving intervention, or training, over an entire day, in every daily routine, to maximize benefit for overall success (Grisham-Brown et al., 2006).

The current study addresses the need for research to provide evidence of effective and efficient intervention delivered by families and siblings. There have been a limited number of studies published which involve siblings using naturalistic teaching strategies such as milieu teaching for increasing communication purposes. However, none of the published studies reviewed by the principal investigator involved siblings teaching sign language to their non-verbal siblings. To meet this need, the purpose of this study is to evaluate the effectiveness of sibling tutors teaching their non-verbal younger sibling sign language through a mand-model procedure (Hancock & Kaiser, 1996). The research questions are: (1) Can older siblings implement a mand-model procedure to effectively teach their younger siblings to use the manual sign "more" to request a want or need? and (2) Can the sibling tutees use the manual sign "more", to make a request? The independent variables are older siblings implementing the mand-model procedure effectively to teach their younger sibling to use a manual sign. The dependent variables are the sibling tutees using the manual sign effectively to make a request. This study provides a starting point in the investigation of use of siblings as tutors for instruction of sign language to their younger siblings.

## **Chapter Three**

### **Methods**

The study progressed in three phases. First the sibling tutor and their mother were trained on the manual sign “more” and on data collection. Next, the probe sessions were conducted with the sibling tutees. Then the intervention sessions are performed. Lastly, the maintenance and generalization sessions were performed. During each of these phases reliability procedures were used to ensure reliable data collection and analysis. In addition, mothers completed a survey to obtain a measure of the social validity of the intervention.

#### **General procedures**

This research study used a mand-model teaching and intervention procedure. This teaching method offers immediate feedback and reinforcement to the targeted child/participant by allowing immediate access to the desired activity or object. The mand-model procedure is typically used to increase the amount of communicative responses related to the activity in which child is engaged (Hawkins & Schuster, 2007). The American Sign Language manual sign for “more” was the targeted behavior. The current study examined the effects of using an older sibling-a tutor to teach their younger, non-verbal sibling to communicate their wants and needs by using the manual sign “more”. The “more” sign was first taught to the sibling tutor by the researcher. The sibling tutor then taught the sibling tutee to use this manual sign to make a request for more food /drink or play (Hawkins & Schuster, 2007).

For this study, the sibling tutor prompted their sibling tutee to make a request with the phrase “What do you want?” The sibling tutee responded with the manual sign

“more”. Criterion was reached when the child correctly used the sign, with or without prompting, to request items and actions they wanted and needed. This objective was functional because it allowed the sibling tutee to make a request in their environment without the use of disruptive behavior. The use of a mand-model procedure with sign language encouraged the sibling tutee to communicate with manual signs in order for their needs to be met. Criterion for each sibling dyad was met when the sibling tutee used the manual “more” sign with 80% accuracy, or more across three consecutive sessions, one session occurred daily.

The effectiveness of siblings teaching the correct and functional use of the manual sign “more” was evaluated in this study. The sibling tutors learned the manual sign “more” and taught their sibling to request an item/action using this manual sign and the mand-model procedure during meal time and play in the natural environment of their home. A multiple probe across subjects design was utilized. The percentage of correct responses of the target behavior (i.e., “more” sign) was evaluated to determine the effectiveness of sibling tutors teaching their sibling’s the correct use of the manual sign “more”.

The principal investigator collected baseline session data for all four dyads. Following baseline, intervention sessions with the first dyad began. When the first dyad’s data trend was stable, intervention with the second dyad began. When the second dyad’s data trend was stable, intervention with the third dyad began. When the third dyad’s data trend was stable, intervention with the fourth dyad began. As each of the dyads completed their intervention sessions, maintenance sessions occurred. These maintenance sessions were conducted at one, three and four week intervals after criterion



had been met for each dyad. Generalization sessions occurred randomly between maintenance sessions across different environments and routines.

The mand-model procedure was used in two settings; during meal time in the sibling tutees kitchen and/or during play time outdoors at the tutees swing. There was a 2:1 ratio, sibling tutor: sibling tutee, with mother collecting data for the correct, incorrect or no manual sign used. Baseline sessions occurred randomly in the morning, for each sibling dyad, until data was stable and intervention sessions could begin. Intervention, maintenance and generalization sessions occurred between 4:00 pm and 5:00 pm, during meal time and play time. These times were selected because they were best suited for the older sibling's schedule, due to them arriving home from school, having a snack and finishing their homework. The timing was also good for the sibling tutees because each had had a nap and a snack and was in a good mood during this time. This time was also well suited for the mother's schedule because it was before they had to prepare dinner and the target children as well as their siblings were typically in good moods. The sessions were daily, Monday through Friday. Saturdays and Sundays were used for make-up sessions if illness or other family obligations interfered with the weekday schedule. The selected time (4:00 – 5:00 pm) was also a convenient time for the principal investigator to be present to collect reliability data.

The study lasted for eight months. Abigayle's time in the study started September fifth and end November 11<sup>th</sup>, this was a total of 68 days, including her generalization and maintenance sessions. Tommy's time in the study started on October 17<sup>th</sup> and ended on December 14<sup>th</sup>, this was a total of 59 days, including his generalization and maintenance sessions. Tammy's time in the study started on November 17<sup>th</sup> and ended on December

22<sup>nd</sup>, this was a total of 66 days including her generalization and maintenance sessions. Katherine's time in this study started on January second and ended on March 13<sup>th</sup>, this was a total of 72 days.

Social validity was addressed through a questionnaire, given to the mothers to address their overall satisfaction with the survey, the importance of the survey and their willingness to participate in another survey similar to this.

### **Participants**

**Tutors and tutees.** Four children, three girls and one boy, with expressive speech delays were the targeted participants in this study. The females, Abigayle, Tammy, and Katherine, were all Caucasian and the male, Tommy was African American. All four qualified for speech therapy intervention services through the state early intervention system. All four children passed a hearing screening and were evaluated by personnel from the state early intervention program and deemed to have normal hearing. These hearing screenings were performed by the state agency responsible for accessing eligibility for evaluation by the early intervention system. Records for the four participants reflect no history of pressure equalization tubes or chronic ear infections. Based on observation and their primary level evaluations, performed through the state early intervention system, all four children were determined to have age appropriate receptive language skills as measured by the Battelle Developmental Inventory 2<sup>nd</sup> Edition (Newborg, 2005). Each scored more than -2.00 standard deviations below the mean in expressive language skills as measured by the Battelle Developmental Inventory 2<sup>nd</sup> Edition (Newborg, 2005). Table 1 includes scores from the Battelle Developmental Inventory 2<sup>nd</sup> Edition, for expressive and receptive communication results for each

sibling tutee. Each child also demonstrated (on the BDI-II) age appropriate cognitive and fine motor skills and was able to imitate modeled manual hand movements. The targeted participant's ability to imitate fine motor movements was assessed through model replication of the ability to bring their hands to midline with clapping and with waving, to ensure they were able to use their hands to imitate sign language. The Individualized Family Service Plan (IFSP) for each of the four participants included an IFSP goal for increasing expressive language, including the use of sign language. None of the four children had been exposed to sign language before the study. Increasing expressive language was also listed as a priority for each family on the IFSP. None of the children attended early childhood and education programs and each child was cared for by their mother/father or other family members during their day in their home.

Table 1

*Results of Battelle Developmental Inventory Communication Domain for Sibling Tutees*

---

Child	Receptive Scores	Expressive Score
Norleen	+0.07	-2.13
Zamaree	+.13	-2.07
Alundra	+.40	-2.33
Zoe	0.00	-2.33

Abigayle was two years and one month old (25 months) at the time of the study. She had a diagnosis of Down's syndrome. Prior to the study, she received developmental intervention services weekly for one hour in her home. Her strengths were fine motor skills and receptive language abilities. She used nonverbal communication such as eye gaze, grunts and pointing to express interest in the things she wanted or needed in her environment. She also clapped if she wanted something. She had no spoken words but did attempt to make single consonant vowel sounds such as "ga", and "da". Her parents reported that she did not have any functional words for making requests. Her family reported that Abigayle demonstrated a high level of frustration when she did not get what she wanted. Her frustration was demonstrated through screaming and pulling her hair. Abigayle's sibling was 13-year old sister, Annabelle, who was in the seventh grade when the study began. Abigayle lives with her parents, two brothers and two sisters in a rural county in Western Kentucky. She is the youngest of the children. Her oldest sister, Annabelle, is a primary caretaker when she is not in school. She enjoys looking after her sister and reading books to her. The family enjoys spending time together at church and in their garden. They especially like working with Abigayle's and watching her develop.

Tommy was two years and two months old (26 months) at the time of the study. He had a diagnosis of developmental delay. In the past, he received developmental intervention for one hour in his home weekly. His strengths were non-verbal communication, receptive language abilities and fine motor skills. His family reported he would point for objects he wanted but his pointing was not always accurate. Tommy had no functional verbal language but would attempt to communicate with others through grunting, sounds and gestures. Tommy would scream, bite and throw things when his

needs were not met and he did not get what he wanted. His family reported this behavior was the result of not meeting his request on the first or second attempt. Tommy's sibling tutor was his 11-year old brother, Henry, who was in the fifth grade when the study began. Tommy lives with his parents and two other brothers in a rural county in Western Kentucky. His grandmother occasionally lives with them for a few months at a time. The family enjoys spending time fishing and being together.

Tammy was two years and one month old (25 months) at the time of the study. She had a diagnosis of developmental delay. In the past, she received developmental intervention for one hour in her home each week. Her strengths were receptive language abilities and fine motor skills. Her family reported she would point at objects she wanted and she would also grunt. They also reported that Tammy would take a communicative partner (adult or child) by the hand and lead the partner to what she wanted. Tammy used no verbal expressive language. Tammy would throw herself down, cry and hold her breath when she did not get what she wanted. Her family reported that Tammy holding her breath was very scary for them. Tammy's sibling tutor was her 11-year old sister, Debbie, who was in the fifth grade when the study began. Tammy lives with her mom, and older brother and Savannah in a rural county in Western Kentucky. They enjoy going to the park and spending time together in their garden.

Katherine was two years and two months old (26 months) at the time of the study. She had a diagnosis of developmental delay and was also being evaluated for the presence of a chromosomal abnormality but had not yet been formally diagnosed at the time of the study. Prior to the study, she received developmental intervention for one hour in her home weekly. Her strengths were non-verbal communication, receptive

language abilities and fine motor skills. Her family reported she used pointing and eye gaze for objects she wanted. She would also gesture for things or people she wanted. Katherine had no verbal expressive language. Katherine would scream and cry when her needs were not met and she did not get what she wanted. Katherine's sibling was her 10-year old sister, Jennifer, who was in the fourth grade when the study began. Katherine lives with her mom, dad and older sister in a rural county in Western Kentucky. They enjoy going to yard sales and spending time together as a family.

Each subject had an older sibling who verbally expressed an interest in participating in the study, and learning sign language. Each sibling was socially responsive to initiations made by their younger sibling. The families of the sibling tutors reported them as strong motivators for communication with their siblings

**Others.** The author is the principal investigator for this project. She is a third year graduate student in early childhood special education completing this study for a Master's thesis. The investigator trained the sibling tutors in the use of sign language and monitored their implementation of the intervention to their siblings. She had attended several trainings in the subject area of sign language and has had previous success in teaching children and their families to use sign language. The investigator had access to a speech therapist for complications that arose, but there were none.

Each mother was trained in data collection as well as the manual sign for more. Each mother was eager to participate in the study in the hopes it helped to decrease her child's frustration and negative behavior. The mother was present to monitor the session for increased frustration and agitation by the sibling tutee. She also performed the generalization sessions and helped collect the inter-observer agreement (IOA) data on the

student responding data (effectiveness of sibling tutors using the manual sign language mand correctly).

### **Prerequisite skills**

Prerequisite skills for the sibling tutee for this study were as follows: (a) receptive language skills within normal limits (at least 0.00 to +1.00) as assessed by the Battelle Developmental Inventory II (Newborg, 2005), (b) ability to make eye contact upon request in order to establish joint attention, (c) ability to follow simple one step verbal directions when asked, (d) ability to tolerate physical guidance, (e) hearing and vision within normal limits, and (f) use of behavioral outbursts to communicate. These five prerequisite skills were chosen because they are important precursors for learning sign language as recognized by “The Signing Times” DVD, by Rachel Coleman (2005). The sixth was chosen because it was important to the families and myself for intervention purposes.

Prerequisite skills for the sibling tutors for the study were as follows: (a) ability to engage and hold their siblings attention for at least 10 seconds to establish joint attention, (b) ability to exhibit the manual sign “more” correctly, (c) ability to use physical guidance with their sibling, and (e) ability to give a predetermined verbal direction / command to their sibling. These prerequisite skills were chosen because they are important for teaching sign language as recognized by “The Signing Times” DVD, by Rachel Coleman (2005).

Other prerequisites needed for this study included the permission of the sibling tutor and sibling tutees’ parents to participate in this study, learn the manual sign for “more”, at meal time or play time, and to reinforce its use for making requests at these

designated times. Identified reinforcers for the study included when the child used the sign “more”, at meal time or play time, the request would be met within 10 seconds of the signed request.

### **Precautions for program implementation**

Each subjects’ family had similar concerns regarding disruptive behavior when the subject became frustrated. It was determined possible that the tutees could become frustrated or agitated during the session (i.e., scream, bite, cry, hold their breath or hit). If this occurred, the sibling tutors were taught to distract their tutees with other activities and immediately notify an adult. If the tutee was not consolable the session would be terminated and it would be noted on the data sheet. The sibling tutor and tutee were visually monitored by an adult when the procedures were being carried out for this research study at meal time and play time.

### **Instructional setting and arrangement**

The instructional settings for this study were either the sibling tutees kitchen table or an outdoor swing, one session occurred daily. The sessions occurred randomly at both locations for each sibling dyad. The sibling tutors decided where they wanted to perform their sessions at the kitchen table or outdoors. Each session was performed at meal time or play time for all 10 trials in the session. In other words, if the session started at the kitchen table it continued there. If the session began on the swing all 10 trials were also on the swing. At each sibling tutee’s kitchen table was a high chair for the tutee and a chair for the tutor. There was also a plate and a cup for the tutee. Outside, each sibling tutee had access to a child swing that could be latched for safety. The girls all had swings that were attached to



tree limbs and Tommy, the male, had a swing attached to his swing set. The sessions were 2:1 sessions conducted with the tutor and tutee. The children's mother was present to collect the data.

### **Materials and equipment**

The materials used for this study were the sibling tutors chair, the sibling tutees high chair, the kitchen table, the plate and the cup at meal time and the outdoor swing for play time. There were also data sheets, a clip board for the data sheets and pencils. The steps for the mand model procedure for "more" were laminated and available for the sibling tutor, as a reference, during the sessions. The "Signing Times" DVD and book, by Rachel Coleman (2010), were utilized as teaching materials for the sibling tutors to learn the manual sign "more". The Signing Times DVD's is a comprehensive teaching system designed to children of all ages to learn and use sign language for communication purposes. The laminated sheets for the mand model procedure for "more" for meal time are located in Appendix A. Those for play time are located in Appendix B.

### **Sibling tutor training**

The principal investigator conducted training sessions for each sibling tutor and their mother. Training sessions were conducted separately for each family. Each session lasted two days, for a total of eight days across the four families. Each training session lasted 30 and 45 minutes. The training consisted of (a) presenting the sibling tutor with a written page, with a picture of the sign more, written at a second grade level using the Simple Measure of Readability Gobbledygook readability formula (b) a verbal description of the material on the page followed by a discussion of the mand-model

procedure, its use and how to implement it at meal time and in play and (c) practicing the mand-model procedure with their mothers and the principal investigator in simulated play sessions. Following the training, the principal investigator performed an informal verbal post-test for each sibling tutor, ensure they were able to use the “more” sign correctly upon request. The parents and other family members were strongly cautioned not to teach or practice the manual sign “more” with the sibling tutee. The manual sign for ”more” is found in Appendix C.

## **Chapter Four**

### **Procedures**

#### **Probe procedures**

The researcher collected probe session data, before the manual sign was taught and after each student met criterion. Probe sessions took place a minimum of three consecutive days or until the baseline was stable for each child. One probe session occurred daily, there were six trials in a session. These sessions occurred in the mornings, there was no set time for probe sessions. During mealtime probe sessions the sibling tutor was present at the kitchen table with the sibling tutee and the researcher. The sibling tutor had the materials ready. The sibling tutor engaged the tutee by calling their name, touching them or making eye contact. At least 6 times during the probe session, the tutor gave a target mand, “What do you want?” “Do you want more to eat? Do you want more to drink ?” The tutor waited 3 s. The tutor provided a small amount to drink or eat, depending on the command given to the tutee, so the opportunity to sign “more” existed. The same procedure was performed for probe sessions at the tutee’s swing. The child was placed and secured in the swing and given a little push so the opportunity to sign “more” existed. The tutor’s target mand was “What do you want?” “Do you want more swing?” If the child imitated the sign a (+) was scored, if an incorrect or no response was given a (-) was scored. The probe data sheet is shown in Appendix D. Periodic probe data was collected prior to each child’s entry into intervention. The researcher collected probe data as congruent with Hawkins and Shuster (2007). The first sibling dyad (Abigayle/Annabelle) had 3 baseline sessions. The second dyad (Tommy/Henry) had

seven baseline sessions. The third dyad (Tammy/Debbie) had eight baseline sessions and the fourth dyad (Katherine/ Jennifer) had ten baseline sessions.

### **Instructional procedures**

The mand-model procedure was utilized for this research project (Warren, et al., 1984). The mand-model procedure is typically used to increase the amount of communicative responses related to the activity in which the child is engaged (Hawkins & Schuster, 2007). The mand-model procedure can help increase a child's ability to communicate, therefore increasing the child's initiation to communicate when their needs are met through requests. The mand-model takes place when an adult approaches the child and delivers a mand (i.e. a non yes-no question or direction) and if the child does not respond to the mand, the adult provides a model to elicit the target response. (Hawkins & Schuster, 2007). When the student produces the sign before or following the mand the request is granted.

The dependent variable, the percent of opportunities, of the correct use of the manual sign "more" by sibling tutees for requesting an item / action, was monitored for this study. The mand-model steps, the independent variable, were modified using the procedures developed by Hawkins and Schuster (2007). A correct response was defined as the tutee signing the manual sign "more" correctly. An incorrect response was defined as an inappropriate sign being offered and no response was defined as the child initiating no sign. The steps for the mand-model procedure were as followed for the sign "more" used at mealtime.

1. The manual sign was "more".

2. The sibling tutor was seated in a chair and the tutee was seated in their high chair at the kitchen table. The sibling tutor gained joint attention with the sibling tutees through touch or calling their name.
3. The sibling tutor placed an empty cup and plate in front of the tutee on the table.
4. The sibling tutor produced the mand “What do you want?” “Do you want more to eat?” “Do you want more to drink?”
5. The sibling tutor waited 3 s.
6. After the mand, if correct, the tutor said “Great signing more, here’s more to drink or here’s more to eat.”
7. After the model, if the correct sign was given, the tutor continued with the activity with another opportunity to sign “more” was given.
8. If the tutee gave an incorrect or no response after the 3 s mand, the command was be repeated and the sibling tutor verbally prompted, with exaggerated speech, “What do you want?” “Do you want more?”, while modeling the sign more.
9. If the child gave the correct manual sign the sibling tutor praised the tutee and gave the tutee more to eat or more to drink.
10. If the tutee gave an incorrect or no response after the 3 s mand, the sibling tutor again manually signed “more” and gave the tutee another drink or bite of food.

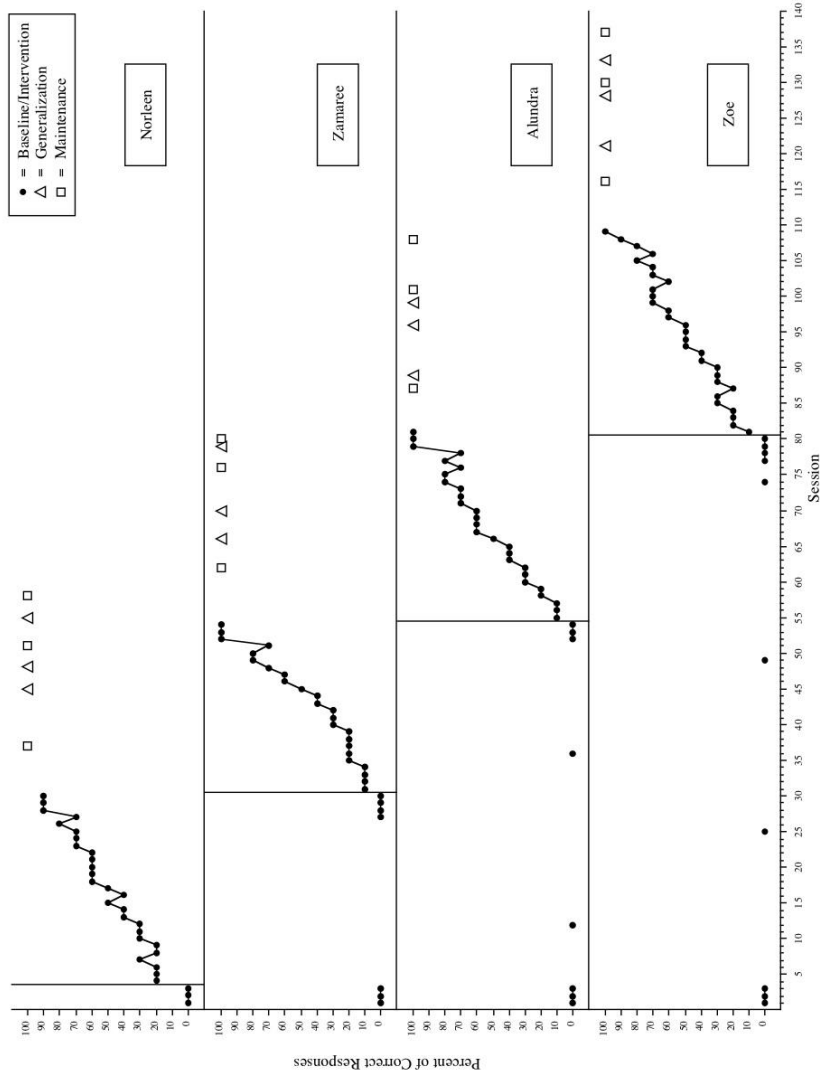
The same steps of the mand-model procedure were followed for “more” as used at play.

1. The manual sign is more.
2. The sibling tutor placed the tutee in their swing and safely latched them in.
3. The sibling tutor established joint attention and gained the sibling tutees attention through touch or calling their name.
4. The sibling tutor produced the mand “What do you want?” “Do you want more swing?”
5. The sibling tutor will wait 3 s.
6. After the mand, if correct, the tutor said “Great signing, here’s more swing.” The sibling tutor gave the tutee a small push.
7. After the model, when the correct sign was given, the tutor continued with the activity with another opportunity to sign “more” was given.
8. If the tutee gave an incorrect or no response after the 3 s mand the command was repeated and the sibling tutor verbally prompted, with exaggerated speech, “What do you want?” “Do you want more?”, while modeling the sign more.
9. If the child gave the correct manual sign the sibling tutor praised the tutee and pushed their swing again.
10. If the tutee gave an incorrect or no response after the 3 s mand, the sibling tutor manually signed more and gave the tutee a small push.

During the intervention phase there were 10 opportunities during each session each day to use the manual sign “more” at either meal time or play time. The sessions were

performed at the kitchen table or swing, the sessions were not divided. The criterion for the intervention phase was met when the sibling tutee used the manual sign “more” with 80% accuracy, before or following the mand, of the opportunities given. When the sibling tutee used the manual sign “more” with 80% accuracy, before or following the mand, for three consecutive days, the intervention phase was terminated and the maintenance sessions began. The correct use of the manual signs, across subjects, is shown in Figure 1. The instructional data collection sheet is shown in Appendix E.

Figure 1-The Correct Use of the Manual Sign “More” Across Sibling Tutees





### **Maintenance procedures**

Maintenance data was collected in a 2:1 ratio, sibling tutor to sibling tutee, with the tutee's mother collecting data. Maintenance data was taken at one, three, and four weeks after the final instructional session, with 10 trials per session. The sessions were implemented as instructional sessions. The maintenance data sheet is shown in Appendix E.

### **Generalization procedures**

Generalization sessions, three for each dyad, were conducted exactly like the instructional sessions with 10 trials per session. The mother of the tutor and tutee conducted the generalizations sessions, they occurred randomly between the maintenance sessions. The generalization sheet is shown in Appendix E.

The generalization sessions for Abigayle occurred across different settings with her mother. These settings included her church, a friend's homes and her aunt's home. They involved meal time, play time and requesting crayons.

The generalization sessions for Tommy occurred across different settings with his mother. They included lunch at McDonald's, play time with cars and wanting items at the grocery store.

The generalizations sessions for Tammy occurred across different setting with her mother. These included a meal at her aunt's home, a meal at her grandmother's and coloring with markers.

The generalization sessions for Katherine occurred across different settings with her mom. They included a meal with her grandmother, a meal with her aunt and a meal at her church with her friends.

## **Experimental design**

A multiple probe design across subjects was used to assess the effectiveness of sibling tutors teaching their sibling tutees to use the manual sign “more” correctly. The percent of correct use of the manual sign “more” is shown in Figure 1. This design is experimentally sound because the probes are conducted in a time-lag fashion which helps demonstrate that extraneous threats are not affecting the data that is collected. Though baseline data is not collected continuously as in a multiple baseline design, the time lag of the design demonstrates the likelihood that the independent variable can be considered a likely factor that causes the change in behavior. Experimental control was demonstrated because the data for each child in baseline is stable until when and only when the intervention was applied.

The four tiers that are associated with this study, for each sibling tutee, are functionally similar but independent. This is demonstrated through the change in only one tier when the intervention is applied. Maintenance data can be built into a multiple probe design. Another advantage of this design is the greater control of the impact of testing effects and instrumentation effects. There also is less likelihood of observer drift than multi-baseline design because of intermittent baseline data that is collected.

Like all research designs, threats to experimental control must be minimized in a multi-probe design. The first threat is maturation. This could have been problematic if any of the children had developed speech skills and the family no longer had an interest in learning manual signs. The investigator monitored this by picking subjects that had no verbal communication and by ensuring that the participating families wanted to learn some simple signs for communication, even if their child began some sound/chain sound

production. If any of the tutees had begun to talk with full words and sentences, they would have been dismissed from the study. Another monitored threat is the threat of co-variation. Co-variation was minimized here because each child was tested in their own environments, which were four completely different places. Therefore the chance of intervention with one sibling tutee affecting the performance of another sibling tutee was minimal. The principal investigator also instructed the parents and extended family of the tutee not to work on the manual sign “more” outside of the study.

## Chapter Five

### Results

#### Effectiveness data

A visual analysis of the data can be seen in Figure 1. In this graph the percent of correct responses for each sibling tutee during baseline, intervention, maintenance and generalization sessions is represented. The closed circles represent the correct responses during baseline and intervention sessions, the open triangles represent the correct responses in the generalization session and the open squares represent the correct responses in the maintenance sessions.

Each sibling tutee demonstrated stable baseline data before intervention was applied. An immediate change in level and ascending trend was noted when the intervention was applied for each of the four sibling tutees. All four sibling tutees had ascending data trends when the intervention was applied. Abigayle and Tammy reached criterion within 27 sessions, Tommy reached criterion within 23 sessions and Katherine reached criterion the latest, in 29 sessions. The data were stable and remained at criterion levels throughout the maintenance and generalization sessions.

The mand-model procedure used by sibling tutors to teach their non-verbal siblings manual signs for communication purposes was effective for all four sibling tutees. Abigayle began with 0% correct for the three probe sessions before intervention began. She reached criterion in the intervention phase after 27 sessions, one per day, (range= 20% to 90%, M= 51%). She obtained criterion in the intervention phase after reaching 90% accuracy the last three days of the intervention phase. She participated in three maintenance sessions at one, three and four weeks after instruction criterion was

reached. Her maintenance percentage was 100% accuracy over all three sessions. Her generalization sessions, performed by her mother, were 100% accuracy over all three sessions.

Tommy began with 0% correct for the seven probe sessions prior to intervention beginning. He reached criterion in the intervention phase after 23 sessions, one per day, (range=10%-100%, M=52%). He reached an accuracy of 100% for criterion to be met for his last three intervention sessions. At one, three and four weeks his maintenance accuracy was 100%. His mother conducted his three generalization sessions and each session was recorded at 100% accuracy.

Tammy began with 0% accuracy for her seven probe sessions before intervention began. She was able to reach criterion in the intervention phase after 27 sessions, one per day, (range=10%-100%, M=54%). She reached criterion in the intervention phase after scoring at 100% accuracy her last three intervention sessions. At one, three and four weeks her maintenance accuracy was 100%. Her mother performed her three generalization sessions and each session was recorded at 100% accuracy.

Katherine began with 0% accuracy for her nine probe sessions before intervention began. She was able to reach criterion in the intervention phase after 29 sessions, one per day, (range=10%-100%, M=51%). She reached criterion in the intervention phase after scoring at 80%, 90% and 100% accuracy her last three intervention sessions. At one, three and four weeks her maintenance accuracy was 100%. Her mother performed her three generalization sessions and each session was recorded at 100% accuracy.

## **Reliability**

The principal investigator collected the independent variable reliability data. The dyad's mother and investigator collected the inter-observer agreement (IOA) data on the student responding data (effectiveness of sibling tutors using the manual sign language mand correctly). Reliability data were collected once or twice during each child's probe sessions and at least once a week for each intervention session. The principal investigator trained the parents in the mand-model procedure and reliability procedures for data collection before the probe sessions began.

Independent variable reliability data were calculated by dividing the number of actual tutor behaviors observed by the number of planned tutor behaviors then multiplying by 100 (Billingsley, White and Munson, 1980.) The sibling tutors behavior in the probe sessions consisted of (a) having the materials ready (b) gaining the sibling tutees attention (c) waiting a 3 s delay, and (d) giving the correct target mands, specific for meal time and playtime. The probe session reliability data collection sheet is shown in Appendix F.

The sibling tutors behavior in the instructional and maintenance sessions consisted of (a) having the materials ready, (b) providing the mand (i.e. What do you want?" ), (c) waiting the 3 s delay, (d) providing a model if needed (i.e. manual sign), (e) 3 s delay, (f) giving verbal praise with "more" and (g) continuing to another prompt for another opportunity to sign. The instructional and maintenance data reliability data sheets are shown in Appendix G.

Dependent variable reliability data were calculated by using the point-by-point method (number of agreements divided by the number of agreements and disagreements

multiplied by 100). Procedural reliability was calculated by dividing the number of interventionist (sibling tutor) behaviors observed divided by the number of interventionist behaviors planned times 100% (Gast, 2010). Procedural reliability for all four sibling dyad's was 100%. Sibling tutee response reliability for all four sibling dyad's was 100%. Procedural reliability during all the sessions was 100% for the tutor behaviors, for all four dyad's. Maintenance reliability was 100%, procedural reliability during the session was 100% accuracy and sibling tutee response reliability was 100% agreement for all four dyads. The principal investigator was present for most, if not all, of the data collection and reliability sessions for each dyad. Experimental-wise reliability was 92 %.

Reliability data were collected during 5 of Abigayle's 27 training sessions, (20%). Sibling response reliability was 90% (r=80%-100%).

Reliability data were collected during 5 of Tommy's 23, (20%) training sessions. Sibling response reliability was 94% (r=80%-100%).

Reliability data were collected during 5 of Tammy's 27, (20%) training sessions. Sibling tutee response reliability was 95% (r=90%-100%).

Reliability data were collected during 5 of Katherine's 29, (20%) training sessions. Sibling tutee response reliability was 90% (r=85%-100%).

**Social validity.** The four participating mothers completed a project-developed questionnaire which included items which asked them to report their satisfaction with the study, the study's social importance, the importance of the intervention, the importance of the manual sign, the interest in learning new signs, the interest in continuing with the manual sign more and if they would participate in the study again. The data from the mother's social validity questionnaire for this study were (a) 100% satisfied with the

study, (b) 100% felt the study had high social importance, (c) 100% felt that knowing this intervention was important for non-verbal children (d) 100% felt that learning the sign “more” helped increase their child’s communication skills (e)100% felt they would continue to use the more sign, (f) 100% stated they would like to have their child learn more manual signs, and (g) 100% felt they would participate in a study like this again. The questionnaire is located in Appendix H.



## **Chapter Six**

### **Discussion**

#### **Significance of the study**

This research study attempted to answer the following research questions: (1) Can older siblings implement a mand-model procedure to effectively teach their younger siblings to use the manual sign “more”, to request a want or need? and (2) Can the sibling tutees use the manual sign “more” to make a request?

A review of the data from this study provides an opportunity to answer these research questions. Abigayle, Tommy, Tammy and Katherine increased their ability to communicate in the instructional, maintenance and generalization sessions by using the manual sign “more”. All four sibling tutees reached criterion with least 80% accuracy, to use the manual sign “more”, across their instructional sessions. Each sibling tutee was able to maintain the use of the manual sign “more” as well as generalize its use across several other settings with their mother. There did not appear to be measurable differences among the performance of the sibling tutors and tutees. Procedural reliability was demonstrated at 100% across the independent variables and 90% to 100% across the dependent variables. The principal investigator was present for most, if not all, of the reliability data that was collected.

The social validity aspect of this study was examined through a subjective evaluation of the sibling tutors and tutees mother. The results from the questionnaire showed a high level of social importance with the intervention. The maintenance data

shows the intervention results were maintained at one, three and four weeks after intervention criterion was reached.

This study expands the previous literature in this area by a focus on very young children as subjects and their older siblings as their teachers. There are a number of studies which focus on older children and using their same age peers as teachers to increase communication. There are also studies that focus on older sibling dyads. However, there are very few studies that use a mand procedure for young sibling dyads to increase communication and decrease frustration and negative behavior.

Many of the studies that use peers as tutors focus on increasing communication but mainly on using prompting, time delay and other response prompting procedures to teach a command or skill. There are very few studies, if any, that focus on using a mand model procedure, with a young sibling dyad to effectively increase communication. Also many of these studies take place in a school or learning environment. The present study takes place in the subject's natural environment with their family present and active in the intervention.

This study was also different from the other studies because the children in this research study were diagnosed as developmentally delayed. This is a general diagnosis that is used to describe development in the early years which suggests that children are progressing at a delayed rate when compared to their peers (Dunn, 1983). Several of the other studies reviewed included children who are much older and who have diagnosed and established cognitive limitations and disabilities.

This study also includes very reliable data; the principal investigator was present, for most, if not all, of each dyad's data collection process.

### **Implications for research**

This study adds to the literature in several ways. First, the investigator was unable to find any studies on the instruction of a mand-model procedure for sibling tutors and its use for teaching sibling tutee manual signs language for communication purposes. The mand-model procedure has been used with increasing verbalizations, vocabulary and complexity of utterances (Rogers-Warren & Warren, 1980), increasing initiations and responding to imitated speech situations (Warren, McQuarter, & Rogers-Warren, 1984) and increasing spontaneous language targets (Hawkins & Schuster, 2007; Hemmeter, Ault, Collins, & Meyer, 1996). However no studies were found using the mand model with siblings with language delays. Research in early intervention and early childhood special education suggests that the family is a child's most valuable teacher (Grisham-Brown et al., 2006). Therefore it is relevant to expand the research in this area. It is especially important to include the use of siblings as the teachers. As embedding instruction becomes best practice in the field of early intervention, generalization of skills across conditions and people becomes a necessity. Due to the importance of generalization of skills to natural settings this study which demonstrated using a naturalistic teaching strategy (Hawkins & Schuster, 2007) could promote generalizations of skills to other adults and peers people in the child's setting.

This opportunity for generalization is true for all daily routines and behaviors not just communication. For example, helping a child string beads or macaroni can help

increase their fine motor skills for dressing and feeding. Also having a child imitate vertical and horizontal lines and circles can later lead to the development of letter writing and fine motor control. Learning to stack blocks can help increase feeding skills and pinching skills. These are simple activities that can be initiated and guided by a sibling tutor to help a child obtain developmental milestones and skills. .

This study is especially important in the context of the current published literature because there are very few, if any, studies that utilize subjects within this age range as tutees for sign language. There needs to be more studies done that involve sibling dyads with younger teachers, different diagnosis of the tutee as well as the tutor and with more manual signs across routines and environments.

### **Limitations**

There were limitations in this study. First, generalization was limited across settings, conditions, and people. Using only two routines of the child's day may be a limitation since children and their families engage in numerous daily routines. However through generalization and maintenance data it was apparent that the sibling tutees were using the signs in multiple environments

The second limitation was the use of only one sign for requesting wants and needs. Future research may utilize more manual signs to evaluate how many signs a sibling tutor can effectively and functionally teach compared to the number a sibling tutee can learn and correctly use. This is especially true when working with children who are at a higher risk to not verbally communicate, such as spastic cerebral palsy, children with autism and children with Down's syndrome.

The third limitation was the use of only four sibling dyads. The effectiveness of this intervention across a greater population needs to be examined through replication of environments, subjects and conditions to increase its external validity. Future research should also vary the ages of the dyads to determine how effective a tutor is with a tutee at a variety of ages.

Finally, while this study was effective it was not very efficient. There are several ways future researchers can increase efficiency. First, including different family members at different times of the day in the instructional sessions, measuring the effectiveness of “more”, could have been utilized. This would have increased the generalization of the study. Second, collecting data on the effectiveness of “more” across several routines throughout the day would have increased the efficiency greatly.

## **Conclusions**

More research on using the mand-model procedure for teaching manual signs to increase communication should be performed. Further investigation could include using sibling dyads with multiple sets of signs and investigating which signs are easier and quicker to learn. It could also include using younger siblings as teachers, to evaluate if they are capable of learning and teaching manual signs to their younger siblings. Furthermore, using the manual signs across different conditions would increase the study’s external validity. Also, using different family members as teachers as well as evaluating the effectiveness of signs across different routines would be acceptable. Using manual signs across all family members and environments should be explored further, increasing the effectiveness of the study. This study did emphasize the impact siblings can

play in their own sibling's intervention as teachers. More studies should explore the impact the entire family has on a child's success in intervention.

## Appendix A

### **Laminated Card for Sibling Tutor for “More” at Mealtime**

The steps of the mand-model procedure will be as followed for “more” as used at  
mealtime:

1. The manual sign was “more”.
2. The sibling tutor was seated in a chair and the tutee was seated in their high chair at the kitchen table. The sibling tutor gained the sibling tutees attention through joint attention by touch or calling their name.
3. The sibling tutor placed an empty cup and plate in front of the tutee on the table.
4. The sibling tutor produced the mand “What do you want?” “Do you want more to eat? Do you want more to drink?”
5. The sibling tutor waited 3 s.
6. After the mand, if correct, the tutor said “Great signing more, here’s more to drink or here’s more to eat.”
7. After the model, if the correct sign was given, the tutor continued with the activity with another opportunity to sign “more” was given.
8. If the tutee gave an incorrect or no response after the 3 s mand, the command was be repeated and the sibling tutor verbally prompted, with exaggerated speech, “What do you want?” “Do you want more?”, while modeling the sign more.

9. If the child gave the correct manual sign the sibling tutor praised the tutee and gave the tutee more to eat or drink.
10. If the tutee gave an incorrect or no response after the 3 s mand, the sibling tutor again manually signed “more” and gave the tutee another drink or bite of food.



## **Appendix B**

### **Lamented Card for Sibling Tutor or “More” at Play.**

The steps of the mand-model procedure will be as followed for “more” as used at play.

1. The manual sign is more.
2. The sibling tutor placed the tutee in their swing and safely latched them in.
3. The sibling tutor gained the sibling tutees attention through joint attention by touch or calling their name.
4. The sibling tutor produced the mand “What do you want?” “Do you want more swing?”
5. The sibling tutor will wait 3 s.
6. After the mand, if correct, the tutor said “Great signing, here’s more swing.”  
The sibling tutor gave the tutee a small push.
7. After the model, when the correct sign was given, the tutor continued with the activity with another opportunity to sign “more” was given.
8. If the tutee gave an incorrect or no response after the 3 s mand the command was repeated and the sibling tutor verbally prompted, with exaggerated speech, “What do you want?” “Do you want more?”, while modeling the sign more.

9. If the child gave the correct manual sign the sibling tutor praised the tutee and pushed their swing again.
10. If the tutee gave an incorrect or no response after the 3 s mand, the sibling tutor manually signed more and gave the tutee a small push.

## Appendix C

### The Manual Sign for More

- The sign for "more" uses flattened "O" hands. Bring both "O" hands together.

## Appendix D

### Probe Session Data Sheet

**Sibling Tutor:** \_\_\_\_\_

**Sibling Tutee:** \_\_\_\_\_

**Date:** \_\_\_\_\_ **Session #:** \_\_\_\_\_ **Researcher: H. Robinson-**

**Curtis**

**Session: Mealtime Playtime**

Procedure :

- 1.) Have instructional materials ready: cup / plate swing
- 2.) Get your siblings attention by calling their name, touching them or making eye contact
- 3.) Give target command:  
Mealtime--- “What do you want? Do you want more to eat or drink?” A small amount of drink or eat is provided so opportunity to sign “more” exists.  
Playtime --- “What do you want? Do you want more swing?” A small push is provided so the opportunity to sign “more” exists
- 5.) After the tutor gives the mand place a (+) in the mand column.
- 6.) If the child repeats the model place a (+) in the model column. If incorrect or no response place a ( -) in the model column.

<u>Trial</u>	<u>Target Commands Given</u>	<u>Mand</u>	<u>Model</u>
1			
2			
3			
4			
5			
6			



<u>Trial</u>	<u>Setting</u>	<u>Mand</u>	<u>Model</u>

Appendix F

Probe Session Reliability Data Sheet

Sibling Tutor: \_\_\_\_\_ Sibling

Tutee: \_\_\_\_\_

Date: \_\_\_\_\_ Session #: \_\_\_\_\_ Researcher: H. Robinson-Curtis

<b>Trials</b>	<b>Materials Ready</b>	<b>Tutor Ensures Attention</b>	<b>Tutor Gives Target Command</b>
1			
2			
3			
4			
5			
6			

**Summary Data**

# observed /total planned			
% accuracy			





## Appendix G

### Instructional and Maintenance Session Reliability Data Sheet

Sibling Tutor: \_\_\_\_\_ Sibling

Tutee: \_\_\_\_\_

Date: \_\_\_\_\_ Session #: \_\_\_\_\_ Researcher: H. Robinson-Curtis

Trials	Materials Ready	Ensures attention	Mand Given	Wait 3 sec.	Correct manual sign given by tutee	Praise if correct and more given	Ignore error / no response and prompt given again	Correct manual sign given tutee	Praise if correct and more given	If incorrect. more is exaggerated and child is given more of eat / drink or swing
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

#### Summary Data

# observed /total planned										
% accuracy										



## Appendix H

### Social Validity Questionnaire

Please answer each of the following 7 questions to the best of your ability, please feel free to write any response, suggestions or comments. Thank you.

1.) How satisfied were you with this study?

A-Not satisfied (0%)

B-Average satisfaction (50%)

C. Very Satisfied (100%)

2.) How important do you think this study is?

A-Not important (0%)

B-Average Importance (50%)

C. Very Important (100%)

3.) How important do you think this intervention (sign language for communication) is to function in our society?

A-Not important (0%)

B-Average Importance (50%)

C. Very Important (100%)

4.) Did learning the manual sign help increase your child's communication skills?

A-No, they did not (0%)

B-Somewhat / average (50%)

C. Yes, they did (100%)

5.) Will you continue to use the manual sign "more"?

A-No, I will not (0%)

B-Somewhat / average (50%)

C. Yes, I will (100%)

6.) Would you like to have your children learn and use more sign language?

A-No, I will not (0%)

B-Somewhat / average (50%)

C. Yes, I will (100%)

7.) Would you participate in another study similar to this one again?

A-No, I will not (0%)

B-Somewhat / average (50%)

C. Yes, I will (100%)

Additional Comments on the back please:

## References

- Abramovitch, R., Pepler, D., & Corter, C. (1982). Patterns of sibling interaction among preschool-age children. In M. E. Lamb & B. Sutton-Smith (Eds.), *Sibling relationships* (pp. 61-68). Hillsdale, NJ: Erlbaum
- Baskett, L. (1984). Ordinal position differences in children's family interactions. *Developmental Psychology, 20*, 1026-1031.
- Berk, L.E. (2006) *Child Development* (7<sup>th</sup> ed.). Boston, MA: Allyn and Bacon.
- Billingsley, F., White, O., & Munson, R. (1980). Procedural reliability: A rational and Example. *Behavioral assessment, 2*,: 229-241.
- Blew, P., Schwartz, I., & Luce, S. (1985). Teaching functional community skills to autistic children using non-handicapped peers. *Journal of Applied Behavior Analysis, 18*, 337-442.
- Bricker, D., & Cripe, C. (1997). *An activity based approach to early intervention* (2<sup>nd</sup> ed). Baltimore, MD: Brookes
- Coleman, R., (2005). *The Signing Times*. Midvale, Utah: Two Little Hands Productions.
- Colletti, G. & Harris, S. L. (1977). Behavioral modification in home: Siblings as behavior modifiers, parents as observers. *Journal of Abnormal Child Psychology, 5*, 21-30.
- Daughtery, S., Grisham-Brown, J., & Hemmeter, M., L. (2001). The effects of Embedded skill instruction on the acquisition of target and non-target skills in preschoolers with developmental delays. *Topics in Early Childhood Special Education, 21*, 213-221.
- Dunn, J., (1983). Sibling relationships in early childhood. *Child Development, 54*, 787-811.
- Gast, D. L. (2010). *Single subject research design*. New York, NY: Rutledge
- Godsey, J., Schuster, J., Lingo, A., Collins, B., Kleinert, H., (2008). Peer-implemented time delay procedures on the acquisition of chained tasks by students with moderate and severe disabilities. *Education and training in developmental disabilities, 43*, 111-122.

- Grisham-Brown, J., Hemmeter, M. &, Pretti-Frontczak, K. (2006). *Blended Practices for Teaching Young Children in Inclusive Settings. Involving Families in Inclusive Programs*. Baltimore, MD: Brookes
- Grisham-Brown, J., Schuster, J., Hemmeter, M.L., and Collins, B.C. (2000). Using an embedding strategy to teach preschoolers with significant disabilities. *Journal of Applied Behavior, 10*, 139-162.
- Hancock, T., & Kaiser, A. (1996). Siblings use of milieu teaching at home. *Topics in Early Childhood Special Education, 16*, 168-190.
- Haring, T., Breen, C., Pitts-Conway, V. & Gaylord-Ross, R. (1987). Adolescent peer tutoring and special friend's experiences. *Journal of the Association for the Severely Handicapped, 12*, 280-286.
- Hawkins, S., & Schuster, J. (2007). Using a mand-model procedure to teach preschool children initial speech sounds. *Journal of Developmental and Physical Disabilities, 19*, 65-80.
- Hemmeter, M., Ault, M., Collins, B., & Meyer, S. (1996). The effects of teacher implemented language use and facilitate generalization in retarded children. *Journal of Behavioral Analysis, 12*, 431-440.
- Heward, W.L. (2009). *Exceptional children, an introduction to special education* (9<sup>th</sup> ed.). Upper Saddle River, New Jersey: Pearson Education, Inc.
- James, S., & Egel, A. (1986). A direct prompting strategy for increasing reciprocal interactions between handicapped and non handicapped siblings. *Journal of Applied Behavioral Analysis, 19*, 173-186.
- Jenkins, C., Undergraff, K. (2009). The relative contributions of parents and siblings to child and adolescent development. In L. Kramer & K.J. Conger (Eds.) *Siblings as agents of socialization. New Directions for Child and Adolescent Development, 126*, 13-28. San Francisco, CA: Jossey-Bass
- Kaiser, A., (1993). Functional language. In M.E. Snell (Ed) *Instruction of students with severe disabilities; (fourth edition)*, 347-379. New York: Macmillan Publishing Company
- Kresak, K, Gallagher, P & Rhodes, C. (2009). Siblings of infants and toddlers with disabilities in early intervention. *Topics in Early Childhood Special Education, 29*, 143-154.

- McHale, S., Crouter, A., & Tucker, C. (1999). Family context and gender role socialization in middle childhood: comparing boys to girls and sisters to brothers. *Child Development, 70*, 990-1004.
- Mircale, S., Collins, B., Schuster, J., & Grisham-Brown, J. (2001). Peer-versus teacher-delivered instruction: Effects on acquisition and maintenance, *Education and Training in Mental Retardation and Developmental Disabilities, 36*, 373-385.
- Mobayed, K., Collins, B., Strangis, D., Schuster, J., & Hemmeter, M. (2000). Teaching parents to employ mand model procedures to teach their children requesting, *Journal of Early Intervention, 23*, 165-179.
- Newborg, J. (2005). *Battelle Developmental Inventory, 2<sup>nd</sup> Ed.*. Itasca, IL: Riverside Publishing.
- Powell, T., & Ogle, P. (1985). Brothers and sisters—A special part of exceptional families. Baltimore, MA: Brookes
- Rogers-Warren, A. & Warren, S. (1980). Mands for verbalizations: Facilitating the display of newly-taught language. *Behavioral Modification, 4*, 361-382.
- Schreibman, L., O'Neil, R., Koegel, R. (1983). Behavioral training for sibling of autistic children. *Journal of Applied Behavioral analysis, 16*, 129-138.
- Stormshak, E., Bullock, B., & Falkenstein, C. (2009). Harnessing the power of sibling relationships as a tool for optimizing social-emotional development. In L. Kramer & K.J. Kramer (Eds.), *Siblings as agents of socialization. New directions for child and adolescent development, 126*, 61-77. San Francisco, CA: Jossey-Bass
- Sundberg, M. & Partington, J. (1998). Teaching language to children with autism or other developmental disabilities. Danville, CA: Behavior Analysis, Inc
- Tucker, C., McHale, S., & Crouter, A. (2008) Links between older and younger adolescent siblings' adjustment: The moderating of shared activities. *International Journal of Behavioral Development, 32*, 152-160.
- Tekin, E., & Kircaali-Iftar, G. (2002). Comparison of the effectiveness and efficiency of two response prompting procedures delivered by sibling tutors. *Education and Training in Mental Retardation and developmental delays, 37*, 283-299.
- Tucker, C., & Updegraff, K. (2009). The relative contributions of parents and siblings to child and adolescent development. In L. Kramer & K. J. Conger (Eds.), *Siblings as agents of socialization. New Direction for Child and Adolescent Development, 126* 13-28. San Francisco, CA: Jossey-Bass



Warren, S., McQuarter, R., & Rogers-Warren, A, (1984). The effects of mands and models on the speech of unresponsive language-delayed preschool children. *Journal of Speech and Hearing Disorders, 49*, 43-51.

## Vita

Author's Name- Heather Robinson-Curtis

Birthplace- Vanderburgh Air Force Base, California

Birth date-March 27, 1973

### Education

Bachelor of Science-Physical Therapy  
University of Kentucky  
August-1995