6-20-2018

Deaf/hard Of Hearing Preschool Students' Acquisition Of Language Through Dyadic And Triadic Communication Contexts

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DEAF/HARD OF HEARING PRESCHOOL STUDENTS' ACQUISITION OF LANGUAGE THROUGH DYADIC AND TRIADIC COMMUNICATION CONTEXTS

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128 Pages

The purpose of this study was to investigate the efficiency and effectiveness of using dyadic communication with a teacher of the deaf (ToD) and a Deaf/Hard of Hearing (D/HH) student compared to a triadic communication with a general education teacher, sign language interpreter, and D/HH student. Four participants in a self-contained D/HH early childhood classroom participated in both comparison groups using dyadic and triadic communication to acquire vocabulary language skills for communication while playing a preschool game. An adapted alternating treatment design (AATD) for single case research was used to rapidly alternate comparison groups using equivalent games and counterbalanced across participants. Interobserver agreement was used for data and procedural reliability. Results revealed the dyadic condition to be optimal for both receptive and expressive vocabulary acquisition for efficiency and effectiveness. Stakeholders gave information regarding perceptions of the study through a social validation survey. Additional findings and recommendations for future research are discussed.

KEYWORDS: deaf/hard of hearing, preschool, early childhood, early years, sign language interpreter, educational interpreter, language strategies, language development, vocabulary, dyadic communication, triadic communication, deaf education

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A Dissertation Submitted in Partial
Fulfillment of the Requirements
for the Degree of

DOCTOR OF EDUCATION

Department of Special Education

ILLINOIS STATE UNIVERSITY

2018

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ACKNOWLEDGMENTS

Throughout the journey to complete my dissertation, I had many constant supporters that deserve recognition. The countless sacrifices made by my husband Eric have allowed me to take classes, attend conferences, read, write, analyze, and rewrite some more! When I started this process four years ago, we had no idea that life would bless us with two pregnancies and two babies along the way. Thank you for your attitude to "Get it done," and allowing me the time to put towards this dissertation.

My parents Sandy and John Rahn have been my biggest cheerleaders encouraging me to pursue what felt impossible. The love and time you spent with my children when I could not be there is priceless. The example my mother set of a working mother, award winning teacher, and pursuer of continuous education created the foundation for me to do the same. Sue Hill, a dear family friend, also dedicated time, energy, and love towards my family and especially my children when I needed to attend class, research, write and study. My sister and editor Erin Rahn Morris also provided support, challenging questions, and feedback when I needed an external frame of reference for the study. Thank you to all my family members who inquired about the research and listened to me describe all I have learned.

The collegiate support I received from faculty at Illinois State University was exceptional. Dr. Jim Thompson was the doctoral coordinator when I first started the program in 2014. His efforts to recruit me with persistent emails and personal invitation to ISU's Doctoral Colloquium are what peeked my curiosity to embark on this adventure.

Special recognition is needed for the members of my dissertation committee. I have known Dr. Maribeth Lartz since I was an undergraduate student at ISU sixteen years ago. She instilled the passion and fervor for educating deaf children that still encourages me as a teacher

today! If I become a future teacher educator, I want to share the passion she ignited in me with others. She planted the seed ten years ago to think about pursuing entrance into the doctorate program and for that I am grateful. Her knowledge of language development was critical to designing this study. When I first brainstormed with Dr. Lartz my ideas for this study, she recommended the perfect person as my chair, Dr. Christy Borders.

Dr. Christy Borders listened to my ideas for this study with excitement and imagination. Dr. Borders and Dr. Bock helped bring this study to fruition. Their knowledge of single subject research design and implementing research was invaluable. Through all the barriers in the data collection phase, Dr. Bock and Dr. Borders encouraged me with new ideas and modifications to make this study possible. Their knowledge of visual analysis and creating graphs to truly reflect my research was inspiring. The hours of brainstorm sessions with Dr. Borders allowed me to think clearly and articulate the fundamental components of this study. I could never have accomplished this dream without you both, thank you.

Dr. Karen Douglas introduced me to the idiosyncrasies of single subject design through SED 512. This was the most challenging course I took in the doctoral program, and also one of the most rewarding to help me properly document and conduct my research. My doctoral program co-hart of peers were significant contributors to my growth and development as a researcher and writer. Thank you to Dr. Kristi Probst who m0.3odeled for me what a doctoral candidate can do! Thank you for reading my papers, providing me with feedback, and allowing me to read your research.

Finally, great acknowledgment goes to the participants of this study and my colleagues and friends. The parents who returned permission to include their child in this research will never know my gratitude for including their child in this study. The children who participated in

this study, without really understanding the implications, were a joy to watch learn and grow! The teachers and interpreter who dedicated time in their schedule to complete this study were selfless and true contributors to the field of education. Haley Clarke, I am grateful for the collaboration we have shared over the past eight years. Your encouragement to investigate this topic along with your personal support helped me persevere. The flexibility and support Michelle Wolfe and Ja'nice Pearson gave daily allowed me the time and energy I needed to focus and complete the research. Michelle, thank you for analyzing and brainstorming with me when met adversity and for helping to collect material.

I am honored to serve students and families in the field of deaf education and cannot wait to accomplish more research in the area of dyadic and triadic communication and working with young D/HH children. My passion for research with young D/HH students and optimal evidence-based practice and educational contexts for learning

M. S. H.

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Some deaf/hard of hearing (D/HH) individuals communicate through use of sign language interpreters. The history of interpreting leads to the uncovering of the field of educational interpreting. Investigating domains of language, cognition, fine and gross motor, social/emotional and self-help/adaptive skills in relation to EC and deaf education established the need for language focus across domains for D/HH students. The use of educational interpreters and their involvement of providing access to language across all domain areas of EC, leads to important research questions for this study. This chapter focuses on the exploration of the history and evolvement of educational interpreting and the domains of EC and special considerations for deaf education.

Studying the progress and change of outcomes for young D/HH children is paramount to understanding the future of deaf education. Since the advent of cochlear implants and digital hearing aids, more students with hearing loss are mainstreamed for certain content areas while others are included in the general education setting all day.

Additionally, early identification of hearing loss through state mandated universal newborn hearing screenings and increased emphasis on intervention services may contribute to the rise of students in mainstream and general education. According to the Gallaudet Research Institute's (GRI) (2009) national survey of D/HH students, approximately 57% of students were educated in the general education setting. Additionally, the GRI revealed 67.8% spent time with hearing peers for at least one or more hour a week with 13.7% receiving sign transliteration services on their IEP; however, this is not aggregated by age. The GRI also reported 39.5% D/HH students were primarily taught using sign language or sign language with spoken language together.

Another national survey revealed 56% of D/HH students received instruction in the general education setting (Office of Special Education Programs, 2014). Furthermore, the literature supported students can be placed in general education classrooms with interpreters in the elementary and primary grades (King, 2006; Seal, 2000). Since a portion of D/HH students received educational minutes in the general education classroom using educational interpreters at young ages, research is necessary to understand how students are acquiring skills during the critical years of EC development.

Educational Interpreters

The primary function of educational interpreters is to provide access to language through a visual system of communication with those speaking with the D/HH student. Although the education of deaf students has an extensive history dating back to the 1800s, educational interpreting is a relatively new field of study (Seal, 2004). There is some question of the efficacy of educational interpreters if D/HH students have not yet acquired a firm foundation of language development. A thorough review of educational interpreter history may lead to a better understanding of the systematic change necessary to continue future progress. To understand the acquisition of early academic skills with educational interpreters, a clear understanding of the history could lead to outcomes that influence the future in research.

History of Interpreting Leading to Educational Interpreting

The history of deaf individuals was first recorded in the early 1800s and revealed instances where D/HH individuals needed to communicate with the hearing population. In 1818, a deaf man named Laurent Clerc addressed the United States President and Congress via sign language. Henry Hudson was one of the first documented interpreters who voiced this speech by speaking aloud what Clerc was signing (Ball, 2016, p. 498). Historians of deaf studies indicated

that hearing Children of Deaf Adults (CODA), family members, and co-workers often acted as unofficial untrained interpreters for their D/HH friends and families. In 1960, William Stokoe, a linguist at Gallaudet University, published an instrumental paper outlining the visual communication systems of the American Deaf. His work led to the recognition of American Sign Language (ASL) as an official language (Stokoe, 2005).

As a result of Stokoe's work in linguistics and ASL, laws were established regarding deaf adults in the work place. The Vocational Rehabilitation Act Amendments of the 1950s and 1960s provided laws to support research and projects to investigate knowledge of interpreting. The original 1954 Act (Pub. L. 83-565, 1954) provided a foundation for vocational rehabilitation counseling and funding for research. Even though the new laws created mandatory interpretive services for the D/HH population, sufficient funding to train interpreters was unavailable. The Vocational Rehabilitation Services (VRS) hired a deaf man named Boyce Williams as a consultant to identify needs of programs for the deaf. Williams' involvement was crucial in creating and contributing to the establishment of The National Theatre of the Deaf (NTD), The Registry of Interpreters for the Deaf (RID), The American Deafness and Rehabilitation Association (ADARA), and postsecondary programs at existing colleges for the deaf. Williams established and managed more than 100 short-term training projects and workshops to educate professionals who worked with deaf individuals (Ball, 2016, p. 499).

Research showed the availability of interpreters for adults was limited because most interpreters had other full-time careers in adjacent fields. Instead, Teacher of the Deaf (ToD) and CODAs often acted as pro bono interpreters without professional recognition. The increasing need for skilled and trained interpreters inspired Williams to write a five-year training grant to influence others to recognize the field of interpreting as an increasingly important career

path. Virginia Lee Hughes, a CODA who was an original interpreter educator, gave credit to Williams for establishing interpreter educator training (Ball, 2016, p. 499).

In 1964, the U.S. Department of Health, Education, and Welfare created an advisory committee to determine how best to meet the educational needs of deaf individuals. Homer D. Babbidge Jr. chaired this committee, giving rise to what became known as the Babbidge Report (Ball, 2016, p. 499). The Babbidge Report contained recommendations for educating the deaf at preschool, elementary, secondary, and post-high school programs. This report was extremely insightful to understand the history of deaf education and lack of existence of educational interpreting. According to Babbidge et al. (1964) four types of organized educational programs for the deaf were offered in the school systems of the country: residential schools, day schools, day class programs, and classes for hearing children into which deaf children were integrated, usually with the provision of a resource teacher who was available to assist the deaf child as difficulties arose (1964). Over 50% of D/HH children were educated in residential schools and 40% were educated in day schools and classes. Some residential private placements existed and only those considered gifted in speech and speechreading were placed in hearing classrooms. What would be considered an educational interpreter was only mentioned once in the entire Babbidge report. When discussing limited opportunities for D/HH students at the post-secondary level, an exception was mentioned for Riverside Community College in California. Riverside provided a hearing student tutor, instructor notes, and interpretation in the student's manual mode of communication. No mention of educational interpreters at the preschool, elementary, or high school level was made (Babbage et al., 1964). The Babbage Report and timeline of evolvement of educational interpreters gave evidence to the novelty of educational interpreting.

Subsequent to the 1964 Babbidge Report, a group of D/HH and hearing individuals met through a grant for a workshop at Ball State Teachers College to discuss a more formalized way to train interpreters and provide quality services to D/HH individuals. One goal of the workshop was to establish curriculum and training workshops for teaching interpreters. Moreover, this workshop led to the formation of the Registry of Interpreters for the Deaf (RID) (Ball, 2016, p. 500; Registry of the Interpreters for the Deaf, 2015). RID paved the way towards establishing a paid profession for interpreters and helped bring respectability to the field (Gannon, 1981, p. 328). Establishing RID was monumental in the field of interpreting and continues to shape the quality and standards upheld today for interpreting as a nationally recognized organization for interpreters.

Along with the establishment of RID, Section 504 of the Rehabilitation Act of 1973 mandated qualified individuals with disabilities be given access to programs and activities which received federal funds (34 C.F.R. Part 104.4, 1973). For D/HH students attending public colleges or universities, this act authorized individuals to access interpreters at the secondary level. Around this time, issues of educational interpreting and qualifications began to emerge (Cohen et al., 1994). In 1975, Public Law 94-142 Educational for All Handicapped Children Act (later reauthorized in as the Individuals with Disabilities Education Act (IDEA) in 2004), mandated that states and agencies provide all children with disabilities services necessary in the Least Restrictive Environment (LRE) (Public Law 94-142, 1975). Public Law 94-142 was pivotal in establishing the creation of the field of educational interpreting. During this time, some D/HH students returned to home schools from residential placements to be mainstreamed in the general education setting. In order to access communication, D/HH students needed educational interpreters to provide a signed interpretation of spoken message. Likewise,

educational interpreters were essential to bridge the gap in communication from the D/HH student to peers and teachers (Cohen et al., 1994). Although the premise behind IDEA was to desegregate individuals with disabilities by providing them access to education at their local schools, not everyone agreed with these placements in the field of deaf education. Some felt that removing D/HH students from classrooms where they had full access to communication with peers in a common language had more advantages than immersion with hearing peers where communication would be limited (Moores, 2005; Moores, 2011). Nonetheless, other proponents of mainstreaming saw benefits of having students close to their home and providing more rigor through the general education curriculum alongside hearing peers. Regardless of viewpoints in the field, if D/HH children were to be in the LRE in general education settings, educational interpreters would be a necessity for some D/HH students.

As interpreting as a profession gained momentum, attention began to shift to the quality, quantity, and roles and responsibilities of educational interpreters. Although focus originally centered on post-secondary educational interpreters, the increase of D/HH students in mainstream placements brought additional scrutiny to the elementary and secondary educational interpreters. In 1985, the National Task Force on Educational Interpreting was established with representatives from a variety of organizations: American Society for Deaf Children, Alexander Graham Bell Association for Deaf Children, Convention of American Instructors of the Deaf, Conference of Educational Administrators Serving the Deaf, Conference of Interpreter training, National Association of the Deaf, and Registry of Interpreters for the Deaf. A grant from the government was given to the National Technical Institute of the Deaf (NTID) to coordinate with the task force. The task force published reports with recommendations concerning roles and

responsibilities, training and education, working conditions, and other issues related to educational interpreting (Hurwitz,1995; Stuckless, Avery, & Hurwitz, 1989).

Continued concern from experts in the field of deaf education launched research into the quality, quantity and qualifications of educational interpreting in the 1990s (Dahl & Wilcox, 1990; Jones, Clark, & Soltz, 1997; Kluwin, 1994; Luetke-Stahlman, 1992; Stewart & Kluwin, 1996). K-12 educational interpreters lacked resources as well as training and knowledge to properly interact with D/HH students and general education classroom teachers. Moreover, results were inconclusive as to whether educational interpreters were effective in the classroom. (Stewart & Kluwin, 1996).

As a result of prior research, the work towards an Educational Interpreter Performance Assessment (EIPA) began in the 1990s from two grants awarded to Brenda Schick and colleagues as she partnered with Boys Town National Research Hospital to begin pilot studies with interpreters in Colorado (Schick, Williams, & Bolster, 1999). The EIPA involved analyzing educational interpreting skills through both receptive and expressive videotaped recordings while working with D/HH students. For the three-year pilot study, 59 educational interpreters were evaluated using the EIPA. A Colorado Task Force established that a 3.5 on the EIPA would be considered a passing score. Results of the pilot study revealed that 44% of interpreters received a passing score while 56% did not pass. With abysmal results, these findings implied over half of Colorado D/HH students in general classrooms with interpreters may not have been receiving adequate models of language and signed communication (Schick et al., 1999).

As the Americans with Disabilities Act (ADA) was established and IDEA was re-authorized in the 1990s, continued support for students and adults with deafness grew in legislation and the school setting. In 1999, the EIPA Diagnostic Center was established as a

resource for states and school districts to assess interpreter skills in the educational setting (Boys Town National Research Hospital, 2017). Since then, the utilization of the EIPA Diagnostic Center continues to be a resource for many states and provides standards for educational interpreting.

National standards for educational interpreters do not exist. Each state is responsible for establishing criteria for certification. A comprehensive list of requirements per state could not be found; however, creating this list would be beneficial for future research. Forty-seven states had some reference to local test administration for the EIPA on the EIPA website. When looking specifically at many states, the majority of states use EIPA, RID, or National Interpreter Certification (NIC). Research regarding educational interpreting does not have an extensive history due to the establishment of certification and laws in the early part of 2000s. Looking at the past of interpreting and analyzing how educational interpreting has emerged gives hope for future advancements in the field of educational interpreting. Educational interpreting was established out of the laws from IDEA and needs continued research to look at the efficacy and use of interpreters for the future. Table 1 provides a timeline for reviewing important dates, events, and significance related to the history of educational interpreting.

Table 1

Timeline for Interpreting

Date	Event	Significance
1818	Henry Hudson voiced for Laurent Clerc as he addressed the United States President and Congress in sign language.	This is one of the first documented uses of an interpreter.
1960	William Stokoe published a famous paper outlining the visual communication systems of American Sign Language (ASL).	This publication led to ASL's recognition as an official language.
1954	The Vocational Rehabilitation Act (Public Law 83-656) was passed.	This act supported research, examined the use of interpreters and instituted interpreting services for D/HH individuals.
1955	Bryce Williams, a deaf man, established a mental health program for D/HH.	This program led to Williams' involvement in being hired for the Vocational Rehab Services (VRS) in Washington D.C.

(Table Continues)

Date	Event	Significance
1957	Williams established and managed more than 100 short-term training projects and workshops to educate professionals who work with D/HH individuals.	Williams' projects increased awareness for training needs for interpreters and lead to a five-year training grant.
1964	The U.S. Department of Health, Education, and Welfare (HEW) established an advisory committee to determine meeting needs for deaf education.	The Committee's recommendations became known as the Babbidge Report.
1964	A group of D/HH and hearing individuals met through a grant for a workshop at Ball State Teachers College to discuss formalized way to train educational interpreters.	The group established curriculum, training workshops, and lead to the establishment of the Registry of Interpreters for the Deaf (RID).
1973	Section 504 of Rehabilitation Act was passed. (34C.F.R. Part 104.4, 1973)	This act granted access to interpreters at the secondary level and eventually lead to investigating interpreting at the primary through high school level.
1975	Public Law 94-142 Educational for All Handicapped Children Act (Later known as Individuals with Disabilities Education Act IDEA) was passed.	The law mandated children be provided with services necessary in the Least Restrictive Environment (LRE). This led to some students returning to general education home districts with educational interpreters.
1985	National Task Force for Educational Interpreting was established.	Task force published reports with recommendations concerning role clarity, and training and education related to educational interpreting.
1990s	The quality, quantity, and qualification of educational interpreters is reviewed.	Brenda Schick and colleagues' receive two grants to continue her research.
Mid 1990s	Brenda Schick piloted studies to create the Educational Interpreter Performance Assessment (EIPA).	Studies led to establishment of EIPA Diagnostic Center Hospital still used today.
Late 1990s	States begin establishing standards for certifications of educational interpreters.	Currently, there are no national standards for educational interpreting; however, the majority of states use the EIPA or some form of state educational interpreting requirement.

Use of Educational Interpreters

Educational interpreters have a primary responsibility of providing access through interpreting spoken language into sign language and vice versa for communication between hearing and D/HH students and staff (Humphrey & Alcorn, 1994). Limited studies have emerged regarding the additional roles and responsibilities of educational interpreters. Some of the additional roles prevalent in literature involve tutoring, clarifying or providing a language model for D/HH students, facilitating interaction between hearing peers, teaching sign language

to hearing peers and staff, monitoring assistive technology, and communicating with the IEP team (Anderson & Easterbrooks, 1999; Antia & Kreimeryer, 2001).

The purpose of tutoring D/HH students in the mainstream classroom by educational interpreters (Anita & Kreimeyer, 2001; Wolber, 2014; Seal, 2004; Wolbers, Dimling, Lawson, & Golos, 2012) is to help D/HH students with concept development, vocabulary, and content knowledge. Along with reinforcing these academic and language skills to D/HH students, interpreters are often placed with students who need language modeling and modification (Anita & Kreimeyer, 2001; Schick, 2014; Wolbers et al., 2012). Unfortunately, many educational interpreters lack training in language development of D/HH students. They possess little knowledge or background in sequential development and modification that some D/HH students need (Seal, 2004). Furthermore, as educational interpreters find themselves in the role of facilitating language and communication between hearing peers and D/HH students (Anita & Kreimeyer, 2001; Schick, 2014; Wolbers et al., 2012), training of global child development would be helpful knowledge that is often lacking (Seal, 2004). Teaching sign language to peers and other adults in the room is expected of some interpreters (Anita & Kreimeyer, 2001; Wolbers et al., 2012) while others do not feel interpreters may be qualified to do so (Stuckless et al., 1989).

Additionally, educational interpreters can often fall into the role of monitoring the D/HH assistive listening device (Leutke-Stahlman, 1992; Wolbers et al., 2012). Often a ToD or audiologist will train the educational interpreter to change batteries and monitor if students seem to be listening with devices appropriately. The general education teacher is often too busy or uncomfortable with the possibility of breaking the equipment, so the educational interpreter takes on the role of managing assistive listening devices.

Jones and colleagues (1997) used a survey instrument called the Educational Interpreting Questionnaire (EIQ) to gather data from 222 K-12 educational interpreters in three Midwest states. In addition to interpreting in mainstream academic and vocational classes, the top five additional ways interpreters spent their time were: tutoring D/HH students, helping hearing students with their work, grading papers for teachers, doing clerical work, and taking contractual breaks. Interestingly, only 20% of additional time was spent with D/HH student outside of interpreting the focused message. Unfortunately, little research has been published regarding the effectiveness of using an educational interpreter to acquire information with students. Although some knowledge exists on the history, roles and responsibilities, and qualifications of educational interpreting, continued focus on the effectiveness needs to be addressed.

Early Childhood Deaf Education

Education of young D/HH in early childhood (EC) has evolved over time including the current practices of using educational interpreters in the mainstream setting with some D/HH students. Many of the changes leading up to the use of educational interpreters with this young population originated with the introduction of early identification and early intervention. Exploring the components of early identification and intervention, advancements in technology, educational placements, and academic focus areas in EC deaf education lead to a better understanding of the myriad of factors that encompass EC deaf education.

Early Identification

In the early 1980s, Dr. C. Everett Coop, the United States Surgeon General, encouraged universal newborn hearing screenings as part of *Healthy People*, 2000 Goals for the Nation (White, 2006). In 1993, the National Institutes of Health Consensus Development Conference on Early Identification of Hearing Loss first promoted Universal Newborn Hearing Screening

(UNHS). The American Academy of Pediatrics (AAP) Joint Committee on Infant Hearing (JCIH) also provided statements of support for UNHS in 1994 (Krishnan & Van Hyfte, 2014). Gradually throughout the 1990s, states mandated hospitals to screen newborns for hearing loss in order to provide families with earlier access to resources, amplification, and intervention. In 1993, 3% of United States newborns were screened for hearing loss before leaving the hospital. By 2005, almost every state implemented a newborn-hearing screening program, and approximately 93% of newborns received screening. The 90% difference in a twelve-year period (White, 2006) shows the dramatic increase in support of UNHS. In 2006, 50% of babies identified through UNHS failed to follow-up with audiological care. This number has decreased to 35.5% in 2011 and agencies are continuing to work towards more reduction (Ditty & Winston-Gerson, 2018).

In 2000, Congress first authorized Early Hearing Detection Intervention (EHDI) programs across the United States. EHDI programs are responsible for UNHS screenings, audiological diagnostic evaluations to confirm hearing loss, and early intervention services to support the D/HH child and families with direct services and resources (Hearing Loss Association of America, 2017). In 2007, the JCIH provided guidelines to update their position statement. Three major recommendations in the guidelines included hearing screening by one month of age, diagnostic audiological identification by three months of age, and intervention and services in place by six months of age (JCIH, 2007) which included amplification (JCIH, 2013). Prior to establishment of UNHS, the average age of identification was two years-old (Yoshinaga-Itano, 2003). Now that many children are ready for intervention and services at six months of age, early intervention is crucial to begin setting the foundation for communication and language development with families.

Early Intervention

In 1986, Early Intervention (EI), which serves children identified with hearing loss from birth to three years of age, was added to IDEA under Part C Infants and Toddlers (Office of Special Education, 2014). This new funding available to D/HH children and families provided new opportunities. Research showed the effects of EI and positive outcomes on speech, language, and communication development (Krishnan & Van Hyfte, 2014; Yoshinaga-Itano, 2003). Some children who were receiving EI, including early diagnosis and amplification, were acquiring speech/language at rates commensurate with hearing same-aged peers (Ching, 2015; Fulcher, Purcell, Baker, & Munro, 2012; Stika et al., 2015). Positive outcomes were achieved for many children receiving early diagnosis and early intervention services.

Although the goal is early detection and EI, not all children receive these services for a variety of reasons. These reasons include a lack of qualified EI providers, non-compliance with following-up on diagnostic testing results, and progressive hearing losses that elude early identification measures. The role of EC providers can differ depending on the information a family receives or does not receive in those first three years. Education of hearing technology, educational philosophies and communication modalities of D/HH children are three areas families need to learn from an EI specialist in hearing loss.

Hearing Technology and Educational Approaches

With early diagnosis through UNHS for D/HH children, new opportunities arose for the use of amplification and hearing technology with infants and toddlers. The results of the diagnostic audiological evaluation following UNHS will determine the amplification an audiologist recommends. The severity and type of hearing loss will guide the audiologist to help the family make an informed decision to pursue options including: no amplification, behind the

ear (BTE) hearing aids, bone anchored hearing aids (BAHA), or cochlear implants (CIs). According to a 2009-2010 National Survey conducted by the Gallaudet Research Institute (GRI), 77% of students reported having two hearing parents while only 7.6% had one or both parents that were D/HH (GRI, 2009). Since most D/HH children come from hearing families, many families pursue some type of amplification with hopes to give their child access to sound to develop spoken language. Children with hearing loss ranging from mild sensorineural hearing loss to moderate-severe sensorineural hearing loss are typically fitted with digital BTE hearing aids. Children with conductive loss often receive BAHAs.

According to the National Institutes of Health (2010), CIs were first approved for adults by the Food and Drug Administration (FDA) in 1985. In 1990, approval for children two years and older was established. In 2000, the criterion for children was changed to 12 months for implantation, which remains consistent with the current standard. In the United States, it is estimated that 26,000 children have CIs (National Institutes of Health, 2010). From the GRI survey, students who wear CIs for amplification constitute 23% of students reported (GRI, 2009). Children and adults must meet specific requirements before CIs become an option. The type of hearing loss, severity, benefit from hearing aid amplification, structure of anatomy, realistic expectations, consistency with appointments and family involvement are all considerations. CIs involve a surgical procedure to place an electrode array inside the cochlea of the inner ear. An internal magnet is also surgically placed to receive the signal from the external processor. Therefore, sound is picked up by an external microphone on the processor and sent through the magnet to the electrodes, which send sound as an electrical signal through the auditory nerve to the brain for interpretation. When children first receive cochlear implants, they

must be trained using aural rehabilitation techniques to help the brain learn to process the sound received through an auditory listening hierarchy.

In addition to decisions regarding hearing technologies, parents also need to decide the educational approach they will choose for their child. If children and families receive EI, the D/HH specialist working with the family will often introduce families to deaf education approaches and communication modalities. Oral Methods involve using auditory-oral only or auditory-visual communication options to educate D/HH children without the support of sign language. There are specific strategies of instruction used in oral education programs for D/HH children which promote development of listening and spoken language (Easterbrooks & Baker, 2002).

To supplement oral/aural methods, Cued Speech was developed by Cornett in the 1960s. Cued speech uses handshapes near the mouth combined with speech to support acquisition of spoken language (Easterbrooks & Baker, 2002). There are some schools in the United States that use Cued Speech to supplement oral and sign language education. Not all ToDs receive training in Cued Speech in their undergraduate programs and may require additional training.

The Total Communication (TC) approach involves a combination of using sign language and spoken language to focus on the needs of the child. Roy Holecomb first defined TC in 1967 with the idea that teachers could add to their existing practices of oral education by simply adding sign language (Easterbrooks & Baker, 2002). Although this approach seemed to bring hope for post lingual D/HH students or students with residual hearing, many profoundly deaf students who relied primarily on signed communication struggled with using English-based signs. A primary concern was many teachers had been trained using the Oral Method of

educating D/HH students did not know sign language fluently and had to learn sign while working with D/HH students with the new shift to TC (Easterbrooks & Baker, 2002).

The Bilingual-Bicultural (Bi-Bi) philosophy emerged in the 1980s with concepts that deaf children of deaf adults who learned through American Sign Language (ASL) acquired better outcomes in academic achievement. The focus of the Bi-Bi approach teaches ASL as a first language and English through the written form as a second language. Deaf culture is also included in this approach to teach the history, arts, and heritage of D/HH individuals. The shift from TC to Bi-Bi was difficult for some teachers who started with Oral Methods training, then learned English Sign based systems, then ASL (Easterbrooks & Baker, 2002).

These educational approaches and communication methodologies are still used in schools today and incorporated in different placement options. According to the GRI survey, 53% of students use spoken language only, 27.4% use sign language only, 12.1% use sign supported spoken language, 5% use sign language with cues, and 2.5% other (GRI, 2009). Often, parents will choose an educational approach based on how their child communicates, what is available in their area, and their comfort level with the approach. As children approach age three, services provided through Part C of IDEA will end and a family will transition from EI services to EC classrooms.

Early Childhood

Early childhood (EC) deaf education has changed dramatically since implementation of Universal Newborn Hearing Screening (UNHS). Some children are no longer first identified for hearing loss between two to three years of age. Many children already have optimal amplification through digital hearing aids or CIs that allow children access to sound and opportunities for learning spoken language. Still other children are delayed in language

development due to late identification, lack of access to EI, or additional disabilities that contribute to delays. Regardless of functioning levels of language, when children turn three years old, they are eligible for services and an educational placement under IDEA.

Placement options. When children are transitioning from EI to EC, it is important for parents to have knowledge of all available placement options. Even though many students with hearing loss previously attended residential schools for the deaf or day schools and classes, there is now a continuum of placements offered. Students can still attend state residential schools for the deaf, which primarily use ASL as a mode of communication and promote acceptance in the deaf culture. Additionally, some school districts also offer self-contained deaf education classrooms. Private schools that encourage the use of listening and spoken language for students with hearing loss and private schools that use Cued Speech are other placement options. Inclusion and mainstreaming students with or without interpreting services are other placement options greatly on the rise and used widely in the United States (King, 2006). This continuum of services aligns with the educational philosophies previously discussed and demonstrates the variety of uses of communication modalities.

Academic focus within early childhood deaf education. As children transition from EI with Part C of IDEA to Part B for school-aged children, the implications of the law have some bearing on curricular focus for students with special needs. The amendment to IDEA in 2004 placed special emphasis on students with special needs accessing the general education curriculum (Office of Special Education, 2014). In EC education, there are five major curricular domains addressed: language, gross and fine motor, cognitive, social/emotion, and self-help. Therefore, a ToD working with EC D/HH students must have a solid foundation of what is involved in the EC curriculum and a strong understanding of how students with hearing loss are

impacted in these five domain areas. Furthermore, if a ToD is not available for instruction and a sign language interpreter is in the mainstream environment, the role of the sign language interpreter becomes crucial for providing a language model to the D/HH student.

Language. When planning for language development, one of the first purposes of EC is to extend the child's acquisition of oral language as well as exposure to written language acquisition (Wortham, 2002). Language development can be described through three domains: form (phonemes, morphemes, and syntax), content (semantics) and use (pragmatics) (Talay-Ongan, 1998, p. 167). These three domains are addressed in EC education through planning for language development in the role of play, role of the teacher, and role of parents (Wortham, 2002). Play is one of the primary vehicles used to motivate, engage, practice, introduce new words, and expand critical thinking. Play facilitates the social interaction of language and is a critical piece for pragmatic skills. The teacher's role is described by Wortham (2002) as "facilitator, instructor, and model for language development" (p.223). By exposing students to new vocabulary along with extending language through play, children in EC receive language development daily from teachers.

Another aspect of whole language approach to EC are the development of emergent literacy skills. According to Wortham (2002), vocabulary, alphabetic knowledge, phonological awareness, phonics, concept of word, and reading as meaning are all basic foundations for establishing success in reading through awareness in EC. These aspects of literacy require strong comprehension and skill using receptive and expressive language.

Some research has shown early identification and EI help close gaps with language development for children with hearing loss (Ching, 2015; Fulcher et al., 2012), most D/HH children who enter EC programs are behind hearing peers in language acquisition and

communication (Lederberg, Schick, Spencer, 2013; Marschark, Spencer, Adams, & Sapere, 2011; Netten, Rieffe, Theunissen, Soede, Dirks, Jorver, et al.; 2015; Vohr et al., 2012). Students with hearing loss do not often have full access to a complete model for language because they do not fully hear the spoken language in their home; many students who have amplification may only have partial or incomplete access to the auditory information they are receiving. Additionally, the incidental learning that takes place in typical developing hearing children may not occur in D/HH students. There is a component of direct instruction that involves explicitly teaching new vocabulary and language structures that is necessary for D/HH children to acquire language (Coyne, Simmons, Kame'enui, & Stoolmiller, 2004; Lund & Douglas, 2016).

When reviewing the EC curriculum of language development and comparing strategies used to develop language in D/HH students, some components must be addressed. D/HH students can only acquire language when they have access to it through a mode of communication that gives them input. Just because students have access to language does not mean they understand or are acquiring the new language. This is important to keep in mind when using a sign language interpreter with the EC D/HH child. Although the sign language interpreter may be signing what the teacher says, the D/HH child may not have foundational language skills to even understand the interpreter. Sign language interpreters and general education teachers should work with the ToD to learn the language levels of the D/HH child and how these language needs can be met. A D/HH child may benefit from 20 minutes a day with the sign language interpreter to go over new vocabulary that will be learned at story time.

Many EC programs use experiences that provide children with atmospheres where they will hear the language, have opportunities to talk and speak, and listen to others demonstrate and follow directions (Wortham, 2002). Although strategies for language acquisition can be similar

for young D/HH children, without direct instruction of a language model and teacher to provide language in a modality children can imitate, practice, repeat, and generalize, language may not be acquired. Therefore, language development and communication are highly impacted in D/HH children and appropriate services and placements must be considered. Furthermore, delays in language acquisition for D/HH children can affect several other EC domain areas.

***Gross and fine motor*.** Gross motor skills (large motor movements generally with the whole body) and fine motor skills (smaller manipulation requiring more precise control with hands and fingers) are another area of focus and development in EC. According to the Early Learning Scale (ELS) teachers monitor motor domains in the areas of balance, spatial awareness, catching, throwing, and manipulation (ELS, 2011). Like supporting language development, motor domains in EC curriculum focus on providing the opportunities for practice and exploration. For example, indoor and outdoor play that involves walking, throwing, catching, balancing, hopping, jumping, climbing, crawling, creeping, scooting, and kicking would all support gross motor development. Fine motor examples include zipping, buttoning, tying, twisting, turning, pouring, cutting, holding and printing, tracing, painting, inserting, building and putting together (Wortham, 2002). Many of these motor domain activities are embedded in daily play and can also be addressed with thematic units.

For children who are D/HH, delays in communication and language can prohibit understanding of expectations when it comes to motor domains. Sign language interpreters who are in an environment to provide interpretation for gross and fine motor areas need to be aware of the expectations of the D/HH child while also providing language input for the vocabulary and directions. Sign language interpreters can sign what is being said but for young D/HH children

may need to take it a step further by modeling the movement being described if the student does not understand the concept or vocabulary.

Leigh and colleagues (2015) discovered a positive correlation between language ability and social and motor development. To promote motor development with children, comprehending language instructions can be critical for success. Another factor besides language that can affect motor development are additional disabilities. The prevalence of students who are deaf with additional disabilities (DWD) is estimated to be 30-40% of D/HH students (Bruce & Borders, 2015; GRI, 2009; Wiley & Meinzen-Derr, 2013). Some of these additional disabilities adversely affect motor domain development. For example, students with orthopedic impairments and traumatic brain injuries who are D/HH may have difficulty with both fine motor and gross motor skills. Furthermore, if students are unable to make handshapes necessary for sign language or have challenges with writing due to fine motor delay or weakness in their hands, alternative communication output may be required for expressive language. Additionally, poor gross motor development can lead to difficulty with regulation and coordinating the finer muscle movements which is required for intelligible speech development. Hearing loss can impact the vestibular system which can challenge balance and coordination for D/HH students.

Cognitive. Cognitive development in the EC years covers a broad range of expectations. Children in the three to five-year-old range expand cognitive development through acquiring complexity in language, accessing long term memory to formulate conclusions and recall information, use spatial organization to make decisions, and increase executive functioning skills to regulate attention, emotions, and thoughts for favorable outcomes (Carson et al., 2015). More specifically, many EC curriculum focus on skills taught in the areas of math and science.

Teachers focus specifically on math domains such as number concepts, measurement, geometry, and mathematical reasoning. Science is presented through means of scientific process with observing, classifying comparing, measuring, communicating, experimenting and relating to information (Wortham, 2002). Cognitive development follows a sequential scale and teachers in EC observe and support growth through opportunities in play and experiences.

For children who are D/HH, cognition can be difficult to assess due to the impact the hearing loss has on communication and language. Although tests of non-verbal ability exist and can be used to assess young deaf children with limited communication, more accurate predictions of cognitive development are assessed through verbal/signed assessment. However, verbal/signed assessments can give D/HH student advantages and disadvantages depending on communication modality (Marschark & Knoors, 2012). In a different study, Kuhn and colleagues (2014) found that the number of occurrences of pointing and early gestures at 15 months had a positive correlation with language development at two to three years of age. At two through four years of age, there was also a positive correlation with cognitive executive functioning. Therefore, the impact of hearing loss on language development can also impact cognitive development even though students may have a high intelligence quotient. Furthermore, other aspects and areas of math, science, and literacy may all be impacted by hearing loss and language delays in D/HH students. Sign language interpreters will need to work with the ToD and general education teacher to determine if a student is not comprehending because of cognitive or language issues. Sign language interpreters need to be aware of the impact language has on cognitive understanding.

Social/emotional learning. Social Emotional Learning (SEL) is critical in the development of EC classrooms and can have lasting impacts on outcomes related to behaviors in the future. The ELS uses four broad categories to regulate SEL growth for students: independent behavior, regulation of emotions and behavior, prosocial behavior and social problem solving. Some examples of behaviors observed in these categories include impulse control, verbal expression of feelings, ability to follow rules and routines, turn taking, resolving conflicts, and coping. Establishing a safe environment with a schedule, predictability, orderly physical arrangement, mutual respect, and open communication between students, parents, and teachers promotes positive social emotional learning (ELS, 2011). Providing opportunities for play and interaction with peers and adults in both engaging and quiet activities allows practice for developing friendships, self-regulation and empathy (DeMeulenaere, 2015). Some EC have measured positive outcomes from structured times for teaching SEL through specific curriculums or programs such as Conscience Discipline (Caldarella, Page, & Gunter, 2012), and Second Step (Alvarez, Anderson, & Ketchmark, 2009). Ongoing daily promotion of expressing feelings, accepting challenges, and building collaborative relationships establishes a culture for learning through positive SEL.

SEL with D/HH students in the EC classroom can be more complex. Parents reported their D/HH child with limited language and communication experienced frustration and behavior problems. Children with higher language levels and communication had greater social functioning and less behavioral problems (Netten et al., 2015). A systematic literature review by Batton, Oakes, and Alexander (2014) revealed some mixed results about acceptance and friendships with hearing peers. However, there was considerable research supporting the isolation and social inexperience of D/HH students as children become older compared to

hearing peers. Depending on educational placement and language levels of young EC D/HH students, frustrations, behaviors, and lack of empathy may exist from language and communication delays. D/HH children scored significantly lower when compared to hearing children's comprehension and use of empathy (Peterson, 2016). For D/HH children who do not have access to sound, facial expressions of pain or emotional distress by others, emotions can be misinterpreted and considered humorous by mistake. D/HH students in EC classrooms need explicit instruction on the language associated with feelings and emotions along with opportunities to build relationships with peers and adults in a safe learning environment. Sign language interpreters will need to communicate with general education teachers and ToDs to recognize areas of social emotional need. For instance, educational interpreters who are interpreting social communications with peers at center time may be first to recognize a social breakdown that might need to be addressed by a teacher. If one student is talking to quietly or not looking at the young D/HH child, repair strategies for the D/HH child may need to be taught.

Self-help/adaptive. As a toddler transitions into EC classrooms, there are expectations to increase independence of self-feeding, dressing and grooming, hygiene and toileting, and daily chores (Extension Foundation, 2015). Children's home environments and expectations can greatly influence independence and meeting the needs of self. Furthermore, the classroom supports growth in self-help skills by setting up rules and routines requiring independence. For example, students may be responsible to hang book bags, coats, use the restroom, wash hands, throw garbage away, clear dishes, clean up toys, etc. Some classroom environments have "class jobs" that promote responsibility such as holding the door open, feeding a class pet, or turning the lights out.

For children who are D/HH, self-help/adaptive skills may be influenced by numerous factors. Parents grieve when they receive a diagnosis of hearing loss for their child, regardless of the child's age at the time of identification (Young & Tatersall, 2007). As a result, they may not have had the highest expectations for their child to learn and acquire language or self-help skills. They may have promoted little independence in their child because of lack of ability to communicate or because they wanted to do everything for them. Furthermore, learned helplessness can be acquired through the school setting by students becoming dependent on interpreters, aids, and peers because the D/HH student believes they are helpless. IEP team members must work closely with students to prevent learned helplessness. It may be important for a sign language interpreter to hold a young D/HH child accountable for independently doing the same expectations as peers while emphasizing the language related to tasks. If D/HH students appear to lack self-confidence, motivation, and have poor problem solving-sills, these may be red flags to address learned helpless behaviors (Clarke & Sheele, Hands & Voices). D/HH students at a very young age must be taught self-advocacy, independence, and language so they can communicate wants and needs and accomplish tasks independently regardless of their hearing loss. The five domain areas in EC all need to be explicitly taught to D/HH children with special attention related to the impact of hearing loss and language development.

Educational Interpreters in Early Childhood Deaf Education

EC D/HH students are experiencing multiple placement options including mainstreaming with interpreters. The age of children, language levels, cognitive development, attention, and experience all influence how interpreters in this setting are utilized. Furthermore, each young D/HH child presents differing unique sets of needs that must be addressed for academic achievement to be accomplished.

Interpreter roles and background in early childhood. Interpreter roles at the preschool-primary age differ from educational settings for middle to high school D/HH students. Seal (2004) states that EC interpreters operate more within a "helping model" using a "shadowing role, actually duplicating the language that the teacher uses, but reproducing it in first person" (p. 51). Seal suggests, "The interpreter in the primary setting, then, cannot function only as the hands of the classroom teacher in signing or cuing the words the teacher used. The interpreter in the primary setting actually reproduces the language in such a *helping way* that the child "learns" the language that accompanies the activities" (Seal, 2004, p. 51). The helper role of the interpreter then would need to span throughout the day in all domain areas addressed in EC. For example, if a child is directed from the teacher to hang up his coat, a self-help skill addressed through the daily routine, the interpreter may need to "help" facilitate this activity if the child does not have the language to understand the interpreted message.

Although some interpreter preparation programs require a course in child development, many interpreters are not prepared in language development of D/HH children to be the accurate language teacher or model needed for that student (Dahl & Wilcox, 1990). Interpreters who work at the EC level must take the message of the individual they are interpreting for and break it down to a language level that is equivalent to the student's functional language needs. Wolbers and colleagues (2012) reported 33% of the message for young children was interpreted directly while 67% of the signed message diverged from the original meaning by either taking out or adding words to help clarify the message. Although the interpreter was meeting the needs of the student's language levels by doing so, members of the student's team were unaware this type of accommodation was being made. Teachers in the general education setting do not get a full picture of what the child's language levels really are and where the child is functioning if

they are assuming the interpreter is signing exactly what is said. Therefore, general education teachers often do not understand the language deficits of the D/HH student in their classroom. Challenges can also arise when one interpreter is responsible for interpreting the message to two or more D/HH students within the same mainstream classroom. An educational interpreter in the EC classroom could not possibly interpret the message at each individual child's language level for whole group instruction. Therefore, the message will either be either too high or too low for one or more students. Complex needs of interpreting at the EC level need continued research and development.

The background, motivation, and compatibility of educational interpreters who work with young EC D/HH students is important. Given the importance of educational interpreters' integration as "language teachers," background knowledge and training of language development along with typical development of all domains areas of instruction in EC need to be cultivated. Interpreters are needed who are willing to take on the "helper role" with more duties and expectations than just interpreting the message at this age group. Educational interpreters at this level also need skills for collaborating with the IEP team. Everyone needs to understand how the interpreter is conveying the message and how much modification of the message is occurring. Continual support from ToD to help train educational interpreters and work individually with D/HH students is also integral to success of young D/HH children.

Conclusions

The support needed for some young D/HH children at the EC level is much greater than the typical developing child due to the effect that language development has on all domains of development. For children who do not have direct access to a ToD, educational interpreters are available at this young age. Educational interpreters allow students to be included in the

mainstream general education environment with general education teachers by helping them access language through signed interpretation of the spoken message given by the teacher. Although the teacher may be selecting one way to word a message, the interpreter may choose different signs to interpret the meaning of the message through a triad communication (Triad communication is used to describe the three people involved in communication: general education teacher, D/HH student, and interpreter). The interpreter may adapt the language in the triad communication for the D/HH child to understand at a level comparable to their functional language. This differs from a ToD using TC who would be providing the signed message and the spoken message in a simultaneous manner using the same wording in a dyad of communication. Students would hear the audible spoken message by the ToD and see the visual message in sign language simultaneously in dyadic communication. A large gap in research exists to support how language is acquired in the dyad of communication between the teacher of the deaf and the D/HH student verses the triad of communication with the general education teacher, sign language interpreter, and the D/HH student. In order to provide children with the most efficient and effective way to acquire language, research in this area is greatly needed.

Chapter Summary

Students with hearing loss are educated in a myriad of placement options including deaf education self-contained classrooms with ToD and mainstream placements in the general education setting with the support of a sign language educational interpreter. The field of educational interpreting is a relatively new field with some of the early seminal articles occurring in the 1980s. Focus for some of the early articles were on the quality of educational interpreters. The articles proved a need for quality educational interpreters to provide an accurate and clear message to D/HH students. Originally many articles have focused on the needs for recruiting

qualified individuals and for professional ongoing education. While some questions regarding qualifications and professional development have been resolved through state mandates and ongoing accountability, identifying success with the use of interpreters in relation to academics remains unreviewed. The development of language during the early years adds another critical element to studying educational interpreting since emergence of language is crucial.

When analyzing the specific domains in early childhood, educational interpreters have a breadth of language development to support across the curriculum. Language is a foundational domain in early childhood, but also cognitive, motor domains, social/emotional, and self-help/adaptive skills use language embedded throughout skill development. The trickle-down effect of language delays due to hearing loss certainly impacts more skills than just language development. Since language development can be taught in multiple environments such as mainstream, self-contained, residential, private, etc., comparing environments can provide information for future placements. Furthermore, condition and modalities of young D/HH students vary. Comparing the dyadic communication and triadic communication within a mainstream classroom gives useful feedback for understanding future academic success for language acquisition.

CHAPTER II: REVIEW OF LITERATURE

This chapter includes two literature reviews: (a) current literature and practices in language development strategies for young D/HH students and (b) educational interpreting. Results are discussed and implications for further research are unveiled.

D/HH children are at a distinct disadvantage for typical language acquisition due to lack of auditory input. Children with any range of hearing loss may not receive adequate information via the auditory channels to interpret spoken language and develop intelligible speech. Furthermore, research suggests there is an optimal window for language development around birth to three years of age (Nicholas & Geers, 2006) and that typically by five and six years of age, language is established. More recent research also reveals the relationship between the critical years of birth to five or six years of age with language development and the neuroplasticity of the brain. As the brain is developing and forming, specific milestones in language and listening should simultaneously occur (Flexer, 2001; Friedmann & Rusou, 2015; Ortmann et al., 2017; Robbins, Koch, Osberger, Zimmerman-Philips, & Kishon-Rabin, 2004). This neuroplasticity allows the brain to "hear" and understand the sounds, which eventually leads to comprehension and expression of spoken language. Correlated to neuroplasticity research, other studies show higher scores of language acquisition when cochlear implantation occurs before 24-30 months of age (Levine, Strother-Garcia, Golinkoff, & Hirsh-Pasek, 2016; Nicholas & Geers, 2003; Tobey, Thal, Eisenberg, Quittner, & Wang, 2013). However, little research exists regarding language development during critical years with regards to neuroplasticity and use of sign language. Limited research coupled with educator observation would lead one to

surmise neuroplasticity and language development are connected, creating an optimal window for language growth and development.

In order to explore the variety of strategies used by ToDs in the early childhood environment to support language acquisition for D/HH students, a thorough review of the literature was conducted. The purpose of this literature review is to bring to light specific strategies for D/HH students' language acquisition, reveal gaps in the literature, and describe how further research could support these gaps. Since research shows 57% of D/HH children are currently educated in a mainstream environment (GRI, 2009), many mainstreamed students access language through use of an educational interpreter (Seal, 2004). Review of the initial search of literature, prompted additional research to analyze the use of educational interpreters to support language development across age and grade spans.

Methods

Searches Conducted for Language Strategies

In order to complete this literature review, a comprehensive electronic search was conducted. Five main search databases were used including Academic Search Complete, CommDisDome, PsychInfo, PubMed, and ERIC EBSCOHOST. A search was conducted for language strategies in each database using Boolean search terms AND OR with the following keywords: *deaf* OR hearing** AND *strategies for language development* (See *Figure 1*). Several different searches separating *strategies for language development* into subcategories were conducted, but the most accurate results were accessed by leaving the search term together. If combining both key search terms with AND revealed results higher than 50 articles, an additional search term *young children* was added to narrow results.

Results in *Figure 1* revealed in the Academic Search Complete database keywords *deaf** OR *hearing** yielded 37,237 results, and *strategies for language development* returned 218 articles. When those two keywords were combined with AND the result was 15 articles. In CommDisDome, similar results were found with 34,103 for *deaf** OR *hearing,** 627 for *strategies for language development,* and 5,444 for *young children* with a combined outcome of 17 articles. PyschInfo yielded no results when search terms *deaf** OR *hearing** AND *strategies for language development* were combined. PubMed had the most results with 55,726 articles for *deaf** OR *hearing,** 1,731 articles for *strategies for language development,* 108,521 articles for *young children.* When all those terms were combined with AND the outcome was 20 articles. ERIC EBSCOHOST results were 11 articles when the two terms were combined. Keywords and results for *deaf** OR *hearing** was *14,582,* and *strategies for language development* was 458. A total of 63 articles required a scope review for inclusion or exclusion based upon content.

Exclusion/Inclusion Criteria

Due to the limited number of articles related to this topic, all publications regardless of date were reviewed. Limits were set for peer reviewed or scholarly journal articles in each database, and duplicates were removed. In order to narrow the 63 articles found in the literature, exclusion and inclusion criteria were defined. Articles were excluded if they contained content related to outcomes measures of young D/HH children but did not give specific strategies to promote positive outcomes. Inclusion of articles contained those with 1) D/HH children birth to five years of age and 2) related specifically to language development strategies or instructional content for promoting language development.

These criteria narrowed the search results to 10 pertinent articles, which were critically reviewed and analyzed exposing four main themes: direct instructional approaches, strategies to

promote listening and spoken language, visual strategies, and facilitative language techniques with parents. In the next section, results of these four main themes will be investigated.

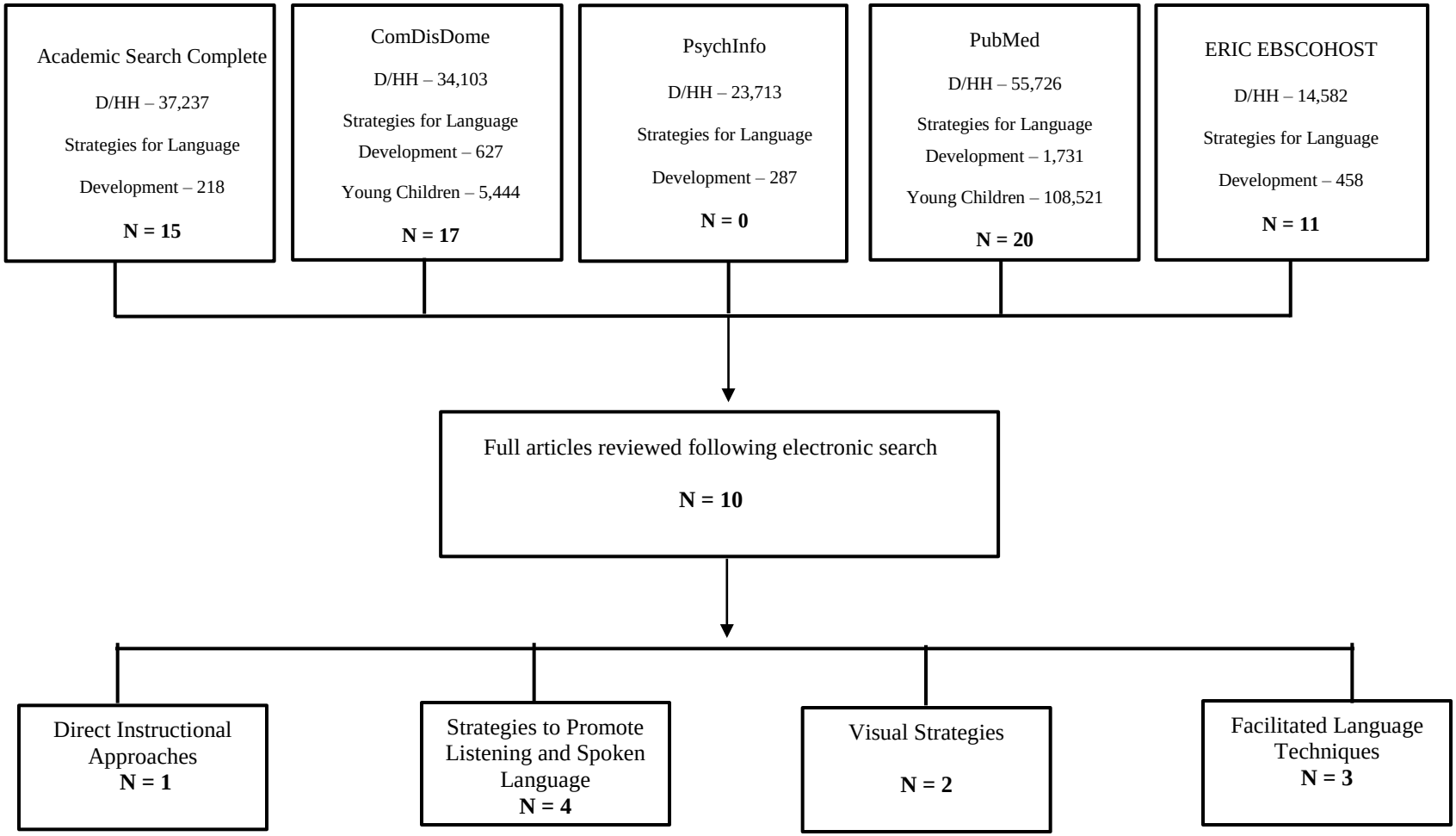

Figure 1. Search term results and thematic breakdown of articles for language strategies

Results

From the methods for this literature review, 10 articles were identified for review (See Table 2). After reading the articles and taking notes to code sections of each article, themes began to emerge. Four common themes were identified related to the search results for strategies used to develop language in young D/HH children. The four main themes: direct instructional approaches, strategies to promote listening and spoken language, visual strategies, and facilitative language techniques with parents will be expanded on for greater understanding.

Table 2

Search Results for D/HH Students and Strategies in Language Development

Authors	Participants	Methodology	Findings
Cruz, Quittner, Marker, & DesJardin (2014)	National study of 93 children under 5 years old, severe to profound hearing loss, all cochlear implant users, using spoken English or spoken English supported with some sign	Videotape analysis of language, parent-child interactions	Higher level of facilitative language techniques (FLT) (recast and open-ended questions) did facilitate higher expressive language but not receptive; parent use of dialogic reading produced higher vocabulary development, lower language TFL had no effects on language although they may be beneficial in the pre-linguistic stages.
DesJardin (2006)	32 mothers of children with bilateral sensorineural hearing aids and were hearing aid users	Scale of Parental Involvement was used to identify parent perceptions on devices and speech and language development	Parents who used higher language facilitation (parallel talk, recast, and open-ended questions) had children with higher receptive and expressive language scores. Parent perceptions had a correlation with lower language facilitation such as close-ended questions and imitations.
DesJardin, et al., (2014)	57 mothers and 3 fathers of normally hearing (NH) children and 44 mothers and 1 father of children with hearing loss who utilize hearing aids; 2 groups of children ages (12-24) and (25-48); mild to severe hearing loss	Parents and children videotaped during storybook interaction for analysis and Preschool Language Scale-4 (PLS-4) administered to children	Children with hearing loss had parents who used lower level of (FLT) such as directive, labeling, linguistic mapping, and commenting. Parents of children with hearing loss provided more literacy strategies (pointing to and labeling letters and pictures) and teacher techniques (elaborating on child's ideas) than NH parents.

(Table Continues)

Author	*Participants*	*Methodology*	*Findings*
Garber & Nevins (2012)	n/a	n/a	Strategies SLPS can use with D/HH students include: auditory first presentation, wait time, sabotage, and thinking turns. Also prompting techniques that include questioning, using auditory closure, and choices.
Martin-Prudent, Lartz, Borders, & Meehan (2016)	11 professionals: 8 ToD and 3 SLPs who work in early intervention with D/HH students in home and clinic settings birth to 3	Video Analysis of pre-post conditions for interventionist use of EBS related to language development in grad training program	Results indicate that EBS were used by interventionist in the 10 areas analyzed: equipment checks, pause time, parallel talk, language expansion, slower speaking rate, hand cue, voice action synchrony, positioned on side of audition, acoustic highlighting and auditory sandwich. Findings suggest professionals were using these strategies pre and post conditions and explanation exists in article for findings.
Robbins (1986)	n/a	n/a	Summary of research and suggestions to support strategy of teaching transparent and concrete concepts first in a direct instructional approach and then teach generalization of the word in different contexts. Another strategy of teaching new vocabulary with familiar context/concepts as opposed to new concepts/context and new vocabulary may be too much.
Sacks et al., (2014)	11 families: 10 mothers and 1 father 1 early intervention therapist DT/H	Implemented Project ASPIRE is a home-based intervention program which promoted language rich experiences at home with caregivers	Increase identified from baseline to intervention in word count spoken by caregiver, conversational turns, and child vocalization. Teaching strategies to caregivers can impact language acquisition.
Simser (1993)	n/a	n/a	Article gives ideas and suggestions at different age levels regarding strategies to promote listening and spoken language such as acoustic highlighting, device checks, developing auditory feedback loop, modeling and imitation, auditory sandwich, proceeding actions with verbal prompts, etc.

Direct Instruction

Direct instructional approaches for young D/HH children are important for facilitating language acquisition. Contrary to approaches for instruction for general early childhood education, which involves facilitation and exposure to language through project and play based models, D/HH children need more direct support. One article identified in the literature review specifically addresses direct instruction through comprehension. Direct instruction for teaching comprehension of language can differ from language comprehension of hearing peers (Robbins, 1986). Often with D/HH children, the production of language can be reinforced more than the comprehension because of the desired output monitored for success. It is important to look at the development of comprehension of hearing children to modify and explicitly teach deficit areas in D/HH children. Through direct instruction, teaching transparent and concrete objects and concepts first is fundamental for building language with D/HH children (Robbins, 1986; Luetke-Stahlman, 1992).

One example of teaching through direct instruction occurs in developing vocabulary concepts. New words and concepts needs to be taught conceptually through tangible, visual, and concrete ways. Robbins (1986) explains once basic comprehension is established, teachers have a responsibility to expand the concepts to more generalized contexts. She used the example of the vocabulary word "corner." A child may understand the corner of a room as a place, but the concept may not translate when the child is asked to find a corner of a puzzle (p. 20). Direct instruction for young D/HH children above and beyond modeling and imitation of words is needed to teach concept comprehension of language in an explicit manner.

Additionally, Robbins (1986) identified through her literature review the difficulty of D/HH children with "order of mention," as a comprehension strategy. For example, "Before the boy

ate, he swam" was taken literally in the order presented to mean "he ate and then swam" (p.17). Teachers of D/HH students know before students can understand statements containing *before* and *after*, the concepts of *before* and *after* will need to be taught directly through concrete ways such as daily routine or visual tasks to understand the terms *before* and *after*. Then generalization of comprehension to more abstract concepts can be applied. Although this direct instructional approach for teaching language occurs in deaf education, specific language concept development and comprehension is not always taught in a direct fashion throughout early general education early childhood classrooms.

Strategies for Promoting Listening and Spoken Language

Direct instructional approaches are also used to develop listening and spoken language with D/HH children who have cochlear implants or hearing aids that give them access to sound. The brain must learn to process the sound and connect the sound with meaning (Madell, 2016). Table 3 is a summary of strategies used to promote listening and spoken language identified through the literature review. Several of these strategies could also be generalized and used to develop language through use of sign or total communication.

Table 3

Comparison of Listening and Spoken Language Strategies

Listening and Spoken Language Strategies	Martin-Prudent, Lartz, & Borders (2016)	Leutke-Stahlman (1992)	Garber & Nevins (2012)	Simser (1993)
Equipment Check	X			X
Positioned on side of auditon	X			X
Voice-action synchrony	X			X
Pause Time/Wait time	X		X	
Acoustic highlighting	X	X		X
Hand cue	X			
Slower speaking rate	X			
Parallel talk	X	X		
Language expansion	X	X		

(Table Continues)

Listening and Spoken Language Strategies	Martin-Prudent, Lartz, Borders (2016)	Leutke-Stahlman (1992)	Garber & Nevins (2012)	Simser (1993)
Auditory sandwich	X		X	X
Recasts		X		
Sabotage		X	X	
Thinking turns		X	X	
Partial repetitions		X		
Withholding objects and turns		X		
Input + 1		X		
Self-talk		X		
Parallel talk		X		
Inform talk		X		
Modeling and Imitation		X		
Prompting		X		X
Conditioning tasks		X	X	X

In order to understand how young D/HH children can acquire language, analysis of the strategies used for spoken language can be beneficial. The list of strategies in Table 3 all require a knowledgeable professional or parent who understands and can implement these strategies. D/HH children will not easily acquire spoken language without these interventions. For example, acoustic highlighting was identified in three out of the four articles as a useful intervention for developing spoken language. Acoustic highlighting involves saying a target word louder than the other words in the sentence or saying a phoneme louder than the other phonemes in a word (Leutke-Stahlman, 1992; Martin-Prudent et al., 2016; Simser, 1993). If a child says, "I eating cheese" a teacher could use acoustic highlighting by stating, "I **am** eating cheese" and emphasizing the omitted word "am". For children who are learning to discriminate sounds with audition and building structured syntax, acoustic highlighting can be a useful strategy.

Another strategy mentioned in at least three of the articles reviewed was the use of the auditory sandwich. The auditory sandwich starts when a presentation of auditory information is given, followed by a pause for response from the child. If the child does not respond, a visual cue is added to the spoken utterance by a picture, natural gesture, or sign. Next, the child hears a

presentation of the information one more time (Garber & Nevins, 2012; Martin-Prudent et al., 2016; Simser, 1993). For instance, if a teacher says, "Tommy, go sit at the table," and there is no response from the child, the teacher may then show Tommy a picture of a child sitting at a table while saying, "Tommy, go sit at the table." The child then goes to sit at the table and the teacher repeats by voice only "Right, Tommy! I said, go sit at the table." This is a strategy that helps develop the auditory feedback loop (Simser, 1993), which allows children to turn auditory information into spoken utterances through monitoring and comparing their speech with the auditory memory. Regardless of the specific strategy selected to help develop listening and spoken language skills, trained professionals or parents need to have knowledge of these strategies and use them daily with D/HH children.

Strategies for Promoting Language through Visual Communication

In addition to some of the strategies used for language development of spoken language through audition, strategies in visual communication such as American Sign Language (ASL) or use of Total Communication (TC) can also promote language acquisition. Overlap exists in some of the strategies used for spoken language which can be combined with visual communication strategies such as pause/wait time, cuing, language expansion, recasts, sabotage, thinking turns, partial repetitions, withholding objects and turns, self-talk, parallel talk, inform talk, modeling and imitation, and prompting; however, less research is available. Alexander, Wetherby, and Prizant (1997) specifically discussed the use of intentionality through highly motivating objects, holding out from giving objects until language is used, and sabotaging environment and situations. Furthermore, promoting social experiences and pairing gestures with communication also were beneficial for pre-conversational repair strategies in their study.

In another study by Berke (2013), ten deaf mothers with D/HH children were videotaped to analyze how deaf mothers are teaching language through shared reading experiences. Some of the deaf mothers used chaining to help explain English explicitly by bridging the gap between English and ASL. Providing examples, definitions, and expanding on what the English words mean through ASL also helped bridge the gap. When the books had word sounds like "zoom" to mean fast, deaf mothers paired the sounds with equivalent sign movements to help build comprehension for their children that did not have auditory access. Other strategies included explanation of rhythm, translating into ASL, providing fingerspelling and name signs, and signing English grammatical features in English word order at times. Incorporation of sign language with strategies used for language acquisition can be beneficial for many early childhood D/HH children.

Facilitated Language Techniques

When discussing young children who are D/HH, the importance of providing parents with strategies to promote language acquisition at home through facilitated language techniques. These parental studies reveal language acquisition strategies that ToDs or early intervention therapists have taught the parents in order to promote language development. Higher level Facilitative Language Techniques (FLT) were mentioned in studies to indicate the desire for parents and educators to proceed beyond lower FLT into higher level of language expectations (Cruz et al., 2014; DesJardin, 2006; DesJardin et al., 2014). Parents of children with hearing loss promoted lower level FLT such as labeling, directives, linguistic mapping, commenting, and closed ended questions (DesJardin et al., 2014). Although these strategies are useful and important in the beginning to establish some foundations for language, the research shows more successful language outcomes for D/HH children who are then challenged to higher FLTs.

Higher FLTs include recast, open ended questions, parallel talk, and expansion resulting in higher expressive language scores for D/HH children (Cruz et al., 2014; DesJardin, 2006; DesJardin et al., 2014). DesJardin's research supported receptive and expressive language levels increasing from higher FTLs. Cruz and colleagues differed slightly in their results. They also discovered increased FTLs for expressive language but receptive language was not effected. Noticeable similarities between the FLT strategies given for parents to use with their children exist between the listening and spoken language and visual communication strategies. All strategies require explicit instruction of language by direct instruction throughout the daily routine.

Sacks and colleagues (2014) implemented a home-based intervention program to promote language rich experiences at home with caregivers. These strategies complimented other strategies that have been discussed and include increasing the amount of words spoken to the D/HH child, providing more opportunity for conversational turns, and encouraging child vocal play. The research on parental input to D/HH children further supports the need for knowledgeable stakeholders to invest in children's language acquisition that does not come easily or naturally for children with hearing loss.

Discussion

Ten articles were identified through the review of literature regarding the strategies used to promote language acquisition of young D/HH children. This literature review was conducted to ascertain knowledge of current practices and empirical evidence regarding strategies used to promote language development by ToDs. Although the literature does support some articles regarding language development strategies, one-third of the articles were written over ten years ago and one-third of the articles do not have empirical evidence to support the strategies.

Furthermore, none of the language strategies acquired from the articles came from experimental research in early childhood classrooms. The research came from interviews or videotaped analysis of parent and child interactions. Many of the articles were based on children birth to three in the early intervention stage of language acquisition. Certainly, there is some applicability from parent-child interactions to the early childhood classroom, but some variances from environmental settings are likely to occur. Additionally, D/HH children may interact differently from parent-child communications than with professional ToDs in a school setting. However, early childhood educators can learn the importance of parental knowledge and use of language acquisition strategies as identified in the literature. Implications for collaboration between home and school are strongly suggested through this literature review even as children move from early intervention to early childhood placements.

Students who are D/HH and entering school at age three are not all placed in deaf education classrooms with access to a ToD using these strategies identified in the literature review. According to the Gallaudet Research Institute's (2009) national survey of DHH students, around 57% of students were educated in the general education setting. Although this is a survey for students from age three through 21, other sources support the placement of young D/HH children in the mainstream classroom with or without educational interpreters (King, 2006). Seal (2004) acknowledges the use of educational interpreters in the early grades with preschool D/HH students. With all the strategies identified through the literature review to promote language acquisition, use of educational interpreter to support language acquisition at this young age was not identified. Unfortunately, the shortage of information found related to this specific topic of use of educational interpreters in the early childhood setting to support language acquisition indicates a gaping hole in the field of deaf education. In order to

understand the use of educational interpreters to support language across age and grade spans, additional research in the literature must be conducted.

Additional Literature Review Summary

The knowledge of strategies necessary to promote language in the early years identified through the original literature review combined with the question of the use of educational interpreters to support language across age and grade span led to an additional literature review. The purpose of the supplemental literature review was to investigate current research and practices regarding educational interpreters in general education. A literature review was conducted using five different databases including Academic Search Complete, CommDisDome, PsychInfo, PubMed, and ERIC EBSCOHOST. A search was conducted using Boolean search terms AND following keywords: *interpreter for the deaf* AND *general education.* A manual hand search of articles was also utilized regarding this topic (See *Figure 2*).

Results from *Figure 2* are shown in Table 4 below. Inclusion criteria was set to include articles related to educational interpreting in the general education setting, any age range, and limited to the academic settings in the United States. Duplicates were removed across search databases and no exclusion criteria was set for date of publication due to limited information on this topic. Twenty-three articles were narrowed down to nine articles for review. Themes were established and categorized as: roles and responsibilities of interpreters, training and qualifications of educational interpreters, impact on D/HH students, and interpreters in the early years.

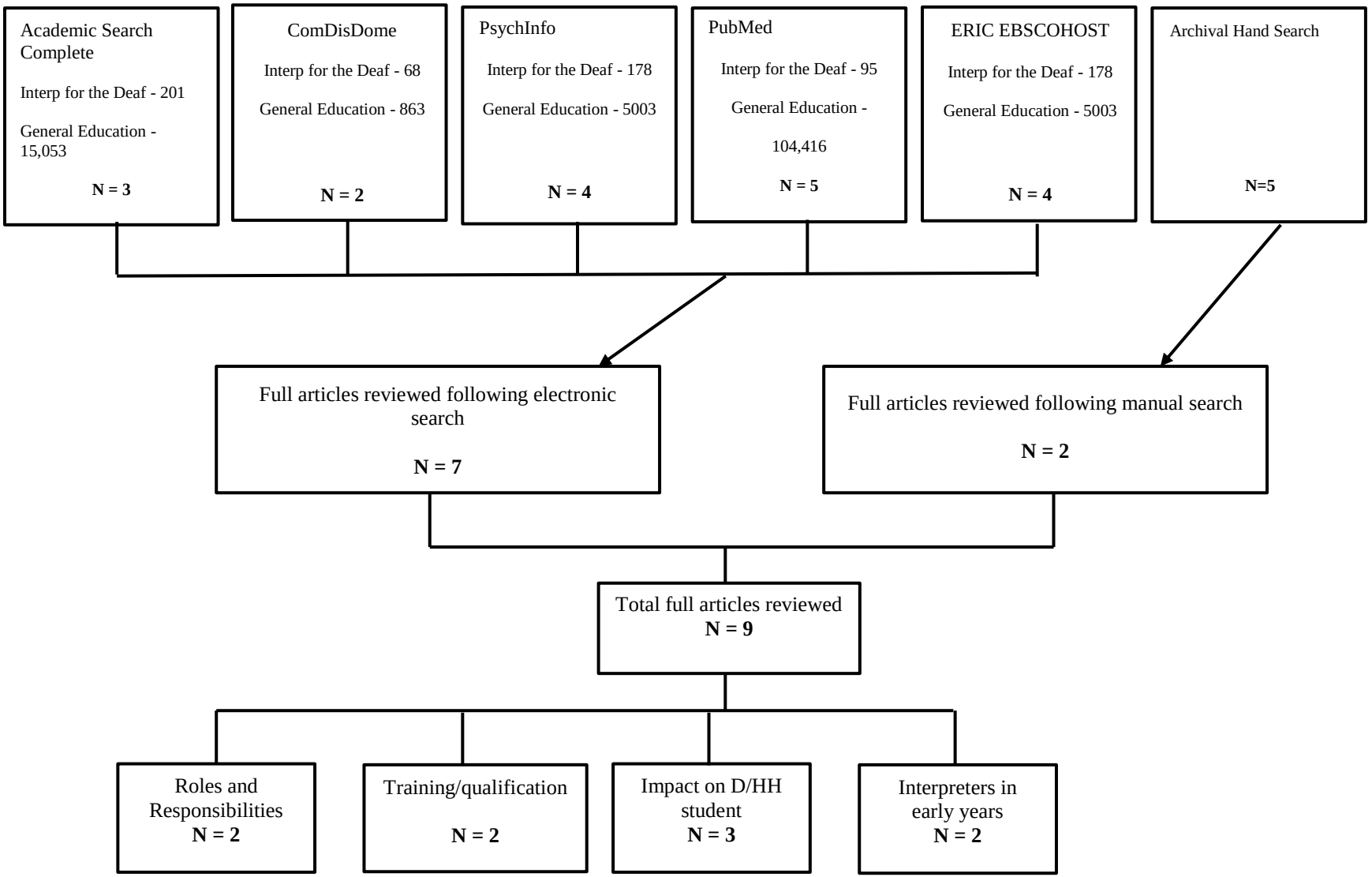

Figure 2. Search term results and thematic breakdown of interpreters as it relates to language strategies.

Table 4

Search Results for Interpreter for the Deaf in General Education

Author(s)	Participant(s)	Methodology	Findings
Anitia, & Kreimeyer (2001)	3 classroom teachers, 2 special education teachers, 3 interpreters, 1 principal, and 1 special education coordinator	29 semi-structured interviews regarding roles and responsibilities of interpreters	Results indicate educational interpreters are required to do more roles than just transferring information between D/HH student and general education teacher. Perceptions differ among stakeholders interviewed.
Beaver, Hayes, & Luetke-Stahlman (1995)	42 elementary school teachers, 11 secondary school teachers, and 6 teachers in both settings	Survey with 11 questions and 1 open ended questions regarding experiences working with educational interpreters and in-service training	An overwhelming amount of general education teachers received no in-service training related to educational interpreting. Many teachers wanted information related to their roles, educational interpreter roles, and environmental modifications.
Best, Lieberman, & Arndt (2002)	8 college students	Informal interviews	Article describing teacher responsibilities and educational interpreters' responsibilities for communication in a physical education classroom setting.
Lindeman & Mageria (2014)	n/a	n/a	Reflections from professionals who co-taught a first grader with a cochlear implant in the general education setting. Insight for collaboration with ToD, general educator, interpreter, and SLP.
Luckner & Muir (2001)	20 DHH students with severe-profound hearing loss in upper elementary to high school, 13 teachers of the Deaf, 19 general education teachers, 19 parents, 9 interpreters, and 2 note takers	Qualitative study involving observational data collection and interviews with DHH students, parents, and school personnel related to success factors for participating in general education classes	Themes emerged from interviews and observations that correlate with findings in the literature such as family involvement, self-determination, extracurricular activities, social skills/friendships, self-advocacy skills, communication and support for general education teachers, pre-teach/post-teach content, collaboration, reading skills, and high expectations.
Schick, Williams,& Kupermintz (2006)	1,505 educational interpreters scores who took the Educational Interpreter Proficiency Assessment (EIPA)	Review of data from EIPA scoring results for the interpreters participating in this study	At the time of the study, the majority of interpreters taking the EIPA did not meet standards set of 3.5 for a passing score. The overall group average was 3.2. Implications of lack of access to language and social development because of lack of interpreter skill.
Seal & Calebaugh (1997)	5 year-old kindergarten student with bilateral moderate-to-severe sensorineural hearing loss	Single subject design of comprehension of teacher directions with the independent variable being attention to the Cued Speech transliterator. A control group of hearing students was also used	DHH student's performance of retelling directions was better with a transliterator and equivalent to hearing peers with transliterator. IEP team defined roles of the Cued Speech transliterator and decided to continue using transliterator services.

(Table Continues)

Author(s)	Participant(s)	Methodology	Findings
Shaw & Jamieson (1997)	8 year-old deaf boy, his educational interpreter, and classroom general educator	Video recorded observations were analyzed to collect language samples for this single case study design	Duration and quality of time the DHH student interacted with the teacher was significantly lower than hearing students. Interpreter lag affected DHH student's participation and overall appearance of "slowness." More instructional time came from interpreter than teacher.
Stinson, Elliot, Kelly, & Liu (2009)	48 D/HH high school students and 48 D/HH college students	Study compared a lecture viewed through interpreter verses a lecture that used a speech to text device C-Print	High school students did better with speech to text device lecture and benefited from note taker and reviewing notes compared to no review. However, college students showed no difference between the two accommodations or between reviewing with notes verses no review.

Since this was a supplemental literature review, full elaboration of each theme and article will not be discussed in detail. However, the four themes that emerged from the articles reviewed were noteworthy: roles and responsibilities, training/qualification, impact on D/HH student, and interpreters in early years. These themes and articles indicate that most educational interpreter research is related to how interpreters function in the classroom. There was limited information regarding how D/HH students are impacted academically through the support of educational interpreters. In summary, there were no articles that specifically addressed educational interpreters and their use as a support for language development. The roles and responsibilities and trainings and qualifications are indeed important research areas but do not specifically address use of interpreters for language development. Furthermore, articles pertaining to the impact on D/HH students had greater emphasis on the myriad of factors that promote positive outcomes in general education settings, not specifically because of the educational interpreters. Some of the articles seemed to focus on the use of educational interpreters as an accommodation to provide access to spoken language.

The use of educational interpreters was compared to an accommodation for D/HH students similar to a note taker or text to speech software. One of the articles highlighted how high school students did better using speech to text accommodations for comprehension of a lecture than with an educational interpreter. The same study had college students with equivalent scores for both interpreters and speech to text (Stinson et al., 2009). Although the purpose of educational interpreters is to provide access to spoken language, how is language development impacted? What are implications related to educational interpreters with young D/HH children who are acquiring language?

Two articles from the archival hand search were selected because of their direct focus on interpreters in the early childhood years. The first study by Shaw and Jamieson (1997) involved an eight-year old deaf boy, his educational interpreter, and a classroom general education teacher. Language samples were collected and analyzed through video recorded observations. Results revealed that the duration and quality of time in which the D/HH student interacted with the teacher was significantly lower than his hearing peers. Furthermore, interpreter lag time affected the D/HH student's participation in group choral responses and opportunities to answer questions from the teacher. The DHH student appeared slow to teachers and students because of this lag time. Additionally, results concluded that more instructional time came from the interpreter than from the general education teacher.

Seal and Calebaugh (1997) also used single-subject design to study a five-year old student with bilateral moderate-to-severe sensorineural hearing loss that used Cued Speech in the mainstream classroom. The study aimed to measure the effectiveness of a Cued Speech transliterator for this student. Comprehension of teacher directions was the dependent variable with attention to the Cued Speech transliterator being the independent variable. Overall, the

D/HH student's performance of retelling directions was better with a transliterator and equivalent to the hearing peer control group. Due to the results of the study, the IEP team decided to keep the transliterator for this student. Additionally, they identified roles for the transliterator to include prompting attention and transliterating instructional material as needed, cueing new vocabulary as it emerged in the day, and cueing and correcting the student's pronunciation of difficult words. Both of these studies were conducted over 20 years ago at a time when mainstreaming with educational interpreters was less prominent than it is today. The implications for further research regarding the use of educational interpreters in early childhood is critical.

Conclusion and Implications for Research

Children who are D/HH are being identified earlier through state mandates of Universal Newborn Hearing Screenings. The rate of 3% of children screened in 1993 to 93% in 2005 (White, 2006) shows the dramatic increase in support of UNHS. In 2007, the Joint Commission of Infant Hearing (JCIH) provided guidelines with three major recommendations that support hearing screening by one month of age, diagnostic audiological identification by three months of age, and intervention and services in place by six months of age which include amplification (JCIH, 2013). With these advances in identification, professionals working in the field of early intervention and early childhood need to be knowledgeable about the strategies used to promote language development through audition and spoken language as well as visual communication strategies.

The strategies identified for language development of D/HH children in this literature review provide a great basis for implementation with ToDs working with young children in early childhood. The implications of ToDs using these strategies occur through a dyadic discourse.

Meaning, a teacher of the deaf uses spoken English alone, spoken language paired with sign language, or manual communication through ASL to communicate directly with the D/HH child. The ToD has the knowledge to use strategies to promote language acquisition. This dyad communication can occur in residential schools for the deaf where mostly ASL and total communication occur, self-contained classrooms with ToDs that utilize total communication or spoken language, and one-on-one direct service sessions with an itinerant teacher of the deaf working in the mainstream. When thinking about the analysis of how language is acquired in typically developing children, a dyadic discourse is required. Children need an understanding of the back and forth turn-taking required of conversation. Children do this in a variety of ways beginning very early.

Showing an interest in conversations with others and short exchanges of one or two turns on the same topic for a two-way conversation typically emerges around 2.9 years of age. At 3.6 years of age, exchanges of three or more turns while engaging in a two-way conversation occurs (Scott, 2004). Another source states sustained conversation for several turns occur between 30 and 36 months of age (Johnson-Martin, Attermeier, & Hacker, 2004). If hearing children are able to take conversational turns regarding one topic at approximately three-years old, the language levels of D/HH students around age three is an important factor for consideration in dyadic communication.

According to the SKI-HI Language Developmental Scale normed on children who are DHH, children with hearing loss begin to understand communication and conversation very early in life congruently with the milestones of hearing peers (Watkins & Tonelson, 2004). Therefore, students who are being educated in self-contained classrooms by ToDs are receiving instruction through simultaneous communication in which the ToD is speaking in English and

accompanying her voice with sign language. These students have a dyadic communication relationship with their teacher. There is a possibility of broken communication occurring due to lack of language development and comprehension. Fortunately, by age three most students with hearing loss and no other additional disabilities typically understand the foundation of the dyad of communication whether it is communicated through sign, spoken language or both.

Some students have placement options that allow for the majority of their day in a self-contained classroom learning through dyadic communication and the rest of their time in the general education setting with a sign language interpreter. Other students may spend their whole day mainstreamed with an educational interpreter and only receive resource instruction from a ToD. This setting requires the use of a triadic communication relationship in which the general education teacher is communicating the lesson and the sign language interpreter is signing what the teacher says for the D/HH students. The sign language interpreter also signs what other students in the classroom are saying. The student may be receiving broken communication for a variety of reasons with the interpreter: lag time from spoken message to signed message, student's lack of sign language knowledge, lack of experience/training with interpreter, and simply not paying attention to the interpreter.

Additionally, a broken message may occur between the D/HH student and general education teacher due to the inability to access all sounds in the speech range, unintelligible speech from the student, vocabulary or language barriers, and lower language levels. This triadic communication involves a more complex layer of acquiring information and is not a natural way of communication or receiving information. Therefore, research in the area of the triadic communication of students acquiring knowledge and understanding the communication through

the use of an interpreter is necessary to understand how best to educate D/HH students in a mainstream setting.

In the educational setting where triad of communication is occurring for the D/HH children, typically the general education teacher nor the educational interpreter have had training in the language strategies identified in this literature review for promoting language acquisition. The research is clear that direct instruction of language using specific strategies is critical to help D/HH children from falling behind peers in language development. The research in the field of D/HH education needs continued expansion on comprehension of the triad of communication in the mainstream classroom because the current literature is limited. By not knowing the use of acquiring knowledge with an interpreter in early childhood several factors are unknown. Some factors include difficulty to determine placement for students, best practices in deaf education, and what type of professional development may be beneficial for general education teachers, interpreters, principals, and other support staff working with DHH students.

Furthermore, limited studies have examined the use of interpreters in early years. Therefore, the challenges of overcoming some factors that may be preventing successful mainstreaming with use of an interpreter may exist. By comparing acquisition of knowledge through dyadic communication verses triadic communication, informed decisions can be made in the field regarding the needs of students. If there is a discrepancy between professional opinions for placement options and educational outcomes of students, research regarding knowledge acquisition may provide answers to these questions.

Chapter Summary

This chapter used two literature reviews to gain knowledge related to language development strategies for young D/HH children and the use of educational interpreters.

Unfortunately, the results of both literature reviews revealed limited information related to academic use of educational interpreters to acquire language development. The literature review regarding young D/HH language development did provide research related to direct instruction, strategies for promoting listening and spoken language, visual strategies, and facilitated language techniques. However, the use of interpreters as a language support for young D/HH children was not presented.

At the same time, the literature review for educational interpreters showed results emphasizing interpreter roles and responsibilities, training and qualification, impact on D/HH student, and two hand searches on interpreter use in the early years. Interestingly, the educational interpreter was viewed more as an "accommodation" for students and less of a language support. The comparison of a dyadic communication (ToD and D/HH student) verses a triadic communication (general educator, sign language interpreter, and D/HH student) in the same academic environment to acquire language skills was not found anywhere in the literature reviews.

CHAPTER III: METHODOLOGY

The methods for this study are included in this chapter. Statement of problem and use of single case design by alternating adaptive treatment design (AATD) are explained in relation to this study. The purpose statement, research questions, participants and participant selection comprise the next section of this chapter. The subsequent section has the explanation of the setting, materials, data collection, procedures, and analysis. The end of the chapter has a description of the social validity survey used in relation to this study.

Problem Statement

D/HH children in early childhood settings have a variety of options for instructional communication. Two specific options are dyadic and triadic communication contexts. Dyadic communication occurs when the D/HH student is communicating directly with the teacher of the deaf (ToD) in a reciprocal manner using total communication (TC). Triadic communication involves the relationship of the general education teacher, sign language interpreter, and D/HH student. In triadic communication, the student must watch both the sign language interpreter for translation of information in sign language and the general education teacher for cues to access communication. For students who have some access to sound, it is difficult to know how much support the D/HH student is receiving from the sign language interpreter and how much is from direct input of the general education teacher.

A thorough review of literature revealed acquisition of language through vocabulary development in comparison contexts has not been studied. Studies using educational interpreters with young children in academic settings were scarce. However, according to the Gallaudet Research Institute's (GRI) (2009) national survey of D/HH students, approximately 57% of

students are currently educated in the general education setting. Furthermore, students may be placed in general education classrooms with interpreters in the elementary and primary grades. Therefore, studying the contexts vocabulary development of language using dyadic and triadic communication helps fill a gap in the literature of the education of young D/HH students.

Methods

Single Case Design: Adapted Alternating Treatments Design

An adapted alternating treatments design (AATD) (Gast & Ledford, 2014) was used to compare the effects and efficiency of using dyadic and triadic communication for acquisition of new vocabulary words. A functional relation was illustrated using AATD to see if one condition was superior for at least five sessions in this design. Both the dyadic and triadic conditions were introduced simultaneously in the first session with alternating groups. Some groups had triadic first while other groups had experienced dyadic communication and games were counterbalanced. Alternating these treatments in a rapid succession was an important condition for using this AATD design. Conditions were altered every other day so no condition was used back to back two days in a row.

Threats to internal validity. Common threats to internal validity identified by Horner and colleagues (2005) were also taken into consideration. The threat as well as how the threat was minimized is listed below.

1) History- To control for history students had no prior experience in the classroom playing the games selected. Furthermore, the words selected for the study that are involved in the game were not sent home with students for additional practice.

2) Maturation- This study shows typical development of growth because it was a brief comparison study and did not extend beyond 2-3 weeks. Also, using AATD is effective for controlling for maturation.

3) Testing- The alternate treatment of this design helped control for boredom because students were going back and forth between groups. Also, having different hearing peers in the group helped keep students interested. As students became more accustomed to the game building confidence helped them want to keep playing. Randomizing the order, not correcting incorrect answers, not prompting and conducting procedures reliably helped guard against facilitative effect.

4) Instrumentation- Interobserver agreement (IOA) for data reliability was targeted at 90% or higher for 20% of all conditions for each participant (See *Appendices A*).

5) Procedural infidelity- All observers were trained by the researcher regarding the steps and script for the study. IOA for procedural reliability was collected at least once per condition and was targeted at 20% of all sessions and all participants. Teachers were trained on procedures during a 25-minute training session. Procedural reliability for all sessions was collected and reported for overall treatment fidelity (See *Appendices C* and *D*).

6) Attrition- Four participants were included in this study to control against any students moving, withdrawing, or being absent too many times.

7) Multiple treatment interference- A generalization probe with the effective treatment only was used to guard against multiple treatment interference. The generalization game helped show that results were not because two conditions were active at the same time during the study, but it was truly one communication context that was the difference.

8) Data instability- In AATD, data was collected for five alternate treatments and if stability was not reached than the result was there is no important differences and the study was over.

9) Cyclical variability- Cyclical variability was controlled by varying students and times/days in which their sessions occurred so predictable patterns across data based on environment/situation did not occur.

10) Adaptation- The video cameras were put out before the first intervention date to help students become accustomed to the equipment in the room. Both teachers were familiar with working in small groups with students during center time prior to the beginning of this study.

External validity. Throughout this AATD design external validity through intersubject and systematic replication was present by using the same setting, independent variable and dependent variable across four participants. A potential functional relationship could be revealed within each participant for intrasubject replication also (Horner et al., 2005).

Appropriate design. The research question for this study addresses the comparison of two conditions: (a) dyadic communication contexts and (b) triadic communication contexts. Furthermore, the dependent variable measured is a non-reversible behavior because it is acquiring academic vocabulary knowledge. Therefore, the independent variables will be compared for efficiency and effectiveness, and AATD is appropriate.

Reliability

Dependent measures reliability procedures. Two researchers reviewed the videotapes of dyadic and triadic sessions to collect data (See *Appendices 1*). One researcher has a master's degree in special education, is a Nationally Board-Certified Teacher, and a doctoral candidate at a large university. The other researcher has her doctorate in education in special education with an emphasis in deaf education. She also works as the interim department chair for the college of

education at her university. One primary observer watched all the video recordings of all the sessions to collect the data. The other observer watched 20% of the videos once per condition which was selected systematically and assigned by the researcher.

Interobserver agreement (IOA) was collected for data reliability. Point-by-point method was used to calculate percentage of total agreement. Percent of occurrence agreement and percent of non-occurrence agreement were also calculated. See Table 5 for formulas.

Table 5

Formulas for Calculating IOA

Type	Forumula
% Total Agreement	$\frac{\text{\# of agreements}}{\text{\# Agreements +\# disagreements}}$ x 100=% agreement
% Occurrence Agreement	$\frac{\text{\# of occurrence agreements}}{\text{\# Occ agreement + \# occ disagr}}$ x 100=% agreement
% Non-Occurrence Agreement	$\frac{\text{\# of non-occurrence agreements}}{\text{\# Non-occ agr + \# non-occ disagr}}$ x 100=% agreement

Note: In Table 5, occ stands for occurrence, agr means agreement, and disagr represents disagreement.

To help teachers implement accurate pre-test and post-test assessments for data collection, the researcher showed a recorded video to the teachers of expressive and receptive data collection during a training session (See *Appendices C).* This allowed teachers to understand the procedures for implementing the assessment portion of data collection and assist fidelity.

Procedural reliability procedures. Procedural reliability was collected at the same rate as interobserver agreement for data collection stated above with two sessions per condition for 20% of the sessions and across each student. Procedural reliability was divided into two parts: steps and script (See *Appendix B* and *D).* Data was collected on the following steps: (a) pre-test receptive test, (b) pre-test expressive test, (c) reading the directions for the game, (d) completing

all ten picture cards for the game, (e) offering a fruit snack, (f) post-test receptive, and (g) post-test expressive. When checking procedural reliability of the script, scores were compared separately to ensure teachers said the word at least four times per turn. Percentage agreement was reported using the same formulas in Table 5.

Treatment fidelity was also collected for every dyadic and triadic session. Treatment fidelity scores were reported by percent of steps followed and percent of script followed.

Purpose Statement

The purpose of this study was to investigate the efficiency and effectiveness of how young D/HH children acquired vocabulary through using dyadic communication (ToD and D/HH student) compared to triadic communication (general education teacher, interpreter, and D/HH student).

Research Questions

1) Do young D/HH children have a greater speed to goal acquisition of receptive vocabulary in dyadic or triadic communication contexts?

2) Do young D/HH children have a greater speed to goal acquisition of expressive vocabulary in dyadic or triadic communication contexts?

3) Does the dyadic or triadic communication group appear to have more effectiveness for vocabulary development?

4) Do stakeholders perceive this study as meaningful for young D/HH children?

Participants

Participant information. The participant groups in this study consisted of four D/HH students, two similar aged hearing peers, one general education teacher, one teacher of the deaf, one sign language interpreter, and two administrators. Participants were from a Midwest urban

population or within an hour driving distance from this city. All participants gave informed consent and were allowed to withdraw from the study at any time.

D/HH student participants. Seven D/HH students were invited to participate in this study based on the criteria below with four participants returning parental permission forms. The criteria for eligibility was as follows:

- Students who had unaided moderate or greater hearing loss in both ears,
- Students who scored less than 30% on the pre-test of target vocabulary for both receptive and expressive measures,
- Students who had reciprocal communication identified through the Ski-Hi Language assessment, and
- Students who received at least 45 minutes per week on their IEP with peers in the general education classroom with support of either a ToD or sign language interpreter.

D/HH students participated in an age-appropriate preschool learning game that focused on the acquisition of new vocabulary through game play. Students were engaged in games in either the dyadic or triadic communication groups for 10-15 minutes of game play daily for two to three weeks until at least five data points in each condition were achieved. Descriptive information for each student is contained in Table 6.

Isaac. Isaac was the youngest participant in this study. He was three years-old and his educational placement was in the D/HH classroom. He traveled thirty-five minutes by bus to and from school daily. He was enrolled in this program for four months. He was diagnosed with profound bilateral sensorineural hearing loss shortly after failing his newborn hearing screening. There is a familial history of hearing loss with his father and older sister also being deaf. Isaac

started early intervention services around six months of age with a Developmental Therapist/Hearing (DT/H) twice a month and speech language pathologist who works with children with hearing loss weekly. Around age one, he received his first cochlear implant and seven months later received his second. Isaac's mother is from Korea. She speaks fluent Korean and is also fluent in American Sign Language (ASL). His father does not use spoken language and communicates in ASL. His preferred mode for expressive communication is oral through spoken English with some supported sign language while talking. Current language levels can be found in Table 6.

Beth. Beth is three years old and attended the self-contained D/HH classroom for five months. She failed her newborn hearing screening and was diagnosed with profound sensorineural hearing loss at two months of age. Beth received bilateral cochlear implants at age one. Beth received services in early intervention that included DT/H, speech, feeding, and PT. She started weekly aural rehabilitation through her implant center. She travels 40 minutes by bus to school from her home district and parents pick her up daily. She prefers to communicate through oral spoken language but due to apraxia of speech is difficult to understand. She uses sign language to support her speech and her mother is in an interpreter preparatory program to become a sign language interpreter. Her father is learning sign language. Current language scores can be found in Table 6.

Hannah. Hannah is four-years old and attended the self-contained D/HH classroom for 19 months. She travels by bus to and from her home district for 30 minutes. Hannah failed her newborn hearing screening and her original diagnosis was profound sensorineural hearing loss. She later received a diagnosis of mild loss in the left ear and moderate in her right ear. She was fitted for hearing aids at age two and a half. Her hearing loss is progressive in nature and she

currently functions with severe bilateral sensorineural hearing loss. She received early intervention DT/H and speech services starting at age two. She did not wear her hearing aids consistently until she started preschool. She is in the process of cochlear implant candidacy. Her speech intelligibility is difficult to understand. She uses sign language to support comprehension and expressive communication. She comes from a single mother home with five brothers and her mother knows limited sign language. Her current language scores are found in Table 6.

Ryan. Ryan is five-years old. He was born pre-mature and diagnosed with Noonan Syndrome as a baby. He passed his newborn hearing screening after several failed attempts. He was diagnosed with a mild sensorineural hearing loss bilaterally when he was two and a half years-old. He received early intervention for PT and speech. He was fitted for hearing aids at two and a half years old. At age four, Ryan's educational placement changed from an at-risk preschool placement in his home district to a self-contained D/HH classroom. Ryan has attended the D/HH classroom for 22 months and is bused 40 minutes to and from school. Ryan had a decrease in hearing levels identified six months after beginning placement in the D/HH classroom. He became a cochlear implant candidate after displaying progressive loss. He received one cochlear implant during the school year and is in the process of second implantation. His parents are learning sign language. He is the oldest of three children. Current language levels are in Table 6.

Table 6

D/HH Student Participant Information

Category	Isaac	Beth	Hannah	Ryan
Age	3 years-old	3 years-old	4 years-old	5 years-old
Hearing Loss/Unaided	Profound bilateral sensorineural	Profound bilateral sensorineural	Severe bilateral sensorineural	Severe-profound bilateral sensorineural
Age of Diagnosis	3 months	2 months	6 months	2 ½ years
Additional Diagnosis	n/a	Apraxia	n/a	Noonan Syndrome

(Table Continues)

Category	Isaac	Beth	Hannah	Ryan
Amplification	Bilateral cochlear implants	Bilateral cochlear implants	Bilateral digital hearing aids	One cochlear implant and one digital hearing aid
Early Intervention	Yes: DT/H, speech	Yes: DT/H, speech, feeding, PT	Yes: DT/H, speech	Yes: Speech, PT
Ski-Hi Developmental Language Scores	Rec: 22-24 mo. Exp: 22-24 mo.	Rec:28-32 mo. Exp:28-32 mo.	Rec: 32-36 mo. Exp: 28-32 mo.	Rec: 28-32 mo. Exp: 32-36 mo.
One-Word Picture Vocabulary Test	Rec: 89 SS (23rd Percentile) Exp: 79 SS (8th Percentile)	Rec: 103 SS (23rd Percentile) Exp: 92 SS (30th Percentile)	Rec: 106 SS (73rd Percentile) Exp: 97 SS (42nd Percentile)	Rec: 74 SS (4th Percentile) Exp: 57 SS (<1st Percentile)
Test of Auditory Comprehension of Language	Vocab-37th % GM- 63rd % EPS-63rd % T3Q-102 Quotient: 55th %	Vocab-63rd % GM- 16th % EPS-50th % T3Q-57 Quotient: 39th %	Vocab-50th % GM- 16th % EPS-50th % T3Q-57 Quotient: 94th %	Vocab-<1st % GM- 9th % EPS-1st % T3Q- 57 Quotient: <1st %

Note: DT/H means developmental therapist/hearing, Rec means receptive language, Exp means expressive language, SS means standard score, GM means grammatic morphemes, EPS means elaborated phrases and sentences.

Student peers. Information letters and consent letters were mailed to 20 hearing peers. Two student peers from the general education classroom returned consent for this study. One hearing peer and one D/HH student participated in each session of game play. Data was not collected on the hearing peers.

Teachers. A teacher of the deaf (ToD) and general education teacher participated in this study. The teachers read the scripts outlined in the procedures for both the triadic and dyadic communication groups and administered the ongoing assessments for data collection. They were also stakeholders in the social validity surveys.

Teacher of the deaf (ToD). The ToD has been teaching for four years with most of her experience as an itinerant ToD. This was her first year teaching D/HH self-contained preschool. She co-teaches with the first author of this study. She has a bachelor's degree in special education and is licensed in deaf education. She has a listening and spoken language professional certificate. She is fluent in sign language and using total communication (TC)

which is defined for this study as talking and signing at the same time. She was the teacher in the dyadic communication group.

During the dyadic communication sessions, the ToD used TC. According to King (2006) "Total communication is an inclusive term that typically refers to simultaneous use of speech and signing (whatever the form)" (p. 79). Therefore, students were taught the concepts of the game while the teacher spoke English for herself and signed at the same time. Student responses were accepted in whatever mode of communication that student preferred.

General education teacher. The general education teacher taught early childhood for 19 years. This was her first year working with D/HH children and a sign language interpreter. She has her bachelor's degree in early childhood and a masters in reading development. She taught one D/HH student and a hearing peer in the triadic communication groups with a sign language interpreter.

During the triadic communication sessions, the general education teacher spoke English while the sign language interpreter signed. Students responded in their preferred mode of communication. The general education teacher did not use any sign language.

Sign language interpreter. One sign language interpreter participated in this study. She was an educational interpreter for eight years and supported children in early childhood for four years. She exceeded the mandatory score on her Educational Interpreter Performance Assessment (EIPA) and met continuing education hours for re-certification. She participated in the triadic communication group by using sign language to interpret information between the general education teacher and the D/HH student and she voiced student responses. She participated in the social validity survey after the data were collected.

Administrators. The principal of the early childhood school and a coordinator for the D/HH program participated in this study. They completed the social validity survey as stakeholders. To aid in future development of the D/HH program, participating administrators received the results of this study.

Participant Selection

The researcher used convenience sampling for participant selection. To obtain consent, parents were contacted through the mail by a third-party, impartial researcher who did not know the families. The school district gave permission for this study to be conducted.

Setting

The setting for this study was a mainstream classroom in an early childhood building. There were 20 at-risk general education three- and four-year old students in this classroom. One general education teacher and one paraprofessional who did not know sign language, one ToDs, and one educational interpreter were in the room. Three levels of instruction occurred simultaneously: (a) large group play with monitoring from the paraprofessional, (b) small group instruction with the general education teacher and sign language interpreter (triadic), (c) small group instruction with the ToD using total communication (dyadic). The triadic and dyadic groups were taught during center times to make the noise levels as similar as possible. Students wore their personal amplification devices such as cochlear implants and hearing aids during the study. Prior to this study, participants in both groups had weekly access to the environment. The setting for generalization data was the self-contained deaf education classroom with the dyadic teacher in limited background noise.

Materials

For the purposes of this study, two games with the same rules and different word sets were used in the triadic and dyadic conditions. The games had the same rules for play so the same teacher script could be used for procedural fidelity. The same number of target vocabulary words was included in each game with the only difference being the words themselves. The MacArthur Bates CDI Words and Gestures List (Fenson et al., 2007) has several vocabulary categories which include: sound effects and animal sounds, animals, vehicles, toys, food and drink, clothing, body parts, small household items, furniture and rooms, outside things, places to go, people, games and routines, action words, descriptive words, words about time, pronouns, question words, prepositions and locations, quantifiers and articles, helping verbs, and connecting words. The first 100-word list published in *Teaching Activities for Children who are D/HH: A Practical Guide for Teachers* (Moog, Stein, Biedenstein, & Gustus, 2003) had similar categories. These vocabulary lists were used as a reference to select and create a game.

A search on Amazon.com was conducted using the keywords *preschool* AND *games* yielding a result of 31,491 to see if two games existed that were exactly the same with only vocabulary words differing. The first 100 games were reviewed and analyzed. Important features found in several of the games included rules of the game, turn taking, understanding of the vocabulary, and matching. Some games would be similar emphasizing clothing words or food words, but no two games were the same as required for this study.

Therefore, two games were created based off a game by Orchard Toys called *The Lunch Box Game* (Orchard Toys Ltd., 2007) found on Amazon. In the original game, a child (1) selects a card, (2) looks at the picture to see if that food item is in their lunchbox, and (3) if the item is in

their lunchbox, they match the card, if not, they place the card back in the pile. The game continues until both of the players fill their lunchboxes.

Based on the frequency of exposure, the food category from MacArthur Bates CDI Words and Gestures List (Fenson et al., 2007) was selected for target vocabulary. A "Lunch Box" game (Orchard Games, Ltd., 2007) was modified from the original game to include words from the MacArthurBates CDI Words and Gestures List (Fenson et al., 2007).

Picture cards were printed to represent the 60 words on the MacArthur Bates List for baseline testing. Following baseline testing, 20 words with the most incorrect responses for all participants were selected for the games. Each game contained ten target vocabulary words split across two lunchboxes. Games stayed in the dyadic and triadic groups and word lists did not change across the intervention sessions.

Other materials used during the study included video recording devices to check for data and procedural reliability. Each teacher had a laminated copy of the script for reference. A bag of fruit snacks was given to each group for student motivation and the compensatory reward when students were finished.

Response Definitions and Data Collection

The target behaviors were the correct receptive identification and expressive labeling of the target vocabulary words. The researcher watched video recordings daily to record data. Recording procedures involved direct systematic observational recording with event recording, using a + to represent correct response and – to record an incorrect response.

General Procedures

Each D/HH student received instruction in either a dyadic or triadic condition once per day for five days a week until ten sessions were reached or the study ended. Receptive and

expressive data collection occurred before each session started. A group comprised of one D/HH student and one hearing peer then received instruction for the game from either the ToD using total communication (dyadic) or the general education teacher and the interpreter (triadic). Each group played the game until all words were stated in the script. Once the game was played and all ten vocabulary words were selected, then the session was complete and hearing peer returned to center play. D/HH students stayed to complete post-test data collection. One round of game play equals one session. These games were intended for three-year-olds and four-year-olds and should be completed quickly so students will not fatigue. Data was collected for two to three weeks for a total of 8-10 sessions and one generalization probe three days after the final data day. Each student received a choice of fruit snack when the game was finished as reinforcement.

D/HH students, peers, and teachers all returned consent forms and video release forms so that data could be analyzed after sessions were completed (*Appendices E* and *F*). The session type a D/HH student started in (dyadic versus triadic) was determined based on the day permission form was turned in and availability of teachers within the alternating treatment design. The games and teachers were counterbalanced within the student participant groups. Students played the same game with the same teacher for the entire session and then counterbalance occurred with the next student for a different game and different teacher.

Generalization Assessment Procedures

Each D/HH student participated in one generalization session after intervention concluded. Dyadic or triadic communication was used during generalization based on optimal conditions during intervention. Twenty real and pretend objects representing the words from the triadic and dyadic word list were used for generalization. The teacher put five foods on the table and informed the child that ____food item was on her grocery list. The child had to find the item

and ring it up on the cash register and then put it in the grocery bag. The teacher kept a field of five objects on the table at all times. Once the grocery list was complete, the student and teacher pretended to drive home. Then students pulled one item at a time out of the grocery bag to "unpack" the food and put it in the fridge. The D/HH student was asked to expressively state the name of the food as s/he unpacked the bag. Data was collected through video analysis regarding the receptive and expressive outcomes of the dyadic and triadic word lists.

Analysis Procedures

Data was recorded daily through observing video recordings on receptive and expressive vocabulary and procedural fidelity. Visual analysis was used to analyze the efficiency and effectiveness of this study. The graphs of individual student data across sessions was used to communicate outcomes of this study through analysis of mean, range, level, variability, over-lapping data, and efficiency of effect. The graphic display of information is the primary form for research decisions, judgments, and conclusions of data in SCD (Gast & Ledford, 2014). Furthermore, for this study, consistent separation of data between conditions provided support for success of one condition over the other. Line graphs were used to display data visually per student. IOA agreement for data and procedural reliability was also analyzed. Treatment reliability for each session per condition also gave important data regarding the fidelity of this study.

Social Validity

Social validity data was collected at the end of the intervention from the general education teacher, sign language interpreter, ToD, and two administrators. The adults rated statements using a Likert Scale on several topics: (a) the importance of learning vocabulary words related to playing a game for three- and four-year-olds, (b) social acceptance of learning

games at three and four years of age, (c) acceptance of using a sign language interpreter, and (d) social acceptance of using sign language to communicate with young D/HH students. There was also one open-ended question asking, "Do you perceive direct (dyadic) or indirect (triadic) communication to be more effective in teaching language to young D/HH children? Data collected from the Likert Scale was reported by mean responses to each question. Qualitative data from question five was analyzed, coded, and reported by themes. Questionnaires for social validity can be found in *Appendices G*.

Chapter Summary

In order to answer questions related to the vocabulary development obtained through dyadic verses triadic communication contexts in the preschool setting, a systematic research design was created. Adaptive alternating treatment design (AATD) under single subject design (SSD) was used to compare the acquisition to goal effectiveness between both groups. The receptive and expressive vocabulary development of young D/HH peers was assessed. Eight to ten alternating treatment sessions were used in a three-week time frame with a generalization probe occurring three days after the last data day. The triadic group was taught by the general education teacher with the sign language interpreter. The dyadic group was taught by the ToD directly communicating using total communication with the D/HH child. One hearing peer was utilized to help support game play with a counterbalanced game related to foods. IOA was collected for data and procedural reliability at 20% of all conditions and participants. Treatment fidelity was collected for each session. Social validity was obtained through an online survey with stakeholders.

CHAPTER IV: ANALYSIS OF DATA

The purpose of this adaptive alternating treatment design was to investigate the efficiency and effectiveness of how young D/HH children learn target vocabulary from a ToD using total communication (dyadic communication group) verses from a general education teacher using a sign language interpreter (triadic communication group). This chapter contains the results of the data collected from the dyadic and triadic communication groups for young D/HH children acquiring new vocabulary. Data will be presented systematically related to the research questions of the study.

Pre-baseline data was collected on all four D/HH students to select a word list with food vocabulary from the MacArthur Bates CDI Words and Gestures List (Fenson et al., 2007). All four students met criterion established in the methodology section with receptive and expressive scores falling below 30% for the twenty words that were used for the game.

Table 7

Baseline Criteria Scores

Student	Receptive Score	Expressive Score	Total Percentage
Isaac	20%	0%	20%
Beth	20%	10%	30%
Hannah	30%	0%	30%
Ryan	20%	0%	20%

Data were analyzed through visual analysis using level and variability (Horner et al., 2005) to compare dyadic and triadic communication groups for the first three research questions: (a) speed to goal of acquiring receptive vocabulary, (b) speed to goal of acquiring expressive vocabulary, and (c) effectiveness of dyadic verses triadic communication groups. Social

validation through survey and qualitative data were used to answer the fourth research question regarding perceptions of stakeholders and this study.

Research Questions 1 and 2

1) Do young D/HH children have a greater speed to goal acquisition of receptive vocabulary in dyadic or triadic communication contexts?

2) Do young D/HH children have a greater speed to goal acquisition of expressive vocabulary in dyadic or triadic communication contexts?

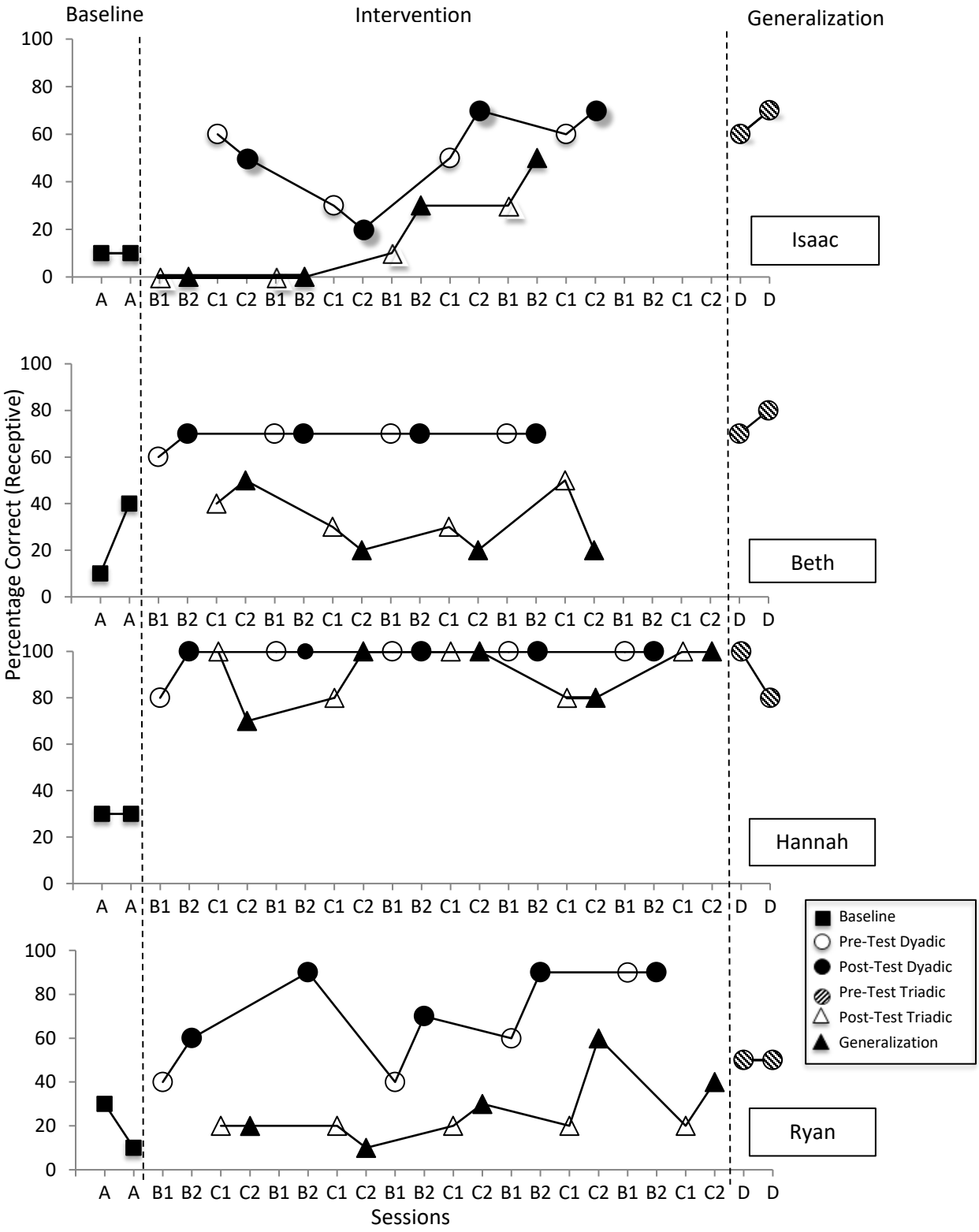

Figure 3. Receptive language scores across participants.

Note: A was baseline data for dyadic word list and triadic word list. *B* and *C* were the first and second conditions in AATD. *1* was the pre-test conducted prior to game play. *2* was the post-test conducted after game play. D stood for the generalization condition which used dyadic communication for both dyadic and triadic word lists.

Isaac receptive language. Visual analysis of receptive language scores in the dyadic communication group for Isaac reveal a slightly variable level with a decrease in scores for pre-test and post-test for session four and then an increase in scores beginning in the third dyadic session. Receptive dyadic pre-test and post-test scores produced a mean of 51.25%. There was a pronounced increased slope from 20% to 70% between sessions four and six with the data becoming level at 70% for session eight. Dyadic communication condition had no overlapping data points. Isaac's scores from triadic communication had raise in scores at session five and seven from 10% to 40% after the first two sessions revealed 0%. Mean score for triadic condition was 17.5%. Total range for Isaac in the triadic group was 0%-50%.

Isaac reached and maintained his highest score in the third dyadic communication session for receptive language with a score of 70%. He reached his highest score in the fourth triadic session with a score of 50%. The rate it took to acquire his highest score was faster and higher in the dyadic communication group. A generalization probe occurred three days after the last session. The generalization phase was delivered via dyadic communication to play a "grocery store" scenario with real and pretend foods of the twenty vocabulary words learned in both dyadic and triadic communication groups. Isaac's generalization probes for receptive language for both dyadic and triadic word lists were 60% and 70% respectively.

Beth. Receptive language scores for Beth were stable at 70% by the second dyadic session. There were stable data and no overlapping data points. Triadic communication sessions for Beth's receptive language pre-test and post-test had a mean of 32.5%. The dyadic condition resulted in the most efficient and effective receptive language score for Beth. Data stability was reached by the second dyadic session at 70% correct. Generalization probes were implemented by the ToD using dyadic communication with pretend and real foods from the dyadic and triadic

word lists. Generalization occurred at 70% for the dyadic word list and 80% for the triadic word list.

Hannah. Hannah had receptive language scores in the dyadic communication group at 80% correct with an increase to 100% by the post-test in the first session. Stability was reached with no variability at a consistent level of 100% accuracy for the proceeding sessions. Mean for dyadic condition was 98% with a range of 80%-100%. Hannah had variability in data for the triadic communication condition. Although the first session in baseline achieved a score of 100%, the fluctuating data shows variability with the last session ending at 80%. Mean for triadic sessions was 91% with a range of 70% to 100%. Dyadic communication was used for the generalization probe with Hannah. Generalization of dyadic words was at 100% and triadic word list scores were at 80%, consistent with intervention scores.

Ryan. Receptive language scores in dyadic condition for Ryan began at 40% for the first session and increased to 60% for the post-test score. No data point was available for the dyadic session two pre-test because the teacher forgot to collect baseline scores that day however, post-test scores were collected at 90% accuracy. The third dyadic session had a lower score for pre-test at 40% and 70% for post-test. Pre-test scores went down to 60% for the fourth dyadic session and data began to reach stability, leveling at 90% for the next three data points. Mean score for receptive dyadic condition was 70% with a range of 40%-90%. Triadic condition receptive language scores were level at 20% the first three data points and dip to 10% for session two post-test. Data increased slightly to 30% post-test in session 3 before it dropped to 20% for pre-test session four and then increasingly sloped to 50% for post-test session four. Scores decreased to 20% for pre-test session five and increased to 40% in post-test data scores. Mean score in triadic condition was 26% with a range of 10%-60%.

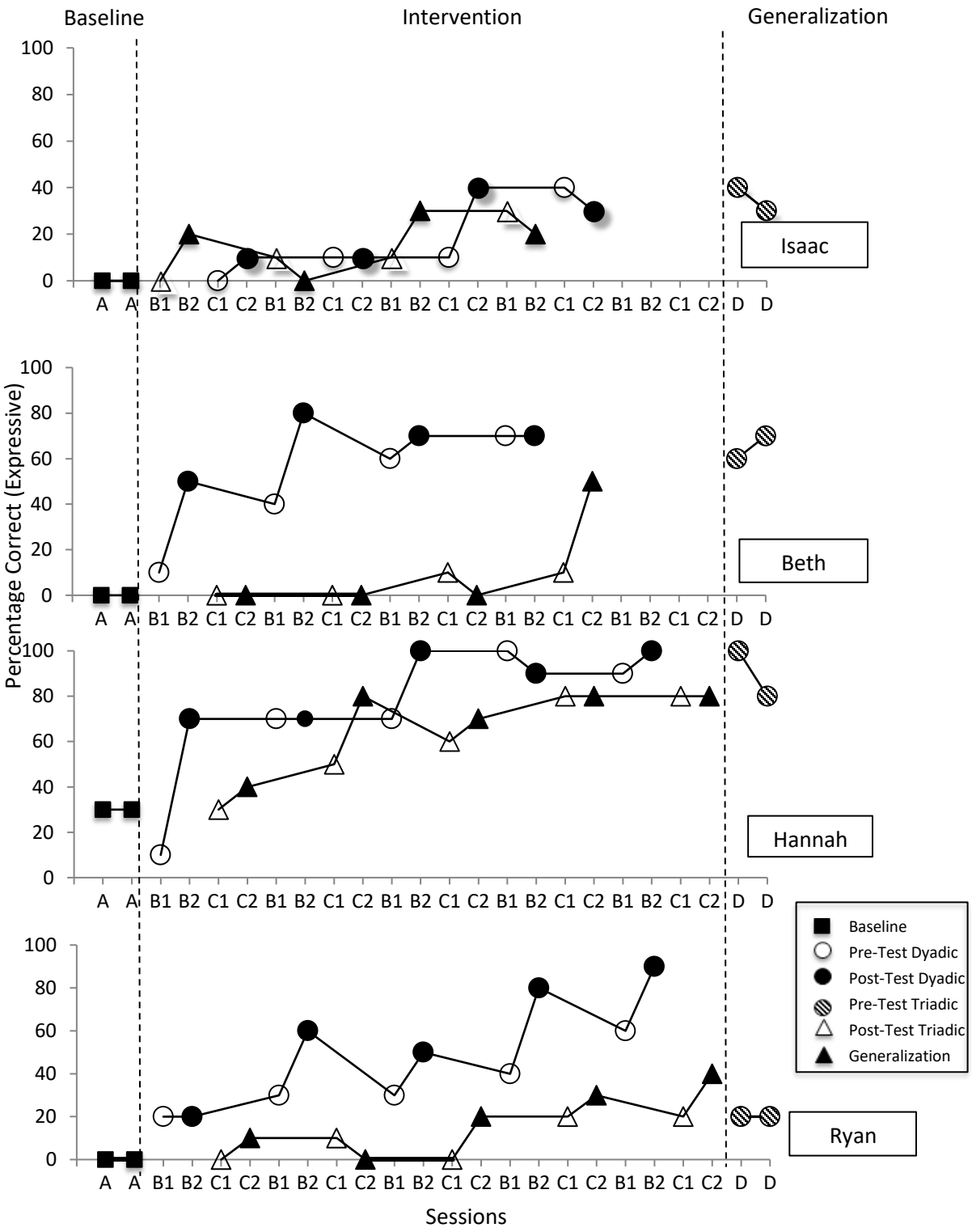

Figure 4. Expressive language scores across participants.

Note: A was baseline data for dyadic word list and triadic word list. *B* and *C* were the first and second conditions in AATD. *1* was the pre-test conducted prior to game play. *2* was the post-test conducted after game play. D stood for the generalization condition which used dyadic communication for both dyadic and triadic word lists.

Isaac expressive language. Isaac's expressive language scores for dyadic communication group have a mean of 18.8% with a gradual slope to 10% for the first three dyadic sessions and then an increase to 40% for the last session. His range in dyadic communication was 0%-40% which is significantly lower compared to his receptive vocabulary score. Isaac's expressive language scores for the triadic communication group were also lower than his receptive scores. Range for triadic expressive scores was 0%-30% with a mean of 15%. Similar to the dyadic condition, the data in the triadic condition did not start to increase until the post-test of the third session.

Isaac's highest score occurred in the third session in the dyadic group with a score of 40%. In the triadic communication sessions, he reached his highest score of 30% in the third triadic session. The dyadic score was slightly higher and also showed less variability. The generalization condition was conducted using dyadic communication with the ToD. Isaac's expressive generalization scores were consistent with his highest dyadic and triadic scores in intervention. He correctly labeled 40% on the word list from the dyadic condition and a 30% from the words in the triadic phase.

Beth expressive language. Expressive language scores in the dyadic condition start at 10% and rise steadily with an increasing to 80% by the end of the third session and level off at 70% for the last two sessions. There is little variability in data but an overall upward slope and no overlapping data. Mean for dyadic condition was 56.3% with a range of 10%-70%. Beth's expressive language scores in the triadic condition began at 0% for the first two sessions (session 2 and session 4), increased to 10% for the third session pre-test, and then decreased back to 0% for post-test. A steep increase from 10% during pre-test to 50% at post-test occurred in the last

session. The mean for expressive triadic condition in intervention phase was 8.75 with a range of 0%-50%.

The dyadic condition appears more efficient and effective for Beth than the triadic condition. The ToD conducted the generalization probe using dyadic communication. Scores for the expressive language generalization probe were 70% on the dyadic word list and 50% on the triadic word list. These scores were consistent with dyadic expressive intervention scores but significantly higher than triadic expressive intervention scores.

Hannah expressive language. Hannah's expressive language scores for dyadic communication had an increasing slope with a prominent jump from the first dyadic pre-test assessment at 10% to 70% for the post-test score in session one. Hannah's scores increased with an overall mean of 77% and a range of 10%-100%. The data continued to increase with minimal variability. There was one point of overlapping data between dyad and triad conditions. In the triadic condition, Hannah had a gradually increasing slope from 30% to 70% with the fourth post-test session overlapping the dyadic line at 80%. Mean for triadic condition was 61% with a range of 30%-70%.

Generalization phase for Hannah's expressive scores was conducted using the dyadic condition. Words from the dyadic list were generalized at 90% and words from the triadic list were reached at 70%.

Ryan expressive language. Expressive language scores for Ryan in the dyadic phase began at 20% for pre-test and post-test in session one. Scores increased steadily with a range of 20%-90% and slight regression dips for pre-test scores from the previous post-test scores the day before. Mean score for dyadic expressive vocabulary was 48%. Triadic condition had a gradual increase with a range of 0%-40%. There was also slight variability related to post-test scores

dipping back down for the next day and the pre-test assessment. Mean for triadic communication was 15%. No overlapping data occurred between dyadic and triadic conditions.

Although both dyadic and triadic conditions resulted in increase in vocabulary acquisition, dyadic had a more effective outcome achieving scores at 90% accuracy compared to 40% in the triadic condition. Therefore, the generalization probe used optimal communication outcome with dyadic condition and a ToD to collect data for receptive and expressive vocabulary during play. Ryan expressively labeled 20% for both word lists.

The non-overlapping data in nearly every graph for participant's receptive and expressive scores, show the dyadic condition as optimum because higher outcomes were achieved. Some of the rates of acquiring new information were similar, however the percentage correct was higher in dyadic. Hannah and Isaac were the only students that showed some overlapping data. Isaac reached a higher total percentage correct in expressive dyadic than expressive triadic when overlapping data occurred. Hannah had some overlapping data but there was some variability in triadic level whereas the dyadic level was stable.

Research Question 3

3) Does the dyadic or triadic communication group appear to have more effectiveness for vocabulary development?

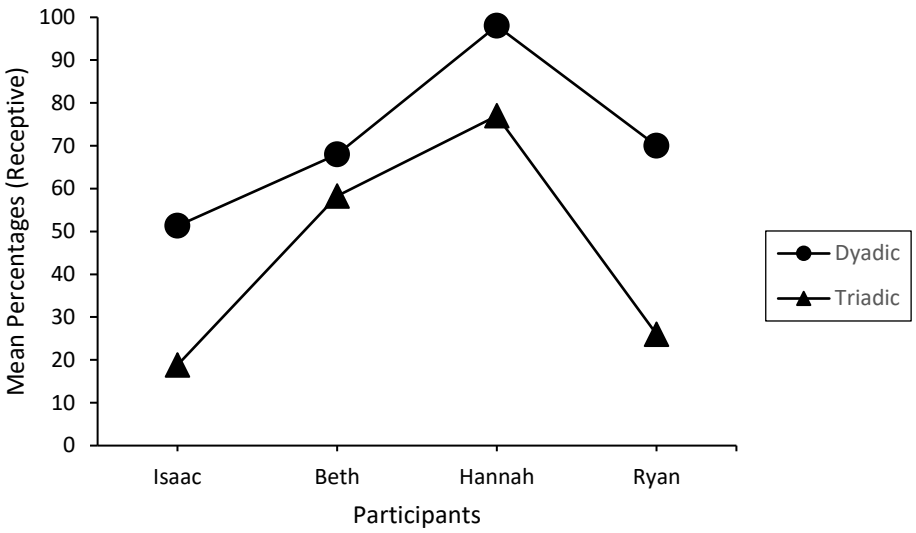

Figure 5. Overall mean percentages for receptive language per condition.

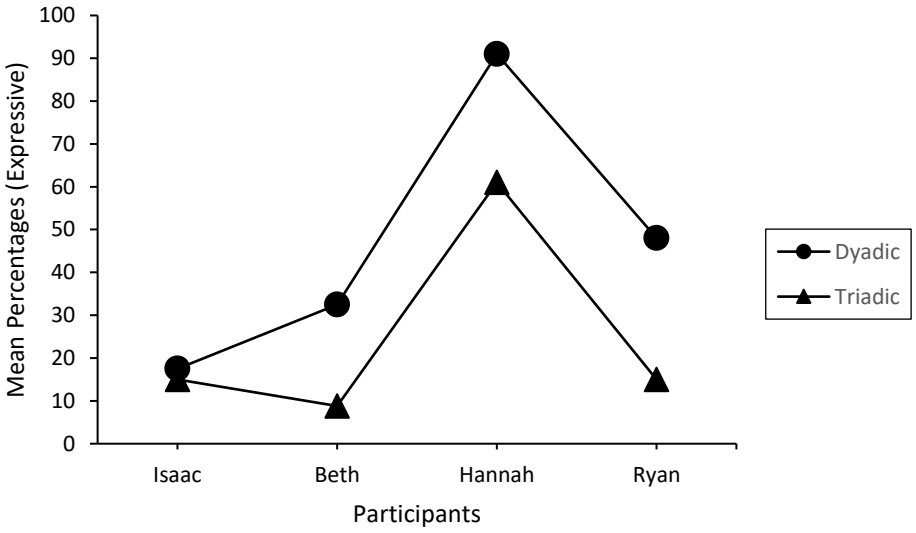

Figure 6. Overall mean percentages for expressive language per condition.

Although individual participants have varied degrees of differences, each participant had a higher mean percentage in the dyadic communication condition for both expressive and receptive language (See *Figures* 5 and 6*).* The overall totals in receptive vocabulary of 71.8% for dyadic and 45% for triadic reflect the superior group as dyadic. Expressive communication

also showed dyadic communication as optimal with 47.3% as the dyadic total and 25% as the triadic total.

Social Validation

Research question four addressed the social validity of this study: Do stakeholders perceive this study as meaningful for young D/HH children? A survey was conducted with the teacher of the deaf, general education teacher, sign language interpreter, D/HH program coordinator, and principal of the school to answer this research question. Results are presented in Table 8.

Table 8

Social Validity Results

Question	S1	S2	S3	S4	S5	*M*
1. How would you rate the importance of learning vocabulary words through playing games for three- and four-year-olds?	4	4	4	4	4	4
2. How socially appropriate do you think playing a game is for three- and four-year-olds?	4	4	4	4	4	4
3. How would you rate the importance of using a sign language interpreter with young D/HH students to acquire academic skills?	4	4	3	4	4	3.8
4. How socially acceptable do you feel it is to use sign language to communicate with young D/HH students?	4	4	4	4	4	4

Social validation survey was sent through email to stakeholders in the study. Five out of five participants responded to the survey and results are shown in Table 9. The mean score for questions one, two, and four were all M=4, which is the highest score of importance. The mean score for question three was M=3.8.

A fifth question was posed in the survey as an open-ended question giving stakeholders an opportunity to write more descriptive feedback. Four out of five participants choose to answer this question. The question posed asked, “Do you perceive direct (dyadic) or indirect (triadic) communication to be more effective in teaching language to young D/HH children?” When responses were coded all participants supported dyadic communication and three themes

emerged in their explanations: (a) time, (b) access, and (c) role of interpreter. Stakeholders discussed how the time it takes for back-and-forth communication seems more efficient if you are not using another person to translate a message. With the age of children and limited attention to task, optimal use of giving "in the moment" feedback with eye contact and communication was mentioned. One stakeholder discussed the concern of lag time creating confusion from the time the spoken message reaches the child through the interpreter. She stated:

Direct (dyadic) seems to be the more effective way for D/HH children to acquire language as they are learning the information directly from the source. There is no lag time between what they may be hearing and what they are seeing and any corrections in the child's language or behavior can be done in the moment with no lag time creating less confusion.

Another theme from question five was access to information. Stakeholders shared that communication, comprehension, and language development were difficult for young D/HH children. Several stakeholders thought direct access to information would be easiest for young children. Maintenance of eye contact was also conveyed as easier in a dyadic context.

The role of the interpreter with young D/HH children was the last theme. One concern noted the need to clarify the role of the interpreter as different than the traditional role. Others wrote about the complexity of understanding how interpreters are not signing their own thoughts. One stakeholder wrote:

> I see how dyadic is more effective. I don't feel that they understand at the preschool level, that an interpreter is taking information from another source and is signing what that person said. I think that most preschool students see the interpreter as someone else that is giving information, rather than a conduit for communication. I feel that the role of

an academic interpreter, especially in the younger grades, is something that needs to be redefined.

The themes all support the perception from stakeholders that dyadic communication was a more effective way for teaching young D/HH children. Responses from the survey support the usefulness and importance of investigating triadic verses dyadic communication in this study.

Interobserver Agreement

Data reliability. Consistency across observers in recording students' responses to pre-test and post-test data was measured by interobserver agreement (IOA). Data reliability is important to control for the threat of instrumentation for internal validity of the study. IOA provides a way to guard against human error and observer bias. For this study, 20% of all conditions for each participant were coded by two co-observers. Table 10 has results for data reliability using IOA. Percentage of total agreement was found using the point-by-point method calculating the number of agreements, divided by the number of agreements plus disagreements, and multiplying by 100. IOA for percent of total agreement was between 90%-100% for all participants in all conditions. Percent of occurrence agreement and non-occurrence agreement are also listed in Table 9.

Table 9

IOA for Data Reliability

Student	Skill	Condition	Testing Time	% Total Agreement	% Occurrence Agreement	%Non-Occurrence Agreement
Isaac	Receptive	Dyadic	Pre	90%	80%	80%
			Post	100%	100%	100%
		Triadic	Pre	100%	0%	100%
			Post	90%	0%	90%
Beth		Dyadic	Pre	100%	100%	100%
			Post	100%	100%	100%
		Triadic	Pre	100%	100%	100%
			Post	100%	100%	100%
Hannah		Dyadic	Pre	100%	100%	100%
			Post	100%	100%	100%
		Triadic	Pre	100%	100%	100%
			Post	100%	100%	100%
Ryan		Dyadic	Pre	90%	75%	86%
			Post	100%	100%	100%
Ryan		Triadic	Pre	100%	100%	100%
			Post	90%	50%	89%
Isaac	Expressive	Dyadic	Pre	100%	0%	90%
			Post	100%	100%	80%
		Triadic	Pre	100%	100%	100%
			Post	100%	0%	100%
Beth		Dyadic	Pre	90%	0%	90%
			Post	100%	100%	100%
		Triadic	Pre	100%	0%	100%
			Post	90%	0%	90%
Hannah		Dyadic	Pre	100%	100%	100%
			Post	100%	100%	100%
		Triadic	Pre	100%	100%	100%
			Post	100%	100%	100%
Ryan		Dyadic	Pre	100%	100%	100%
			Post	100%	100%	100%
		Triadic	Pre	90%	0%	90%
			Post	100%	100%	100%

Treatment fidelity agreement. IOA was also calculated for treatment fidelity to measure the consistency of collecting data for teachers adhering to the procedures of the study. Overall percent agreement for procedural reliability was between 95%-100%. Co-observer data was analyzed for 20% of sessions for each participant in both condition. The scores for treatment fidelity help provide internal validity for this study. See results in Table 10.

Table 10

IOA for Treatment Fidelity

Student	Condition	Testing Time	% Total Agreement	% Occurrence Agreement	%Non-Occurrence Agreement
Isaac	Dyadic	Procedures	100%	100%	100%
		Script	100%	100%	100%
	Triadic	Procedures	97%	97%	0%
		Script	95%	95%	67%
Beth	Dyadic	Procedures	100%	100%	100%
		Script	100%	100%	100%
	Triadic	Procedures	100%	100%	100%
		Script	100%	100%	100%
Hannah	Dyadic	Procedures	100%	100%	100%
		Script	98%	98%	0%
	Triadic	Procedures	100%	100%	100%
		Script	96%	96%	60%
Ryan	Dyadic	Procedures	100%	100%	100%
		Script	98%	98%	83%
	Triadic	Procedures	100%	100%	0%
		Script	98%	91%	83%

Procedural Reliability

After every session, one reviewer coded each video recorded session for teacher behaviors of following the steps on the script and reliability of following the script. Table 11 shows the procedural reliability for each participant, both conditions, and each session. Since videos were reviewed nightly, if a percentage fell below 90%, retraining occurred with the teacher and scores increased for the next session.

Table 11

Overall Procedural Reliability

Student	Condition	Procedure	Procedural Reliability Per Session in Percentages									
			1	2	3	4	5	6	7	8	9	10
Isaac	Dyadic	Steps		100		100		100		100		
		Script		100		99		100		100		
	Triadic	Steps	100		98		98		100			
		Script	77		97		100		99			
Beth	Dyadic	Steps	100		100		100		100			
		Script	100		100		100		100			
	Triadic	Steps		98		98		98		98		
		Script		100		100		98		100		
Hannah	Dyadic	Steps	100		100		100		100		100	
		Script	87		99		99		100		100	
	Triadic	Steps		100		98		98		98		98
		Script		93		95		100		97		96
Ryan	Dyadic	Steps	100		78		100		100		100	
		Script	100		100		100		100		100	
	Triadic	Steps		98		98		98		98		98
		Script		92		100		100		97		100

Chapter Summary

Results of language acquisition through dyadic and triadic communication conditions in an adapted alternating treatments design study were presented in this chapter. Research questions one and two regarding speed to goal acquisition of receptive and expressive language through dyadic and triadic contexts were addressed through visual analysis of graphs. Data in graphs indicated that dyadic communication context had greater speed to goal acquisition in both receptive and expressive skills through visual analysis of mean percentages, level, and variability. Tables showing mean percentages, range, and session acquisition of highest score were used to address research question three. The tables indicated the dyadic context to be more effective in developing vocabulary with young D/HH children. Stakeholders participated in a survey to collect data regarding research question four and social validation for this study. Results indicated that stakeholders perceived this study as useful and believed dyadic was a

superior condition for teaching young D/HH children. Interobserver agreement (IOA) was used for both data reliability and procedural fidelity agreement. Data IOA was at 90% or higher for 20% of all conditions for all participants. Procedural fidelity agreement was at 95% or higher for 20% of all conditions for all participants. Procedural reliability for all sessions was calculated daily throughout the session for internal validity. Most sessions were 90% or higher and if a session fell below 90%, retraining occurred with the teacher. A summary of findings will be discussed in the next chapter.

CHAPTER V: SUMMARY AND RECOMMENDATIONS

This chapter includes a summary and discussion of several important findings from this study. Additional findings, limitations, and recommendations for future research will also be presented.

Placement options for children who are D/HH have changed over the years with increasing support from legislation for inclusion with laws such as IDEA (2004), supporting the least restrictive environment (LRE). The Gallaudet Research Institute (GRI, 2009) reported the population of D/HH children ages three-five comprise 6.5% or 2,415 students of the total D/HH population. The GRI listed placement options as special center or school, general education school setting with hearing peers, self-contained classroom in general education school setting, a resource room, or home. It is unknown where the majority of the 2,415 students between the ages of three-five years of age are receiving instruction. However, the GRI also reported that 57.1% of total D/HH students received instruction in the general education classroom with hearing peers. Furthermore, of the support services given to the total population, 4,158 students (21.9%) received sign language instruction and 2,599 students (6.5%) received sign language translation (GRI, 2009). Rose (2002) suspected that most D/HH preschool students received instruction in self-contained placements because of the intense language needs of students and lack of availability for inclusive placements. Current research was unavailable to prove these suspicions. There is speculation that many areas who do not have self-contained preschool placements are assigning sign language interpreters as a support to develop language in young D/HH children. The scarceness of research to support acquisition of language through the use of

a sign language interpreter in young D/HH children lead to this study of dyadic (direct) communication verses triadic (indirect) communication.

Four D/HH children between the ages of three to five participated in this study with two hearing peers, one teacher of the deaf (ToD), one general education teacher, and one sign language interpreter. An adapted alternating treatments design was used to answer research questions regarding the acquisition of receptive and expressive vocabulary in two communication groups: dyadic communication and triadic communication. Dyadic communication was defined as the ToD using total communication to sign and voice her own thoughts and opinions simultaneously with D/HH student. Triadic communication was defined as the sign language interpreter translating what the general education teacher is saying to the D/HH student. Social validation surveys from stakeholders (ToD, general education teacher, sign language interpreter, D/HH coordinator, and principal) answered the fourth research question. Findings and discussion below will provide details regarding the outcomes of this study.

Findings and Discussion

Summary of research questions one, two, and three. The first three research questions aimed to identify whether instruction in dyadic or triadic communication groups had a greater speed to goal outcome on acquisition of receptive and expressive vocabulary. The effectiveness of triadic verses dyadic was addressed in the third question. Receptive and expressive vocabulary pre-tests and post-tests were conducted in baseline and at the beginning and end of every session. Each session included an age-appropriate preschool memory and matching game to learn new food vocabulary. Both the general education teacher and deaf education teacher read the same script while collecting pre- and post-test data and playing the game. Each teacher

had to state the new vocabulary word four times throughout a child's turn to expose the child to the new vocabulary through game play. IOA was collected for data reliability and procedural fidelity. Data were visually analyzed through graphs with focus on level and variability. Mean percentage of pre-tests and post-tests, range, and efficiency of effect were also presented as data to conclude that the dyadic condition was superior for acquiring both receptive and expressive language for all four participants at a faster or equivalent rate.

Discussion. The dyadic condition had more stable data, higher outcomes, and achieved acquisition faster for all participants. One possible explanation is the relational aspect and immediacy of feedback given through dyadic communication. Immediate reciprocal back-and-forth communication with one person makes acquiring new knowledge from one source simple. Building relationships with children at a very young age is critical to developing trust and social emotional stability (Hemmeter, Ostrosky, & Fox, 2006). The direct communication through dyadic conversation sets a foundation for socialization and learning.

In the triadic communication group, the D/HH children did not have immediate access to the teacher because what they were signing had to be interpreted through the interpreter and vice versa. Through observing video recordings, even within the triadic communication group, several of the young D/HH participants were seeking feedback and communication from a dyadic partner, the sign language interpreter. There were several occurrences when the D/HH participant signed something directly to the sign language interpreter that was unrelated to the game. For example, one student signed and voiced to the interpreter, "Game all done, go back to class. Time for lunch." The interpreter responded back to the D/HH child and signed /YES/ and the general education teacher either did not even know the conversation took place or chose to ignore it. Conversely, the hearing peer used spoken language directly with both teachers. When

a comment was made in the dyadic group, the teacher immediately understood the child, responded, and moved on. There was efficiency in the dyadic teacher directly understanding the child.

Another additional observation in the dyadic group verses the triadic group was the amount of eye contact. D/HH children in the dyadic group looked directly at the teacher of the deaf to receive the message. They had access to both visual sign language and facial speechreading while the teacher was talking. In the triadic group, D/HH children were often looking at the general education teacher and missing the visual input from the sign language interpreter. Lag time also impacted student's ability to access the speech input and facial features of speech reading from the general education teacher while getting visual input from the interpreter. The general education teacher used a faster rate of speech to say the word four times per turn, impacting lag time and the efficiency of interpreting the message. Furthermore, students with hearing aids and cochlear implants sometimes relied on listening to the general education teacher and misheard a word. Direct back-and-forth communication and feedback along with eye contact reveal some explanation for dyadic being the optimal condition for acquiring new vocabulary.

Summary of research question four. The fourth research question was related to the social validity of the study. Stakeholders who took the survey perceived this study to be important for discovering information related to use of educational interpreters, game play, and communication. They also perceived dyadic communication would be a better condition for teaching young D/HH children. Three themes emerged when an open-ended question was posed and coded using qualitative methods: time, access to information, and role of interpreter.

Discussion. The role of the interpreter in the preschool setting was a theme from stakeholders in the social validation survey. In chapter one, a thorough history of the educational interpreter was outlined. Chapter two identified the sparseness of research regarding use of educational interpreters as a language development strategy. This study supports Seal's (2004) concept of using a sign language interpreter with young children in a "helper role." She explained how educational interpreters actually have to teach the language if children do not have a language foundation. The "helper role" she described actually suggested the interpreter replicating the sentences in first person as though shadowing the teacher. What would happen if the sign language interpreter was allowed to also use speech with sign language in a helper role for children with cochlear implants and hearing aids who were used to total communication? This may not be possible in all contexts but if a child was going to a therapy session with an Occupational Therapist or Speech Language Pathologist, how could the sign language interpreter be used as the dyadic partner more efficiently for support providers who do not know sign? Research identifies that roles do change between young children and older children but little is known about the preschool population. This study shows the children in the triadic condition are not looking at the interpreter as often as in dyadic condition. Furthermore, the data results provide evidence that dyadic is more effective. Therefore, what changes need to be made in educational interpreting with young preschool D/HH children to acquire language and use an interpreter successfully when they are older? What professional development do educational interpreters need on language development of D/HH children?

Reciprocal direct communication with eye contact and speech reading access in one person may explain why the optimal condition was dyadic communication. The attention span,

lag time, confusion of multiple presentations of language through different adults, and developmental levels of preschool aged children could explain less effect in the triadic condition.

Additional Findings

Three main additional findings emerged when observing the video recordings and reflecting on the study: language strategies, teacher behavior, and student behavior. Although these topics were not addressed in the research questions, they provide valuable information.

Language strategies. The lunchbox game and script were created by a ToD and colleagues with applied knowledge and experience of language strategies for teaching D/HH children. Auditory and visual bombardment, repetition, modeling, prompting, recasting, and parallel talk were all included in the script and procedures of playing the game. These strategies have been noted in the literature for language development as successful ways to teach D/HH children (Cruz et al., 2014; DesJardin, 2006; DesJardin et al., 2014; Encinas & Plate, 2016; Leutke-Stahlman, 1992). More specifically, both the dyadic and triadic teacher read a script that had the target word embedded in game play four times. Teacher's said, "What did you get? You got a _____. Do you have a _____ in your lunch box? Yes/No, you do/don't have a _____. Put the _____back in the pile/in your lunch box." This exposure to the word four times proved to be a successful intervention by increasing scores in both the dyadic and triadic conditions. Both groups learned new vocabulary from playing the game in this way.

Training general education teachers about direct instruction and language strategies used with D/HH students may be beneficial. General education teachers could incorporate strategies when interacting with D/HH students in their room. Receiving direct instruction and language strategies specifically for D/HH students when they are in the general education environment and self-contained environment could increase acquisition of language across contexts.

Teacher behaviors. Although both teachers had the same exact script and followed the procedures and script with reliable treatment fidelity, there were some differences in the dyadic and triadic groups. Both teachers followed the procedures of the steps with similar fidelity at 98.8% overall for the ToD and 98.3% for the general education teacher. The ToD in the dyadic communication group appeared more comfortable following the same script saying the exact words for all 20 sessions. The ToD made few changes to get the four target words in each turn. The ToD procedural fidelity for script was 99.1%. The comfort level for the ToD was probably higher due to the background knowledge of language strategies for D/HH children. The general education teacher had a procedural fidelity for script at 96.7%. Although she made sure to say the four target words for procedural fidelity, she adapted the script to what made her more comfortable. She said things like, "Pretzel. You found the pretzel picture! Good job finding the pretzel. Put the pretzel on top." The slight variation of the script led to some variability in the number of times the target word was said per turn. If there had not been a script for this study, the number of times the word was modeled for children would have probably been different between the two groups and less consistently exposed in the triadic group.

Both teachers instinctively directed students to "look" at the receptive field of cards by pointing so they would scan before making a choice. There were a few occurrences where the general education teacher was not really sure if they pointed to the right card but she did not go back and restate the card later to try to get a more clarification. When this happened in the dyadic group, the ToD automatically repeated the questionable word in a later turn to see if it was a correct or incorrect response. Similarly, when students were being tested for expressive vocabulary in pre-test and post-test, the ToD immediately knew if the student was signing the right answer even if their speech was hard to understand. If the ToD did not understand a

student's speech, she asked the student to clarify by saying, "Can you sign it?" This immediate feedback and input helped student's attention to task. If students were unsure of the words, the clarifying questions asked by the ToD seemed to encourage them to try to respond.

When students were engaged in the expressive pre-test and post-test in the triadic group, the general education teacher used limited responses to D/HH students. One response was to put the card down and move on to the next one. Another response was to look at the interpreter for clarification. The last response was to look at the interpreter with an inquisitive facial expression but still move on to the next card. She never asked the student to say it again, sign it, or repeat what they said. The sign language interpreter however, interjected several times by asking students to say it again and sign it. During times when students displayed behaviors (out of seat, not looking at teacher or interpreter, or refusing to take a turn) the general education teacher never addressed behavior. The sign language interpreter instructed the D/HH student to sit down, look, and respond. Although the scripting was exactly the same, the background knowledge teachers had on working with D/HH students appeared to affect the comfort level of the teacher while implementing the study. Providing training to general education teacher about basic language strategies for D/HH students could increase comfort level for general education teachers.

Student behavior. Another observation was the behaviors of students related to game play, assessments, and generalization in the dyadic and triadic conditions. During the actual intervention game, both the hearing peers and the D/HH students appeared excited to play the game. One peer even stated on camera, "Yes! I love this game!" There were minor corrections in behavior needed for both D/HH students and peers while playing the game. The corrections were statements to gain a child's attention for their turn or redirecting behavior from a side

conversation back to the game. Two out of four of the sessions for Beth had more significant behaviors during the triadic session of game play. Some of this behavior included out of seat, under the table, and choosing not to participate in her turn. The general education teacher was not sure how to address Beth's behavior and looked to the interpreter for assistance. The interpreter got the researcher to help direct the situation. The researcher coached the general education teacher by having the peer go again and telling the teacher to choose a card for Beth. Then Beth was excited to see if she had those pictures in her lunch box and she was back to playing the game. Beth did not display any of these non-compliant behaviors while she was playing the game in the dyadic group. With the exception of Beth, both D/HH and peer participants had age-appropriate behavior during game play.

Behaviors during pre-test and post-test assessment of receptive and expressive vocabulary provided interesting information. Expressively, the ToD knew right away if the student got the answer right or wrong or if she needed to get clarification. Student behavior reflected the confidence of the ToD and students appeared to be more willing to give some responses or guess if they did not know an answer. Some students when they were in the dyadic group would voice or sign, "I don't know." Beth had some moments of delay in responses but she always remained in her seat and was re-directed by the ToD. Isaac pointed at the pictures when he did not know the answer, the ToD corrected this behavior by saying, "No, tell me," and the behavior subsided. Ryan had some impulsivity when he was in the receptive phase and in the expressive phase he sometimes named foods that were not from the dyadic word list such as /HOT DOG/ in the beginning sessions. Session two pre-test was the last time a random food was used.

In the triadic group during pre-test and post-test, different responses were seen for different participants. When Isaac was shown a picture during expressive vocabulary assessment, he would touch the picture repeatedly if he did not know the answer. The general education teacher would then move the picture to the side, and expressed that she thought maybe he needed more time to think of the word. This behavior continued for all the pre-test and post-test assessments when he did not know the word. Beth's out of seat behavior increased when she was in the testing phase of the session and was significantly worse during the post-test phase. Her age and lack of interest in the assessments when she was in triadic seemed to attribute to this out of seat behavior. She appeared to not know the words or have comprehension of what she was supposed to do. However, she scored 80% in generalization phase for receptive language with triadic words and 70% for expressive words. She scored similarly for generalization phase with words from dyadic communication but there was no out of seat behavior exhibited during the dyadic testing. When Ryan was in the triadic communication group for testing and did not know a word, he gave an unrelated response for the first two sessions. For example, when shown a picture of a melon he signed, /ORANGE/ /ORANGE TRACTOR/. Then when he was shown a picture of nuts he signed /ISAAC/, a student in his class. He also signed /BABY DIERKS/, his brother's name, for another food. As the sessions continued he started replacing the random words with actual food words from the word list, although they were often incorrect. Hannah was reserved when in the triadic group and exhibited some avoidance behavior when she did not know the word. When shown a picture of potato chips, Hannah started to count the chips in the picture. Some of the students' behavior when they did not know the word seemed to be to please or entertain the teacher. The general education teacher would often smile or laugh at their responses which seemed to reinforce the behavior they were displaying.

Some of the students had difficulty when the stimuli were auditorily, signed, or pictorally similar. For example, Hannah, who has a severe hearing loss, struggled with the words "toast" and "potato." Both words have a predominant "toe" sound in them. In the same way, the signs are also very similar. The sign for toast is a curved two handshape on the top and back of the hand and the sign for potato is a curved two handshape only on the top of the hand. Moreover, words such as Jell-O and jelly (auditorily similar), potato and potato chips (auditorily and signed similarly), spaghetti and noodles (pictorially and signed similarly), soda and tuna (pictorially similar), raisin and pickle (pictorially similar), butter and cheese (pictorially similar) were paired together. These pairs were on the same words list counterbalanced across conditions to disperse challenging words.

During the generalization phase, three out of four students showed strong generalization abilities. Students used the words they learned for the two-dimensional pictures and generalized them to pretend and real three-dimensional objects. The pictures and objects looked similar but not exactly the same. The three-year-olds in the study, Isaac and Beth, both showed significantly higher scores in the generalization phase with triadic words than they did in pre- and post-test phases. This implied that although they may have learned the words through game play, the attention and motivation for completing the testing phase in triadic may not have been as effective as the dyadic. Ryan had a harder time generalizing some of the pictures to the objects, but his scores were still higher in generalization than in baseline. This was not surprising because in every session, his pre-test scores went down from post-test score the day before showing some regression between phases. Ryan was the only student diagnosed with an additional disability and learning disabilities are commonly associated with Noonan Syndrome. This was an interesting finding and could account for some of the variability in his data for both

triadic and dyadic conditions. Students were very motivated by the grocery store play scenario and excited to find the words on the list and ring them up. The dyadic communication condition was used with all students and no avoidance behaviors or non-compliance behaviors were observed.

Behavior of students seemed to be comparable for most students in both conditions during game play, with the exception of one student. Throughout the pre-test and post-test phase, more non-compliance and avoidance behaviors seem to occur in the triadic phase. However, generalization scores supported vocabulary acquisition in both groups. Younger students scores in the dyadic generalization play of the grocery store scenario reflected higher scores of the triadic word list than the pre-and post-test scores in triadic condition.

Limitations of this Study

Several limitations may have affected the results and interpretations of this study. The word list, exposure to words, time limitation, and sample size all could affect outcomes.

Word list. First, the category of foods as a target vocabulary list was age-appropriate, but it was also one of the most embedded and exposed topics throughout a D/HH preschool curriculum. The students in this study had at least four months of exposure to learning food words and two of the students had longer exposure because of the amount of time in the program. Therefore, when receptive baseline testing occurred, if a word they did not know was paired with three or four words they did know, the field was immediately narrowed and their chances of guessing were better. Unknown words needed to be in a field with other unknown words which was difficult to manage for all four students. Conducting this study closer to the start of the year may have made finding a word list easier.

Exposure to word. Due to the nature of the game, some words were exposed through turn-taking more than others. For example, in Ryan's second dyadic session, the words sauce, cheese, raisin, tuna, and butter were only selected one time because the student had the food in their lunch box when picked. The words pickle, noodles, spaghetti, gum, and soda were exposed two times because they had to be returned to the pile. Varied exposure to the word could affect acquisition. Also, teachers shuffled the cards to vary word card pairings for each session in the receptive field of five. Pictures like spaghetti and noodles were on the same word list. If these pictures were both in the receptive field, sometimes errors occurred because of similarities in pictures. For replication of this study, controlling the field for receptive assessment is recommended. However, as students began to learn the words better, less errors occurred.

Time limitation. The original date planned for implementation of this study was April, two months prior to the end of the school year. Due to delays in approval, participant responses, participant absences, and school breaks, the study began four weeks before the end of school. This adjustment in scheduling required a modification to the maintenance phase of the study. Originally, a maintenance phase of playing the game a month after intervention was planned. Due to time restraints, a generalization phase was substituted and conducted three days post-intervention. A maintenance phase could have provided valuable feedback on the carryover of dyadic condition by testing more sessions in that condition alone at a later time.

Sample size. Due to the small sample size for single subject design, multiple replications of this study need to occur. Internal validity was present with intrasubject replication and intersubject replication. Systematic replication across grade levels and environments would help with generality of this study.

Recommendations for Further Studies

There is a dearth of information regarding the study of dyadic communication verses triadic communication and using a sign language interpreter to support language development with young D/HH children. Recommendations for investigating these topics include triadic and dyadic communication across grade levels, acquisition of more complex skills and different instructional settings in dyadic and triadic conditions, use of educational interpreters and certified deaf interpreters (CDI) as dyadic partners with young D/HH children, and development of instrument for mainstream readiness with an interpreter.

Grade levels. This study provided information that the dyadic condition was optimal for vocabulary acquisition with young D/HH students. However, there may be a point in time where children are able to use the interpreter with success to acquire new vocabulary comparable to a dyadic context. By replicating this study with kindergarten, first grade, and second grade students, information regarding stable data could indicate similar acquisition through triad and dyad. A better understanding of interpreter roles could be defined from studying this topic across the span of grades.

Complexity. This study aimed to study the basic concepts of language starting with vocabulary acquisition. If dyadic was proven to be optimal in vocabulary skill development, what outcomes would occur if more complex concept development was taught in dyadic verses triadic contexts. Furthermore, what if students were taught in different instructional settings like whole group instruction in dyadic verses triadic conditions? How would outcomes change or stay the same if students were using an interpreter to acquire knowledge with twenty other students verses two. What would outcomes be if dyadic communication was used in whole group instruction of twenty students? Additionally, if the instructional environment was free

play at center times, how are D/HH children using the interpreter to support language acquisition? What are the roles of the interpreter in this environment and how does it differ from center time in a dyadic condition?

Interpreters. Currently, some young D/HH students attend occupational therapy (OT), physical therapy (PT), and speech therapy either without an interpreter, or with an interpreter being used in the traditional sense. If young D/HH students are without an interpreter, what are the outcomes of the skills they are learning? Would outcomes improve if an interpreter was present? If they have an interpreter, the therapist is most likely speaking while the interpreter translates the message in the traditional triadic role. However, knowing now that young D/HH children acquire information faster and more affectively in a dyadic context, what would happen if the interpreter was the dyadic partner and the therapist "fed" the interpreter instructions? What if the therapist coached the interpreter with what to say so that only one person was modeling, talking, and signing at a time? How could bringing a dyadic condition to support staff like therapists impact learning for young D/HH children?

There is also potential for research and use of a certified deaf interpreter (CDI) as part of a quadratic condition. A CDI is a deaf person trained to watch the sign language interpreter and then translate information to a D/HH person using native language and concepts in ASL. CDI's would have knowledge of the D/HH child's language levels and adapt the incoming message to sign concepts appropriate for them. CDI's may be especially helpful with students with additional disabilities or general education classrooms with multiple D/HH students with differing language levels.

Instrument. There is limited literature and instruments available for making informed decisions about mainstreaming placement for young D/HH students. Using the procedures identified from this study in dyadic and triadic conditions, an instrument could be designed to assess how students are acquiring language in both conditions. The information from the instrument could be used by IEP teams to determine appropriateness of using sign language interpreter in the general education classroom. Deaf educators could implement the instrument to students to compare acquisition in both conditions for future placement decisions.

Conclusions

This preliminary study explored the use of dyadic verses triadic communication with young D/HH children is just the beginning of a line of research that has limitless potential. Total communication was often criticized as being an incomplete modality for teaching D/HH children. Although total communication is not a language, simply a modality for supporting acquisition of English, the population in most self-contained D/HH classrooms is so diverse that one language such as ASL or spoken English is not realistic for instruction of all the D/HH students in a room. Dyadic communication using total communication in this study was shown to bridge the gap and help D/HH students with cochlear implants and hearing aids comprehend and use spoken language. The triadic communication group had access to full language through ASL, however the young D/HH students took longer to acquire new words and for some students the outcomes were not as high. The triadic group also had access to spoken English by listening to the general education teacher. ASL and spoken English were modes presented to the students simultaneously through dyadic communication, but there was a breakdown somewhere in acquisition compared to the outcomes of the dyadic group. The dyadic group had full access to auditory input along with visual modality through sign language from one person

simultaneously. The background noise in a general education classroom was elevated and may have impacted the access D/HH students had to spoken English from the general education teacher. However, the background noise was exactly the same for both dyadic and triadic groups and important since this is the natural environment students will experience.

The exploration of the sign language interpreter's role in the preschool setting may need further investigation based on the results of this study. Information revealed in Chapter 2 explained educational interpreters have limited training in language development of D/HH children. If interpreters have the potential to be dyadic language partners for young D/HH children, curricular changes to interpreter preparatory programs may be necessary. Furthermore, use of minutes in the mainstream and use of minutes in self-contained D/HH classrooms may also need to be explored. Data supporting the dyadic condition as the optimal condition is just the beginning of collecting information to help make decisions about the use of direct communication through total communication with young preschool children. Special education administrators can use information from this study to make informed decisions about placements and programming.

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APPENDIX A: TARGET VOCABULARY DATA COLLECTION

	Pre-Test- Dyad									
	Session__		Session__		Session__		Session__		Session__	
	Rec.	Exp	Rec.	Exp	Rec.	Exp	Rec.	Exp	Rec.	Exp
butter										
cheese										
gum										
noodles										
pickle										
raisin										
sauce										
spaghetti										
soda/pop										
tuna										
TOTAL										
Percentages										
	Post-Test									
	Session__		Session__		Session__		Session__		Session__	
	Rec.	Exp	Rec.	Exp	Rec.	Exp	Rec.	Exp	Rec.	Exp
butter										
cheese										
gum										
noodles										
pickle										
raisin										
sauce										
spaghetti										
soda/pop										
tuna										
TOTAL										
Percentages										

Name_____

Group: _____

	Pre-Test-Triad									
	Session __		Session __		Session __		Session __		Session __	
	Rec.	Exp	Rec.	Exp	Rec.	Exp	Rec.	Exp	Rec.	Exp
Jell-O										
jelly										
meat										
melon										
muffin										
nuts										
potato										
potato chips										
pretzel										
toast										
Total										
%										
	Post-Test									
	Session __		Session __		Session __		Session __		Session __	
	Rec.	Exp	Rec.	Exp	Rec.	Exp	Rec.	Exp	Rec.	Exp
Jell-O										
jelly										
meat										
melon										
muffin										
nuts										
potato										
potato chips										
pretzel										
toast										
TOTAL										
%										

Name: _____

Group: _____

APPENDIX B: TEACHER SCRIPT

PRE-TEST ASSESSMENT:
Flashcard the pictures and say, "What's this?
Lay 5 pictures out and ask student to "Find the word I say by pointing to it." Find ____.

DIRECTIONS FOR GAME:

"Let's play this game. First you will pick a card that has a picture of a food on it. Then tell me what food it is. See I picked _____. Next you will see if you have this food in your lunch box. If you have it in your lunch box you can put it in. If it is not in your lunch box you have to put it back in the pile. We will play until both lunch boxes are full. When your lunch box is full you will get a fruit snack. Ok let's play!

Your turn to pick a card

"What did you get/draw?"

1. You picked (_____)

2. "Do you have a (_____) in your lunch box?"

3. Yes / No, you have (_____) / you don't have (_____)

4. "Put the (_____) in your lunch box / pile" (Can point to where if needed)

Look at the other student, "**Your turn**"

When the first lunch box is full:

"Look your lunch box is full! You are the winner! (Give student his/her fruit snack)
"Let's see if you can finish filling your lunch box." (Good job, here's your fruit snack)

POST-TEST ASSESSMENT:

Flashcard the pictures and say, "What's this?

Lay 5 pictures out and ask student to "Find the word I say by pointing to it." Find _____.

APPENDIX C: TRAINING OUTLINE

I. Introductions

II. State the purpose of this study and research questions

III. Read and explain the procedures

IV. Read and explain the script to teachers

V. Watch video example created by Co-PI

VI. Practice following script

- A. Pre-test
- B. Game Play
- C. Post-test

VII. Questions and Answers

APPENDIX D: PROCEDURAL FIDELITY

Dyad or Triad Group (circle)	**Session Number**: ___ **Student Initials: _____**	**Observer**: _____

Did you observe the following?	Write + if observed as many times as appropriate Write – if not observed or incorrect as many times as appropriate					TOTAL SCORE
1. Pre-Test Expressive Data: Asked "what's this/that?" or pointed to one card at a time for 10/10 words. (Triadic group must have interpreter present and signing.)	1	2	3	4	5	Out of 10
	6	7	8	9	10	
2. Pre-Test Receptive Data: Asked students to "find ___" or an equivalent word (touch, point, etc.) for 10/10 words in a field of 5 each time. (Triadic group must have interpreter present and signing.)	1	2	3	4	5	Out of 10
	6	7	8	9	10	
4. Read the directions for the game from the script. For triadic group, interpreter must be interpreting while reading for a (yes).	(Circle one) yes OR no					1 or 0
5. Said the target word 4 times per turn for each student (Mark Below) Put a + each time target word is said per turn in 1 box. If a target word was missed or substituted with a pronoun (it) than mark a (-). There should be 4 (+) in a box for 1 turn for perfect score.						Count + out of total
You picked a _____! Do you have a _____ in your lunch box? (Yes/No) you (do/don't) have _____. Put the _____ in your lunch box//pile.	1	2	3	4	5	
	6	7	8	9	10	
	11	12	13	14	15	
	16	17	18	19	20	
	21	22	23	24	25	
6. Both players fill their lunch box until all the cards are gone.	Player 1: yes or no (circle)			Player 2: yes or no (circle)		Out of 2
7. Both players are offered a fruit snack for compensation	Player 1: yes or no (circle)			Player 2: yes or no (circle)		Out of 2
1. Post-Test Expressive Data: Asked "what's this/that?" or pointed to one card at a time for 10/10 words. (Triadic group must have interpreter present and signing.)	1	2	3	4	5	Out of 10
	6	7	8	9	10	
2. Post-Test Receptive Data: Asked students to "find ___" or an equivalent word (touch, point, etc.) for 10/10 words in a field of 5 each time. (Triadic group must have interpreter present and signing.)	1	2	3	4	5	Out of 10
	6	7	8	9	10	

APPENDIX E: CONSENT FORMS

Dear Parent/Guardian,

This research study is being conducted by Molly Herman at Illinois State University to compare how students who are deaf/hard of hearing (D/HH) learn new words in different communication groups. One group would have a teacher of the deaf who would be signing and talking. The other group would have a general education teacher and a sign language interpreter. Both groups would have a D/HH student and a peer from general education to play a game. Molly would like to study how students are learning new words when they are taught in the different groups. The other children in the class would be playing in centers in either the mainstream classroom or the D/HH self-contained classroom being supervised by their regular teaching associate or teacher. Instructional time would not be lost due to this study.

I am inviting your child to be included in this study. If you choose to allow your child to participate, they would be playing 2 different games in the 2 communication groups focusing on learning names of foods. These games would be two similar preschool memory/matching games involving food words. Before and after the game, the teacher would lay some of the food cards on the table and ask students to point to the food named. They would also flashcard the foods and ask students to name the foods. Students would play the game in a small group with the teachers and peers during center time in the mainstream classroom while other children are supervised by the teaching associate. Students would be video recorded to collect data on how many food words they are learning by both pointing to and saying the words. Video files would be saved on a password protected computer for 10 years and then destroyed. Once students are finished playing the game, they would return to center time. Students would play one game a day for 10 minutes. They would do 10 minutes of game play for 10 sessions or 2 weeks. After 1 month they would play for 3 sessions to re-check. A package of fruit snacks would be given to students if they do or do not complete the game.

The risks associated with this research include loss of confidentiality with video recording, loss of time, and emotional distress. Although pseudonyms would be used to help protect children, there is potential that because of the low numbers of participants in the study, someone may be able to identify a student if they were to watch the video. Therefore, we ask for parents to select what they are giving permission for with the video release. Video release options include use for research, conferences, publications, and college courses. There is also a risk of loss of time. Students would be given opportunities to play in centers before and after game play. Risk of emotional distress from being singled out to play a game will be lessened by allowing students opportunities to play before and after the game.

There are no direct benefits to participants. However, your student's participation would greatly contribute to the knowledge of the field of deaf education. Data would possibly be shared in a published dissertation, journal articles, conferences and workshops, and undergraduate/graduate courses. Peoria Public Schools is requesting a copy of signed parent permission forms for the study and Dr. Lawrence Tourijigian is the administrator for the district with access to these forms.

The participation of your child is voluntary. Not participating in this study would not affect your child's status or outcomes in the classroom. Refusal to participate involves no penalty or loss of benefits. You may discontinue participation at any time without penalty or loss of benefits. You do not need to grant permission to this study if you do not want to.

For questions about this research contact Molly Herman at (XXX) XXX-XXXX or xxxxxxx@xxx.edu OR Dr. Christy Borders at (XXX) XXX-XXXX or xxxxxx@xxx.edu
Sincerely,
Dr. Christy Borders and Molly Herman

Keep one copy of this consent form for your records and sign and send the other one back.

_____I give my permission for my child _____(name) to participate in the above study.

Signature _____ Email _____Date_____

If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Research Ethics & Compliance Office at Illinois State University at (XXX) XXX-XXXX or via email at xxx@xxx.edu

Dear Stakeholders,

This research study is being conducted by Molly Herman at Illinois State University to compare the acquisition of vocabulary words in two different learning groups: dyad (teacher of the deaf using total communication to teacher deaf/hard of hearing (D/HH) student and a peer) and triad (general education teacher, sign language interpreter, D/HH student, and peer). The purpose of the study is to compare if students acquire vocabulary more quickly or effectively in one group over the other.

Participation of the teachers and interpreter would be in the dyadic and triadic communication groups and social validation survey. The Teacher of the Deaf (ToD) would teach the dyadic group and the general education teacher would teach the triadic group while the sign language interpreter interprets. Students would be playing 2 different games while in the mainstream classroom in both the dyadic and triadic communication groups. These games would be two similar preschool memory type games involving two different sets of vocabulary words. Teachers would administer receptive and expressive vocabulary pre and post-tests before and after each session. Teachers would play the game with the D/HH student and a peer during center time in the mainstream classroom while other children are supervised by the teaching associate in the room. Teachers would follow the same prescribed script when implementing the game. Teachers would watch a training video with Molly in order to understand what procedures would be expected. The interpreter would strictly interpret the message in sign language. Students, teachers, and interpreter would be video recorded strictly for data collection purposes of student receptive and expressive data and procedural fidelity. Procedural fidelity is looking to see if teachers are following the script and doing what they were taught from the sample video and training. Participants would select what additional permission may be included for use on the video release form such as conferences, presentations, publications, and college courses (attached). Once students are finished playing the game, they would return to center time. Students would alternate which group they play the game in for 10 minutes a day for 2 weeks.

Administrators, teachers, and interpreter would be asked to complete a short survey online at the end of the study regarding the importance of the study. The survey should take approximately 5 minutes and a link would be emailed to you.

Risks for this study include loss of confidentiality, coercion, loss of time, and loss of employment. Although pseudonym would be assigned if consent is given, due to the low number of research participants identifiers through data and video may be possible. This risk would be minimized by having participants check on video release box what can be done with video recordings. Coercion is minimized by the PI recruiting students and allowing participants to withdraw without penalty. Loss of time in relation to the survey is minimized by a short survey requiring 5 minutes or less and the option to stop the survey at any time. Loss of employment is minimized through knowledge that your school district may have software that closely monitors the computer use and activity of students and staff. Because the responses to this survey involve information about aspects of your position, you may wish to complete this survey on a non-work-related computer at a location other than school if you feel that there is any risk to your employment by completing this survey. Data will be reported both aggregate

and individually. Peoria Public Schools is requesting a copy of signed informed consent for the study and Dr. Lawrence Tourijigian is the administrator for the district with access to these forms.

There are no direct benefits to participants. However, your participation would greatly contribute to the knowledge of the field of deaf education. Data would possibly be shared in a published dissertation, journal articles, conferences and workshops, and undergraduate/graduate courses.

Your participation is voluntary. Refusal to participate involves no penalty or loss of benefits. You may discontinue participation at any time without penalty or loss of benefits.
Sincerely,
Molly Herman (XXX) XXX-XXXX or xxxxxxx@xxx.edu
Dr. Christy Borders (XXX) XXX-XXXX or xxxxxx@xxx.edu

Keep a copy of one of these consent forms for your records.

_____I consent to participating in this above study.

Signature _____ Email _____Date ____

If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Research Ethics & Compliance Office at Illinois State University at (XXX) XXX-XXXX or via email at xxx@xxx.edu

APPENDIX F: VIDEO RELEASE

Title: **Preschool D/HH Student's Acquisition of Language through Dyad and Triad Communication**

PI: Dr. Christy Borders Co-PI: Molly Herman Institution: Illinois State University

Directions: Please read the following options and select any or all if you would like to allow permission. You do not have to select any if you do not want to. You have the option to select some but not others. The videotapes for this research study would help in collecting expressive and receptive data. The videotapes will also help the researchers know the teachers are following the script and procedures for the lesson.

Video Release Form

As part of this project, I will be making videotape recordings of you (or your child) during your participation in the research. Please indicate what uses of these videotapes you are willing to permit, by putting your initials next to the uses you agree to and signing the form at the end. This choice is completely up to you. I will only use the videotapes in ways that you agree to. In any use of the tapes, you (or your child) will not be identified by name.

1. _____ The videotapes can be studied by the research team for use in the research project.

2. _____ The videotapes can be used for scientific publications.

3. _____ The videotapes can be shown at scientific conferences or meetings.

4. _____ The videotapes can be shown in classrooms to students at the college level (undergraduate or graduate) for educational purposes.

5. _____ The videotapes can be shown in public presentations to non-scientific groups.

I have read the above descriptions and give my consent for the use of the videotapes as indicated by my initials above.
(Keep one copy of this video release form for your records and sign and send back the other one.)

Name_____(Email)_____ Child's Name (if applicable) __ _____

_____ _____
(Signature) (Date)

APPENDIX G: SOCIAL VALIDATION SURVEY

Questionnaires for Adults: Please rate the following questions with 1 being lest important and 4 being very important?

1. How would you rate the importance of learning the vocabulary words related to playing games for three and four-year-olds? 1 2 3 4
2. How socially appropriate do you think playing a game is for three and four-year-olds? 1 2 3 4
3. How would you rate the importance of using a sign language interpreter with young D/HH student to acquire academic skills? 1 2 3 4
4. How socially acceptable do you feel it is to use sign language to communicate with young D/HH students? 1 2 3 4

Please answer the following in your own words:

1. Do you perceive direct (dyadic) or indirect (triadic) communication to be more effective in teaching language to young D/HH children? Please explain your response.