5-2015

LENA Measurements of Language Facilitation Strategies Utilized by Parents during Storybook Reading

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Storybook Reading

by

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A project submitted in partial fulfillment of the requirements for the degree of

MASTER OF EDUCATION

In

Communicative Disorders and Deaf Education

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Logan, UT

2014

Literacy Support Materials and Child Language Outcome

Approximately 12,000, or 4-6 per 1,000 babies per year in the United States are born with some degree of hearing loss (NCHAM, 2014). Children with any degree of hearing loss are at risk for having difficulty with academics, language and communication. However, with early detection, and use of hearing technology (e.g. hearing aids and cochlear implants), and specialized early intervention, many children who are Deaf and Hard of Hearing (DHH) can develop language and academic proficiency at or near their same aged peers (Moeller, 2000).

The development of age-appropriate literacy skills in children who are DHH is essential in establishing the foundations of academic success. Because many aspects of literacy acquisition are based on the phonemic elements of written text, appropriate supports for children with hearing loss to promote early literacy skill development will optimize growth and progress. Easterbrooks (2010) reported five main components that help children who are DHH develop emergent literacy, including, 1) parent involvement, 2) a language rich environment, 3)storybook reading, 4) a supportive classroom environment, 5) and early intervention services. Because literacy is vital to a child's development, this proposal will describe 1) the impact of hearing loss and benefits of hearing technology 2) the importance of early intervention with children who are DHH by involving parents through storybook reading, and 3) strategies that have been developed to help facilitate language in DHH children. These include developing the skills to use acoustic highlighting, asking questions that facilitate critical thinking and promote text comprehension, and utilizing appropriate wait time after asking targeted questions so that the child has time to think and offer a response.

Researchers have found that there have been improved language scores with the use of specific language facilitation methods and literacy materials. Most research has samples sizes of children and families ranging from 18 to 145 children and families. These studies have included DHH and typically developing children, but mainly typically developing children. Some have also looked at the effectiveness of teachers using literacy units (Easterbrooks, Lederberg, & Connor, 2010). Qualitative and quantitative measures have been used. Calderon, (2000) found that maternal and parent involvement was a significant predictor in positive language development by obtaining data from a questionnaire that was administered to parents. DesJardin (2008) found a correlation between the scores of expressive language scores that were obtained, using the Reynell Developmental Language Scales- 3rd edition, and maternal relationship with the child. While past research has shown how effective relationships and early intervention can help facilitate language in children with hearing loss, the effectiveness of parent language facilitation methods has not been discussed.

The Impact of Hearing Loss and the Benefits That Can Be Provided To Children Who are DHH

It is common practice for children diagnosed with a hearing loss to be recommended for intensive language immersion in the first years of life. Because of neuroplasticity during these first years it is optimal for a child to be exposed to as much language as possible. This is especially true to children who are DHH (Scott, 2011). To make sure those children have the best access to language, and therefore communication development, it is critical to have the child diagnosed early on. Based on many studies,

children who are diagnosed before the age of six months have a higher expressive language score than the children who had not been diagnosed early. This is problematic for the DHH children when hearing loss is most likely to be diagnosed anywhere between the ages of 13 to 22 months (Prendergast, S., Lartz, M. N., & Fiedler, B. C., 2002).

Technology

There are many technologies available for the child who is DHH. For most children, a hearing aid is used to compensate for their hearing loss. Most children have the hearing aid fitted behind the ear, with a tube that runs into an ear mold inside of the ear. This amplifies sound into the ear canal making sound more audible. When a child cannot benefit from a hearing aid, a cochlear implant is a viable alternative. A cochlear implant is different from a hearing aid in that instead of amplifying the sound, it stimulates the auditory nerve to send sound signals to the brain. With these technologies, children who are DHH are able to have access to environmental sounds, music, and spoken language (Kennedy, et. al., 2006; Moeller, 2000; Nelson, 2008; Nicholas & Geer, 2007; Yoshinaga-Itano, 2003; Yoshinaga-Itano, 2004).

Early intervention

After being fit with hearing technologies, the next step is intervention. Early intervention is one of the best ways to ensure that children who have been fitted with hearing technology, to acquire spoken language skills. In addition, children need to be exposed to the language of books to develop literacy skills. If children are not exposed to the language found in books they would have difficulty learning vocabulary and other complex structures in print (Bennett-Armistead, Duke, Moses, 2005). Research has shown that the delivery of early intervention to parents and their children who have a

hearing loss before the age of six months causes improvement in both receptive and expressive language development (Proctor, Niemeyer, Compton, 2005). Children who are engaged in early book reading have been shown to have significantly higher scores in verbal reasoning skills and in the aspect of their vocabulary (Moeller, 2000). These scores are close or equal to those of their hearing peers (Moeller, 2000).

The Importance Of Early Intervention and Parent Involvement

Not many studies have addressed parent involvement with children who have hearing loss. Though they have, however, found that the involvement of parents influences three main areas in the child's development. These include 1) academics, 2) language development and 3) social-emotional development (Calderon, 2000). Bodner – Johnson (1986) found that families that were more involved with their children and who encourage high achievement had children who obtained higher scores in math and reading. Calderon's study showed that with high maternal involvement in school-based intervention services, language development does increase, along with reading skills and social-emotional development. It was also found that behavior problems were less prevalent (Calderon, 2000).

Learning Spoken Language

Lev Vygotsky developed the Social Interaction Theory of Language. This theory states that when adults use words, refer to objects, and they perform actions, the child is activily taking all of this in even if he/she is not verbally responding (Robertson, 2013). Due to the fact that they are listening intently to the structure and vocabulary they don't just copy what adults say, but are hard at work learning the language system (Robertson, 2013).

When a DHH child is learning spoken language it is important that there be large amounts of extended interactions with people who speak the native language. Because we want to have a lot of interactions with the child to teach him or her spoken language we have to rely on parents and family members to facilitate these social language interactions.

Hart and Risely (1995) used the Social Interaction Theory in a study that looked at parents' of children with typical hearing. In this study on 42 families of various SES levels were observed. The research found that low SES children were exposed to 13 million fewer words than the child in a working class family by age 4 (Robertson, 2013). This gap has been attributed to many things. However the single most important factor was that low SES parents simply talked less to their children (Robertson, 2013).

Shared storybook reading

One way of addressing this gap is through training better parent involvement is through storybook reading. It has been found that parents' who use higher levels of language facilitation techniques during shared storybook reading, prepare children with better language skills during the preschool years (DesJardin, 2008). The National Association for the Education of Young Children states oral language skills are highly correlated with extensive shared storybook reading with a parent or guardian (DesJardin, 2008). By reading aloud, consistently and frequently, with a child who has a hearing loss, oral language skills and, cognitive and literacy development are positively impacted (Robertson, 2013).

Impact of parent driven participation on child language development

Family Literacy programs teach parents and caregivers how to interact linguistically with their children (Beaty, & Pratt, 2011). This training is accomplished with Home Literacy Activities (Tompkins, 2011). These activities involve reading aloud together, and talking with children about the text that was just read using language facilitation techniques (Tompkins). Language development is promoted by making sure that these six factors are exhibited when reading: 1) numerous amounts of different words, 2) number of questions answered by the child, 3) number of questions asked by the child, 4) number of questions asked by the parent, 5) questions answered by the parent and the amount of positive reinforcement provided by the parent (Tracey, 2000).

Importance of 'parents and partners' in education

The Individuals with Disabilities Education Act (IDEA) has encouraged every parent to be involved in the decision-making process of the education their child receives, especially the education of children with special needs (Calderon, 2000). When working with children who are DHH it is important to support the parents of these children because of the crucial role they play in helping develop literacy and language (Tompkins, 2011).

Two initiatives that have been put into place to help children with early and emergent literacy are the Reading First Initiative and the Race to the Top Initiative. The Reading First Initiative is a program that provides states with tools and funds to make sure that students are able to be proficient readers by the end of third grade (U.S Department of Education, 2009). The Race to the Top Initiative is an initiative that has

been put into place to inspire states to improve their early education programs to better prepare children for kindergarten (Gonzales, 2014).

Language Facilitation Techniques

Interactive reading has been proven to improve language and literacy development (Tracey, 2000). According to a publication put out by the National Reading Panel, parents who read to their children often, and who use enthusiasm to make it an enjoyable experience, have children who are able to pretend to read books, able to say the names of objects in familiar books, and are able to comment about characters, For this to occur, parents need to be provided with strategies for effective storybook reading. Therefore this study will focus on three primary areas of parent-focused engagement. The first is a parent's ability to use probing and comprehension questions. When parents use more probing and comprehension questions, they are allowing the child to explore the concept of the topic within the context of the book or literacy unit. They are able to prompt the child to explore information. The second strategy is the parent being able to use appropriate wait time. Along with asking these comprehension questions throughout the literacy unit or story, the parent should learn that the amount of time given to answer the question is just as vital as the question itself. By improving the parents' capacity for wait time this allows the child to not feel rushed and holds the child accountable to at least explore a possible answer.

Acoustic highlighting is the third necessary language facilitation strategy. When a caretaker changes the pitch and tone of his/her voice, a child is able to stay more engaged and tuned into the material that is being presented. This is critical for children who are DHH because they have lower access levels to the sounds in their environment. So when

a parent uses acoustic highlighting and changes his/her pitch and tone he/she is giving

that child a wide range of sounds to help them develop their hearing ability.

LENA Software

The LENA Software is a program that was specially designed for researchers and

other professionals interested in language development. The LENA software allows

professionals to easily collect, process, and analyze language development data of

children. Utilization of this software is appropriate for the present study given the ability

to obtain advanced analysis of language samples during shared storybook reading,

including analysis of acoustic highlighting, use of comprehensive questions,

implementation of wait time, and the parent and child's total word count to calculate

utterance ratio.

Project Proposal (Methods)

This study will present empirical evidence of the importance of providing parents

with strategies to facilitate literacy and language skills in preschool children who are deaf

or hard of hearing (DHH) during shared storybook reading activities. During early years

of reading skills acquisition, parents play a vital role in establishing child engagement in

the reading process to maximize learning opportunities for the child. Language and

literacy acquisition is an important component to child development. However, research

shows that children from underprivileged or low socio-economic backgrounds often lag

behind their peers in language and literacy development. This project will describe

strategies that can be used by parents in the home to improve parent engagement and

maximize child-learning opportunities. This project will focus on the impact of teaching

parents to 1) use acoustic highlighting in which key sounds or words are emphasized, 2)

ask questions that facilitate critical thinking and promote text comprehension, and 3)
utilize effective wait time after asking targeted questions so that the child has time to
think about the question and offer a response. **Project Outline**

Strategies and recommendations provided in this study will be grounded in
empirical evidence as obtained from a multi-tier single subject design study. Findings
from 5 – 6 families will be presented in which systematic introduction of each variable
(acoustic highlighting, posing targeted comprehension questions, and utilization of wait
time) will be evaluated in comparison to baseline measures. Data will be collected during
parent-child storybook reading utilizing Language Environment Analysis (LENA)
software. The LENA software will also facilitate analysis of environmental noise, and
parent-child communications.

Methods

This study utilized a multiple baseline single subject design to identify the impact
of explicit parent training to utilize effective literacy strategies during parent-child
storybook reading within the natural home environment.

Participants

Four families were recruited for study participation. Study inclusion criteria:

1. The family had a child who is deaf or hard of hearing and who used hearing
   technology (hearing aids or cochlear implants) to access sound for the
   development of listening and spoken language.

2. The child was 3.0 to 6.0 years of age.

3. The family agreed to engage in parent-child reading for 15 minutes, three to four
   times per week over a combined period of five weeks.

4. The child had no significant co-morbid disabilities that negatively impact an interactive parent-child reading activity.

5. Parent agreed to wear the LENA recording unit during the book reading activity.

Procedures

Parents were provided with five age-appropriate books, one with words and four wordless, that were utilized during the study period. Parents self-selected if the child's mother or father would be the study participant. The parent participant was asked to use the wordless books provided, as well as any other books already in the home that the child chose, during a parent-child book reading activity for 15 minutes, three to four times per week.

Baseline. During the baseline phase, parents received no direct training on literacy strategies and were recorded utilizing their own natural and typical book reading interactions during a 15-minute segment. The parent-child readings were recorded using the LENA recording unit. Baseline data was collected for two-weeks, with two families entering the study each week (see Table 1). In utilizing this schedule, there were a total of four families who participated in the study. Three to four recordings were obtained per week, resulting in a combined six to eight baseline data points over the two-week period. At the conclusion of the baseline data collection period, the LENA recording were loaded into the LENA software to transcribe and analyze parent use of:

1. Prompting comprehension questions

2. Parent-child utterance ratio

Intervention. At the end of the baseline period, parents participated in a 15-20 minute training session to learn how to prompt comprehension questions during the book reading. Parents were informed of the concept of 'wait time' after a question has been posed, and the importance of allowing the child adequate time to consider the question and formulate a response. Parents were informed that measurements of parent-child utterance ratio were obtained. Instructions to parents were scripted to ensure that training sessions were consistent and uniform across all study participants. Upon completing the training, parents proceeded to use the LENA device to record 15-minute book reading segments with their child, three to four times per week. Recordings continued over a two-week period, resulting in six to eight data collection points during the intervention phase.

Table 1. Family LENA Schedule

	Week 1	Week 2	Week 3	Week 4	Week 5	
Family #1	Baseline	Baseline	Intervention	Intervention		
Family #2	Baseline	Baseline	Intervention	Intervention		
Family #3		Baseline	Baseline	Intervention	Intervention	
Family #4		Baseline	Baseline	Intervention	Intervention	

Data Collection

Data from the LENA recordings was downloaded into the LENA software program when the recording memory capacity was full. It was anticipated that this will occur at the end of the baseline phase and again at the end of the intervention phase. The LENA unit was collected from the family after completion of the intervention phase and then returned to the family four weeks later to obtain generalization data. At the conclusion of one week of generalization data, the LENA unit was collected from the

family and the final recordings were loaded into the computer for analysis. Analysis of generalization data will be included as a second stage to the study and are not included in this manuscript.

Data Analysis

Data analysis included:

1. The number of comprehension questions parents posed to the child during the 15-minute segment. Content analysis was completed to describe the type and complexity of questions used.

2. The ratio of adult vs. child utterances. This information was automatically calculated in the LENA software.

Data collected and analyzed was the same for the baseline, intervention, and generalization study phases and was based on 15-minute recording segments.

Upon study completion, parents retained all study materials (books and strategies instructions) in appreciation for their participation in the study. No identifying data was collected to ensure child and parent confidentiality.

Results

Family #1. During baseline Family #1 read through multiple books quickly and there was very little child engagement, so the number of parent words were much greater compared to the child vocalizations. In baseline the parent averaged 5 questions per session. This increased in intervention to 42 questions per session. The parent also used other strategies like expansion and sabotage. The child's utterances grew from a two-word utterance to a nine-word utterance.
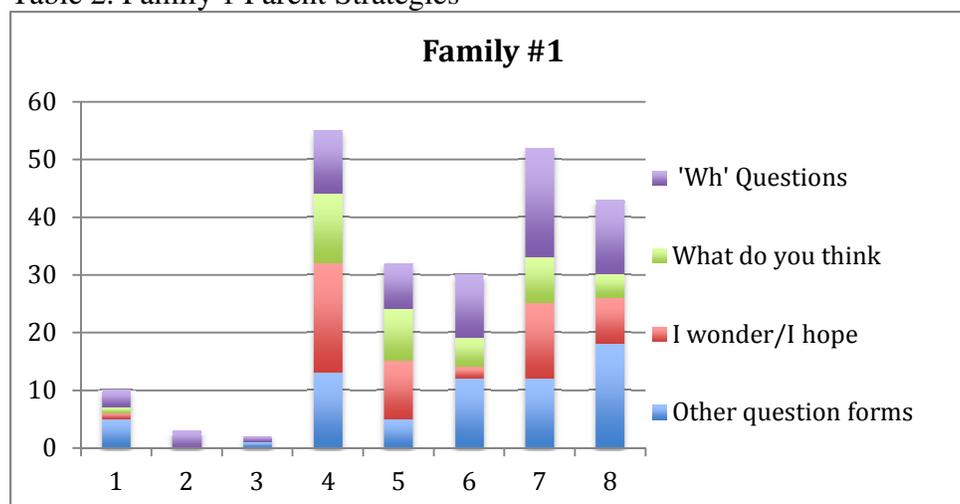
Table 2. Family 1 Parent Strategies

Table 2 shows the baseline data (section 1-3) and intervention data (section 4-8).

Family #2. During baseline Family #2 also used multiple questions such as "Where is…" and "What is that…" Then during intervention, the parent substantially increased the amount of times she used the question "What do you think?" This question expanded the child's utterances and involvements. During baseline the family averaged 13 questions and then 40 questions during intervention. Another special thing that Family #2 implemented during intervention was using phonemic awareness prompts to help the child throughout their reading time.
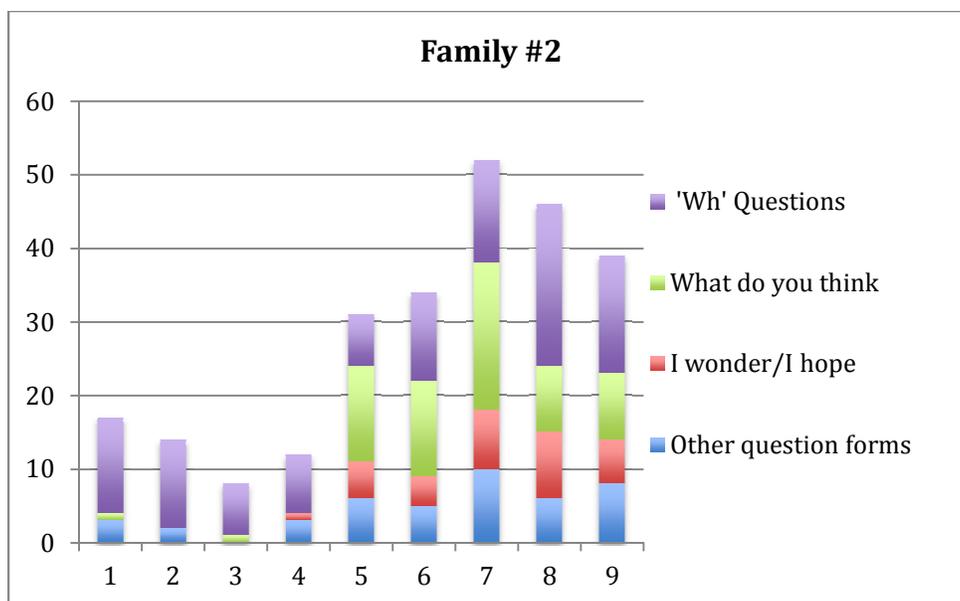
Table 3. Family 2 Parent Strategies

Table 3 shows baseline data (Section 1-4) and intervention data (Section 5-9)

Family #3. Family #3 increased the amount of playful language during intervention. Parent feedback from Family #3 noted that when reading wordless books with the child her utterances and imagination about what was going on in the book increased. The average question amount increased from 14 questions in baseline to 44 questions in intervention.

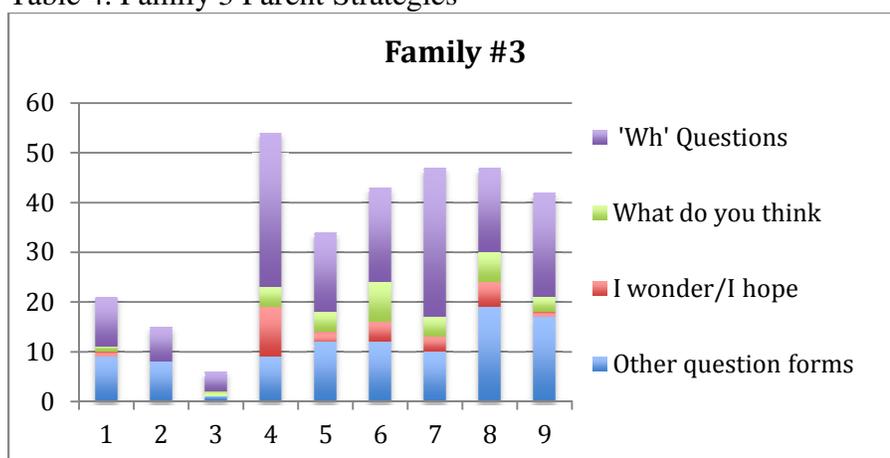Table 4. Family 3 Parent Strategies

Table 4 shows baseline data (Section 1-3) and intervention data (Section 4-9)

Family 4. There was very little child engagement during storybook reading at baseline but this increased at intervention. During intervention the family began to increase the emphasis on phonemic awareness and began singing. This increased engagement with the storybook and parent as well. The average question amount increased from 1.5 questions in baseline to 18 questions at intervention.
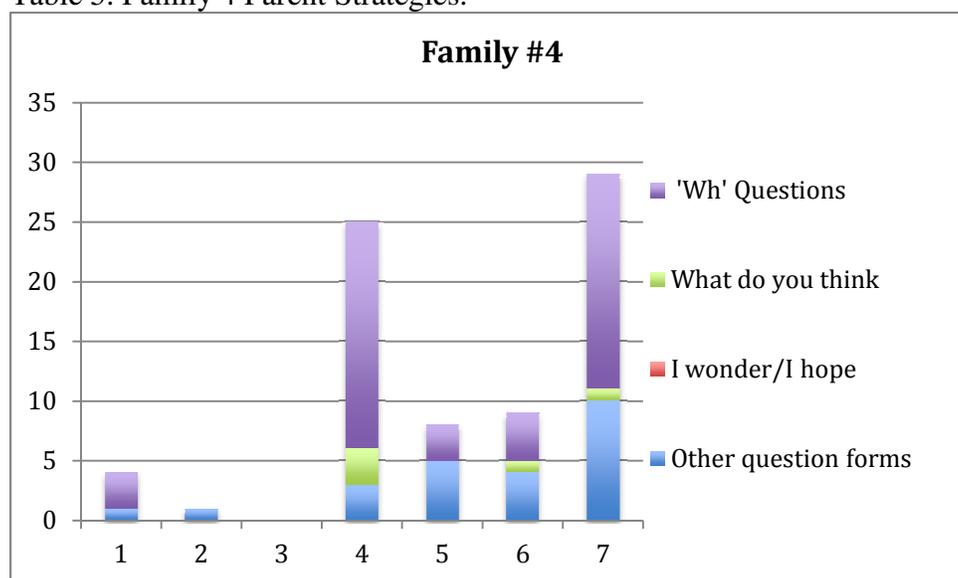
Table 5. Family 4 Parent Strategies.

Table 5 shows baseline data (Section 1-3) and intervention data (Section 4-7)

All families showed an increase in child utterances from baseline to intervention. Analyzed data also showed an inverse correlation between the number of adult utterances and child vocalizations. During baseline, parents had a higher amount of words than their children. Likewise in intervention, if parents decrease their amount of words, but still use language that elicits child vocalizations, child utterances increase.

Table 6. Increase in Child Vocalizations
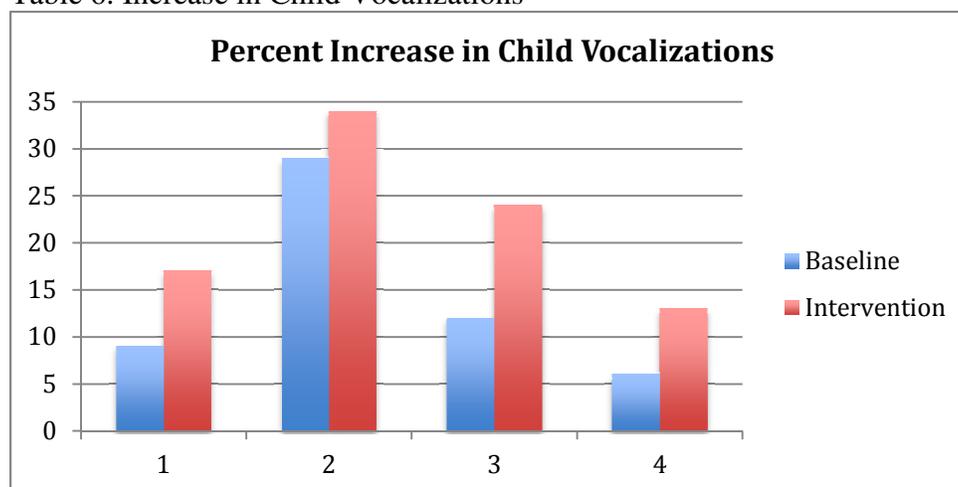
Discussion

For children who are DHH, there needs to be an excess amount of language exposure to increase both their receptive and expressive language. This is due to the fact that all of a child's academic success is based off of their early development and progression of literacy such as vocabulary development (Luckner, Slike, & Johnson, 2012). Age-appropriate foundations for literacy development are universally regarded as priorities in early childhood special education. Children who are deaf or hard of hearing are at risk for language and literacy delays.

To prevent or minimize delays for children who are DHH professionals use LSL strategies to help educate families on these strategies to carryover to their home. Parent-child storybook reading provides opportunities for enriched language and reading comprehension interactions and promotes literacy development within the natural home routine.

Many parents read with their children and enjoy the shared storybook engagement that comes with a nightly reading ritual. However, many parents are unsure about how to utilize effective reading strategies to maximize literacy growth in their

preschool children who are DHH. These strategies can be taught to families in many different ways starting in Early Intervention. By collaborating and having parents as partners, professionals and parents are able to strive for the best results for each individual child. Giving parents resources and materials to help facilitate their actions during specific times of engagement with their child can help facilitate language. Particularly, shared storybook reading with a parent and child can have the greatest potential for the most language between the parent and child.

Children who are DHH benefit form meaningful exposure to language and literacy activities to promote expressive and receptive language development and literacy foundations with the use of their hearing technologies. When parents promote reading time at home they need to make the reading time natural and avoid making it become a therapy session or placing stressful requirements on the child. Reading time should empower the child to use creative language and make them confident in literacy activities. Parents can have the tools to empower their child during reading opportunities if they are given the appropriate tools. The tools can be simply provided in a 20-minute training session of by simple reminders to help guide parents to improve the quality time during storybook reading.

Strengths and Limitations of this Study

In the study some of the strengths that was experienced consisted of the recruitment of participants. By reaching out to families and providing information there were many families that were interested in participating.

Some of the limitations in this study consisted of only having the shared reading book sample time of 15 minutes. If this time were increased there might be a more

reliable sample of questions that were posed. Another limitation would be if the fathers were the ones that were involved in the shared storybook reading time.

Conclusion

By providing parents with a simple 20 minute training session on reminding or briefly educating them on the benefits of LSL strategies during their routines, parents were able to increase their child's vocalizations and the variety of vocabulary they used. Listening and spoken language (LSL) strategies enabled parents to elicit and more language during everyday activities which helped the child reach their overall hearing and language goals.

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