

2016-01-01

The Effect Of A Fluent Signing Narrator On Quality Of Maternal behavior During E-Book Shared Reading Interactions With Their Children With Hearing Loss

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THE EFFECT OF A FLUENT SIGNING NARRATOR ON QUALITY OF MATERNAL
BEHAVIOR DURING E-BOOK SHARED READING INTERACTIONS
WITH THEIR CHILDREN WITH HEARING LOSS

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Dean of the Graduate School

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Mar Alejandra Bonilla Yáñez

2016

Dedication

Con todo mi amor,
para Mami, Papi, y por supuesto
Maryana

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BEHAVIOR DURING E-BOOK SHARED READING INTERACTIONS
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by

MAR ALEJANDRA BONILLA YÁÑEZ

THESIS

Presented to the Faculty of the Graduate School of

The University of Texas at El Paso

in Partial Fulfillment

of the Requirements

for the Degree of

MASTER OF SCIENCE

Program in Speech-Language Pathology

THE UNIVERSITY OF TEXAS AT EL PASO

May 2016

Acknowledgements

The dream team. I owe my most sincere gratitude to my advisor, Dr. Vannesa Mueller, for entrusting us with such an honor, a follow up to her very own dissertation. I will forever be grateful for the way you believed in myself, but even more so, for teaching me how to do it too. Your enthusiasm and support were my inspiration to give my very best in each step of the journey. More than a thesis, this marks a stage in my life that will never be forgotten and you played a fundamental role in it.

Since there would be no team without Gaby, I also give my warmest thanks to my colleague, my best friend. Thank you for your patience and for always thinking outside the box when we needed it the most. I cannot imagine having to navigate this quest without your strength, unconditional friendship, or the Salsa nights that got us through.

I would also like to extend my appreciation to my committee members, Dr. Connie Summers and Dr. Helen Hammond. Thank you for your time, feedback, and support. A special recognition to Dr. Gerald Mahoney for allowing us to access to his extraordinary work. My study could not have been completed without his contribution.

Quisiera también agradecer a toda mi familia. En especial a mis Abues Esther y Matilde, por su amor perfecto e incondicional, y por sus oraciones. Estoy convencida de que cuando ustedes rezan, Dios escucha. Así mismo, gracias a mis Abuelos Carlos y Lorenzo, por ser un ejemplo de esfuerzo y dedicación. De todo corazón, gracias a mis padres y hermana. Cada una de las páginas que aquí encontraran la escribí por ustedes y para ustedes. Gracias Mami por haber dedicado tu vida a mi educación, mira que tan lejos llegamos. Gracias por hacer de mí peor día, el mejor, con tan solo una sonrisa y un plato lleno de amor. Gracias Papi por haber dado todo de ti para ofrecerme estas increíbles oportunidades. Nada de esto sería posible sin tu valentía, dedicación, y entrega hacia nuestra familia. A Maryana, por las noches de hermanas que me dieron la energía para seguir. Y por encima de todo, gracias a Dios por ser mi refugio y mi fortaleza, por elegirme para esta vocación.

Abstract

Purpose: The average high school student with hearing loss graduates reading at a 4th grade level. A factor that may contribute to the literacy development in children with typical hearing is language modeling and support surrounding shared book reading. The shared book reading experiences of children with hearing loss (CHL) and their parents may be different in quantity and quality from their peers with typical hearing. There is evidence reporting parental frustration and feeling of incompetence when reading to their CHL due to a sensory mismatch between the child's and the parent's mode of communication and skills. This study investigated the effect of a fluent signing narrator (embedded in the Iowa Signing E-Book) on maternal behavior during shared reading interactions between mothers with typical hearing (MTH) and their CHL. **Method:** In an expansion of Mueller and Hurtig (2009), 50% of total time of each lap reading session of 4 mother-child dyads were analyzed within a single-subject ABABA withdrawal design in which the withdrawal phases included E-Books with no fluent, signing narrator and the treatment phases included the use of E-Books with a fluent, signing narrator. Maternal behaviors were rated using a modified version of the Maternal Behavior Rating Scale (MBRS) (Mahoney, 2008). **Results:** Three out of four mothers showed patterns in treatment effect in favor of the no-narrator phases of the study. One mother showed a clear pattern in favor of the narrator phases of the study. Behaviors of effectiveness, enjoyment, and directiveness were rated better when the narrator was not present. Behaviors of achievement and praise were rated better when the narrator was present. **Discussion:** Factors such as maternal attitudes, experience/education, motivation to learn sign language, and willingness to go through parent training could have influenced the results. **Implications:** The use of technology enhanced shared reading is supported given the

positive results on achievement and praise. However, child behaviors should also be taken into account when making recommendations. Future research should encompass explicit parental training in monitoring and modification of behaviors that contribute to high quality shared reading interactions.

Table of Contents

Abstract.....	vi
Table of Contents.....	viii
List of Tables.....	x
Chapter 1: Introduction.....	1
Chapter 2: Literature Review.....	3
Literacy Deficits of Children with Hearing Loss (CHL).....	3
Importance of Early Shared Reading Experiences.....	4
Technology Enhanced Shared Reading.....	8
What Constitutes High Quality Shared Reading Interactions?.....	12
Contribution of Maternal Behavior to Quality of Shared Reading Interactions and Literacy Development.....	16
Defining Quality of Interactions: Analysis of Maternal Behaviors.....	19
The Current Study.....	22
Chapter 3: Methods.....	24
Participants.....	24
Mother-child shared reading interactions.....	27
Measures.....	27
Procedure.....	31
Analysis.....	32
Chapter 4: Results.....	33
Dyad one: Mother 1 and Charlie.....	33
Dyad two: Mother 2 and Ivan.....	33
Dyad three: Mother 3 and Nancy.....	35
Dyad four: Mother 4 and Wayne.....	35
Chapter 5: Discussion.....	38
Summary.....	38
Dyad one: Mother 1 and Charlie.....	38
Dyad two: Mother 2 and Ivan.....	39
Dyad three: Mother 3 and Nancy.....	42

Dyad four: Mother 4 and Wayne	43
Overall Patterns per Study Phase	44
Implications.....	49
Limitations	49
Directions for Future Research	50
Conclusion	50
References.....	52
Appendix A.....	59
Vita	66

List of Tables

Table 1. Characteristics of Children	26
Table 2. Characteristics of Mothers	26
Table 3. Results for Mother 1 Table 4. Results for Mother 2	34
Table 5. Results for Mother 3 Table 6. Results for Mother 4	36
Table 7. Cohen's d for all four Mothers	45

Chapter 1: Introduction

Good literacy skills are not only essential in today's society, they are the foundation on which all other academic skills develop. A good and avid reader is more likely to be successful in all academic aspects because reading opens the door for knowledge, inquiries, and connections between ideas. In the same manner, those who struggle with reading early on, have marked difficulties in many other educational areas. According to the National Institute on Deafness and Other Communication Disorders (NIDCD, 2014) two to three out of every 1,000 children in the United States has a detectable hearing loss at birth. Such a prelingual hearing loss carries a tremendous impact in the child's development of language and furthermore, literacy skills. Wang, Spsychala, Harris, and Oetting (2013) stated that, on average, children with hearing loss (CHL) in the United States graduate high school reading at a fourth grade level. This alarming statistic calls for an urgent change in interventions and reading programs that help diminish these literacy deficits, which can have a detrimental impact on both the educational and vocational opportunities for this population.

Current research emphasizes the important role early shared reading experiences have on the development and improvement of literacy skills. Several studies have looked at the impact different reading techniques have in promoting language and literacy development. When examining these early shared reading interactions between CHL and parents with typical hearing, a trend is noticed. These children are not read to as often as children with normal hearing, and when they are indeed read to, these interactions are not optimal for fostering literacy skills (Dirks & Wauters, 2015; Stobbart & Alant, 2008; Trussell & Easterbrooks, 2014). Mueller and Hurtig (2009) presented one of the very few investigations on the use of technology enhanced shared reading programs and its impact on acquisition of signed vocabulary by CHL. Mueller and

Hurtig (2009) highlighted the importance of not only analyzing the quantity of shared reading experiences CHL receive, but also the quality of such interactions. Little is known about the quality of shared reading interactions among CHL and their parents when using e-books.

Given the limited research on this population and the use of technology enhanced reading, it is of importance to analyze all factors that may play a role in fostering literacy skills in CHL. Thus, the current study sets forth to expand the work of Mueller and Hurtig (2009) by analyzing any possible effects a fluent signing narrator in the Iowa Signing E-Book might have on the overall quality of mother-child interactions during shared reading sessions. By conducting this investigation, the author hopes to answer what effect, if any, did the presence of the fluent signing narrator in the e-books have on maternal behavior. An additional research question relates to the relationships, if any, that may exist between ratings of maternal behaviors and results from Mueller and Hurtig (2009). Complete analysis of mother-child interactions during shared reading provide information relevant to the much needed future development and use of technology enhanced shared reading interventions and parent training that may help fight literacy deficits in CHL. The current study is of particular importance because of the specific variables it will encompass: young children with hearing loss, shared reading interactions, e-books, a fluent signing narrator, and quality of interactions. The current literature available provides investigations which analyze how the said factors may influence each other.

Chapter 2: Literature Review

Literacy Deficits of Children with Hearing Loss (CHL)

Alarming statistics indicate that although CHL who have access to early intervention and advanced technology are performing better in reading outcomes, they still fall below ranges of children with typical hearing. Overall, even with increased efforts to target this issue, many members of this population graduate high school reading at a fourth grade level (Wang, Spychala, Harris, & Oetting, 2013). These facts are concerning because academic success is heavily dependent on literacy skills. These deficits can impact all areas of academic development and also deprive them of equal higher education and vocational opportunities, as compared to their peers with typical hearing. The language development of CHL is characterized by a slower than normal trajectory (van Staden, 2013). In addition, according to Fung, Chow, and McBride-Chang (2005), deficits can be evident in all domains of language. These deficits can be traced back to their difficulty hearing, leaving them with limited exposure to speech sounds, which is the basis for phonological storage and word formulation. In turn these skills become the foundation for spoken language development. For example, Lederberg et al. (2003) stated that for children whose native language is signed, learning to read is difficult because they do not have a spoken phonemic inventory on which to map written words as their signed phonemic inventory greatly differs. As CHL age, their language skills remain below average, thus, they have limited access to obtaining knowledge from their environment – leading to a weak foundation from which to build advanced language skills.

Factors influencing literacy development. The above-mentioned signal mismatch between signed and verbal phonemic inventory reported by Lederberg et al. (2013) may be one factor that accounts for literacy deficits in CHL. Fung et al. (2005) stated that the degree of hearing loss does not appear to be a factor influencing language delays in CHL. An interesting

issue contributing to literacy development, which continues to be under research is the impact of early print exposure at home. Vast amounts of evidence highlight the importance of exposing all children to books from an early age. With regards to CHL, several researchers have concluded that parent-child shared reading is associated with all areas of language development and can be predictive of later language skills (DesJardin et al., 2014; Dirks & Wauters, 2015; Fletcher, Perez, Hooper, & Claussen, 2005; Fletcher, Cross, Tanney, Schneider, & Finch, 2008; Fung et al., 2005). A positive environment, parental involvement, and maternal communication skills play a relevant role in language development of both children with typical hearing and those with hearing loss. These three parental qualities that foster language skills can be implemented during shared reading activities (DesJardin, 2006; Fung et al., 2005; Plessow-Wolfson, & Epstein, 2005). Early experiences are associated with all areas of child development (Fung et al., 2005). Given the practical opportunity for literacy development shared reading represents, it is crucial to analyze the characteristics of such interactions between mothers with typical hearing (MTH) and their CHL.

Importance of Early Shared Reading Experiences

For children with typical hearing, shared reading has been reported to be related to social-emotional, language, and general cognitive development. Kamhi and Catts (2012) argue that shared reading exposes children to print conventions, letter names, shapes and sounds. All of these aspects are the foundations for later reading skills. In addition, shared reading was found to have a “direct impact on learning to read” regardless of family’s socioeconomic status (Kamhi & Catts, 2012, p.26). This can lead to better preparedness when they enter kindergarten (DesJardin et al., 2014). Fung et al. (2005) stated that the frequency of shared reading interactions can impact comprehension, vocabulary, oral language, and narrative skills. Shared reading is related

to their later literacy skills. Furthermore, shared reading is considered to help in the development of background knowledge, language, and listening comprehension skills (Almaguer & Pena, 2010). The same applies for children who are at risk for reading difficulties, including CHL (Dirks & Wauters, 2015; Robertson, Dow, & Hainzinger, 2006). There is limited research on the effect of shared reading on the language and literacy development of young CHL. Below is a summary of relevant studies available:

By modifying a “dialogic reading method” developed by Whitehurst et al. (1998), Fung et al. (2005) analyzed the differences in receptive vocabulary acquisition of 28 children with mild to severe hearing loss from Hong Kong. Children were divided into a dialogic reading group where parents had access to storybooks and corresponding prompt questions and picture cards. The typical reading group had access to storybooks, however no questions or picture cards were included. After an 8-week intervention, the researchers found that children in the dialogic reading group had significant receptive vocabulary gains when compared to children that went through typical reading. This significant gain was not due to maturation only, since the researchers included a control group. An important factor in this study is the inclusion of specific techniques that parents were encouraged to use when reading with their children. Further detail on this method will be provided in sections to follow.

Given CHL’s limited acquisition of vocabulary through incidental learning, Trussell and Easterbrooks (2014) analyzed the effect of an enhanced shared reading interaction between five deaf children and a teacher of the deaf. This enhanced reading time included three different books with a specific script of questions that helped highlight target vocabulary words. The aim was to analyze the effect of these reading techniques on picture vocabulary identification. At the end of a four week intervention, all children had learned all the 15 target vocabulary words. In

addition, all children showed maintenance of acquired vocabulary two weeks after the end of the intervention program.

Few researchers have studied young children with cochlear implants and reading interventions. DesJardin, Ambrose, and Eisenberg (2008) report on a longitudinal study conducted on shared reading interactions of 16 dyads of MTH and their young children with cochlear implants. Both maternal (use of facilitative language skills) and child factors (age, age at implant, and language skills) that may play a role on phonological awareness and reading skills of these hard of hearing children were analyzed. Children's language skills and mother-child shared book reading interactions were recorded initially and three years later. Overall, the researchers concluded that child's expressive oral language skills and maternal use of higher level facilitative techniques were related to the literacy skills children exhibited three years after the initial phase of the study.

It is important to consider that the aforementioned benefits of shared reading interactions have a greater impact when they are introduced early. Kamhi and Catts (2012) described that there might be a threshold level where the amount and quality of shared reading experiences may have little impact on literacy skills. Stevenson and Fredman (1990) concluded that reading, spelling and IQ scores of 13-year-olds were strongly predicted by the frequency with which their parents read to them in preschool. Hence the importance of *early* shared reading experiences in young children.

A look into shared reading experiences of CHL. What is supposed to be a pleasant experience in the child's early years, may turn into something undesirable for both parents with typical hearing and their CHL. First, this may be due to the children's loss of hearing and language delay, leading them into difficulty coordinating an alternating their gaze between their

parents and the book, as they need both sources of language input to comprehend what is being read to them (DesJardin et al., 2014; Dirks & Wauters, 2015). This need for coordination increases demands on both parent and child, as parents need to accommodate themselves and the book, while maintaining child's interest and focus. In addition, given that they hear and their children do not, Fung et al. (2005) report the existence of a "sensory mismatch" between the children's abilities and their parents' mode of communication, which more than likely is spoken (p. 84). It is thus hard for parents to utilize verbal communication to teach language to their children in a manner that would be taught to hearing children. In addition, parents reported that they do not have the skills or strategies to engage their children in reading a book (DesJardin et al., 2014; Fung et al., 2005; Mueller & Hurtig, 2009). This feeling of incompetence can then lead to frustration and parents refrain from getting involved in such activities (Delk & Weidekamp, 2001; Dirks & Wauters, 2015; Fung et al., 2005; Mueller & Hurtig, 2009; Plessow-Wolfson & Epstein, 2005). In a chain of events, this frustration and lack of involvement can lead parents to be more controlling during the interaction. They also tend to correct their children more often than in hearing dyads and do not show adequate responses when their child wants to communicate with them (Fung et al., 2005; Schleper, 1997).

Furthermore, these factors can lead both the parent and the child to avoid shared reading time and consequently, CHL tend to have limited exposure to books and may not be given sufficient opportunities to both develop and practice basic literacy skills such as print awareness (DesJardin et al., 2014; Mueller & Hurtig, 2009). Due to these factors, children are at risk for developing negative attitudes toward shared reading experiences which can in turn impact early reading ability, as attitude and motivation play a considerable role in literacy development (Kamhi & Catts, 2012). Overall, shared reading interactions amongst CHL and their parents with

typical hearing are very limited in frequency of occurrence, and when they do take place, these interactions may not be optimal for promoting literacy skills.

Technology Enhanced Shared Reading

As technology (e.g. computers, smartphones, and tablets) becomes readily available to people of all ages, children are spending a significant amount of time interacting with electronic devices (Kim & Anderson, 2008). Such devices can be adapted to include electronic books (e-books) or other artifacts in an effort to make reading time more interesting, and attract and maintain a child's attention. According to Almaguer and Pena (2010), "The National Association for the Education of Young Children (NAEYC) stated that technology should be actively used to enhance the learning process" (p. 293). In order for children to learn, they must be engaged in the material they are presented and thus, technology enhanced shared reading is a viable option because it increases participation by making books more appealing and interactive.

One example of technology enhanced shared reading are e-books. While maintaining the characteristics of traditional books, e-books offer added motivational and educational features that attract children's attention and invite them to respond to the interaction. Furthermore, e-books contain multimedia aspects that can help support understanding. Multimedia features such as word pronunciation, narration, sound effects, and animation can help facilitate decoding, allowing children to focus on the meaning of the text. In turn, the added benefits provided by e-books support emergent literacy skills which may reflect on later reading abilities (Almaguer & Pena, 2010; Salmon, 2013). In a review of the current literature, Salmon (2014) reported gains in phonological awareness, vocabulary, word meaning, decoding, and print knowledge when using technology with children with typical hearing. Furthermore, better outcomes were seen when

adult support was provided. Technology has been used in diverse attempts to enhance the shared reading interactions of both children with typical hearing and CHL.

Almaguer and Pena (2010), conducted a classroom-based study where 43 student teachers were asked to create electronic books using Microsoft PowerPoint and implement a shared reading activity with elementary school children with typical hearing. After conducting several surveys evaluating the difficulty and ease of implementing the electronic books, the researchers concluded that student teachers found the e-books easy to present because children were very responsive, participated, and enjoyed the activity. However, it is important to recognize that although beneficial, e-books or other forms of technology can add challenges to the interaction. In this study, student teachers reported it was difficult to find the technology (e.g. computers and projectors) necessary to produce, present, and implement the e-books. Benefits and challenges provided by e-books should be balanced and it is important to analyze the effects, if any, that these pros and cons can have on shared reading interactions.

In a single-subject withdrawal design study, Mueller and Hurtig (2009) analyzed shared reading interactions between 4 dyads of mothers with typical hearing (MTH) and their CHL. The Iowa Signing E-Book that varied in the presence of videos of a fluent signing narrator was utilized for this study. The fluent signing narrator was removed from the e-books in the withdrawal phases of the study. The narrator signed the story, asked questions, made comments, and provided feedback. The key factor about the intervention in this investigation was the added visual support provided by the signing narrator and the pictures included in the books. This support was provided not only to the children, but also to the mothers who were able to increase their signing vocabulary by the end of the study. Similar to Almaguer and Pena's (2010) description of the added benefits of using technology in shared reading experiences, this signing

narrator is an added multimedia characteristic of technology enhanced shared reading that can help support understanding. In addition, mothers had access to training e-books containing videos of the signed story in order for them to learn it before they read to their children. They were also given specific strategies to help them develop conversations about the books. Finally, mothers had access to the 15 Shared Reading Project principles from the Gallaudet Shared Reading Project, and specific examples of how each principle can be implemented. Baseline and post treatment measures were conducted for this 5 week intervention. Mueller and Hurtig (2009) concluded that all participants, including mothers and children, increased their signed vocabulary independently of the presence or absence of the fluent signing narrator. Furthermore, although small, Muller and Hurtig (2009) found differences in the time spent reading the e-books: more time was spent reading books containing the fluent signing narrator. Perhaps the signing narrator promoted longer interactions between the dyads via the added signed support.

Wang and Paul (2011) conducted a classroom based study using an alternating treatment design. Participants of this study included 22 students ages 7 to 11 years with mild to profound hearing loss. The treatment conditions included the Cornerstones approach and a Typical approach. The Cornerstones approach is a "literature-based, technology infused literacy project" that focuses on print word recognition and development of background knowledge to facilitate comprehension through the use of technology (p. 57). In this highly structured approach, teachers were provided with lesson plans and all materials needed to carry out diverse activities that revolved around the theme of animated stories. These animated stories were presented in videos with captions, or presented in American Sign Language (ASL), Signing Exact English, or Cued Speech. Children were exposed to technology in the form of graphic organizers, character templates, and games. For the Typical approach, teachers were only told to present stories as

they normally would. Researchers used both quantitative: formal measurements of print recognition, word knowledge and story comprehension, and qualitative: classroom observations and interviews with teachers, to analyze the effects of the two treatments. Overall, there was a statistically significant difference in the students' improvement in word identification and story comprehension skills with the Cornerstones approach versus the Typical approach. There was no significant difference for word knowledge. Noteworthy, teachers stated that the Cornerstones approach can indeed be implemented in the classrooms and they reported the use of technology was a highly valuable aspect of the overall approach.

Beyond the engaging aspects and multimedia features provided by e-books, there are literacy issues currently debated in the field (Snoddon, 2010). Proponents of the ASL-English bilingual educational paradigm support that bilingual education for CHL "provides a developmentally significant resource that will facilitate cognitive development and the acquisition of literacy skills, including English reading and writing" (Stone, 2014, p. 187). Thus, sign-print e-books are literacy tools that can favor the acquisition of both ASL and English. Strong emergent literacy skills, which can be targeted through the use of e-books, can be determinant in later reading ability (Kamhi & Catts, 2012). However, Stone (2014) cautioned that unequal text representations in ASL and English might be present in many of the now commercially available sign-print e-books. Consumers and researchers should evaluate how the e-book was designed, the quality of sign narration, and the degree to which both languages are equally represented in the story. Stone described Mueller and Hurtig (2009) Iowa Signing E-Book and makes note of how the narrator signed the English text in ASL while each printed word could be clicked by the child to present a video of the word in Signed English. Since ASL does not have signs for all of the words in the text, these features of the Iowa Signing E-Book

allow for exact correspondence between each word and a sign, providing a more equivalent representation of both languages.

Given the limited information available regarding the value and effect of technology enhanced shared reading in the population of interest, further research is needed to analyze the extent of the contribution and/or challenges it places on parent-child interactions during reading time.

What Constitutes High Quality Shared Reading Interactions?

Language enhancing techniques. As aforementioned, parents with typical hearing report they do not feel prepared to read to their children. The literature reviewed highlights the importance of providing parents with training and guidance. This has been shown to influence both expressive and receptive skills in their children. The key point is that the mere act of reading out loud is not enough to enhance both language growth and the overall parent-child interaction. Shared reading must be as dynamic as possible. Thus, parents need to make use of specific techniques such as asking questions, praising, expanding, making connections to real world events, and adjusting sign and book placement to name a few (DesJardin et al., 2014; Fletcher, Perez, Hooper, & Claussen, 2005; Fung et al., 2005; Plessow-Wolfson & Epstein, 2005). When following these techniques, the interaction becomes an effective way of fostering literacy skills because children are encouraged “to become active, critical readers, by making predictions, summarizing the events in a story, and answering questions about a story” (Almaguer & Pena, 2010, p. 293).

Dialogic reading (DR) was briefly introduced earlier as one of the few studies including the population of interest. It is necessary to explore the details of this method as it is the basis for many of the language enhancing techniques described in the literature. This method focuses on

parental techniques plus child attention, by providing feedback and scaffolding. The intent of this method is for the child to be able to become the storyteller. It has four components: prompt, evaluation, expansion, and repetition (PEER) (Whitehurst et al., 1988). First, the parent “prompts the child to say something with the help of the book, evaluates the child’s response, expands the child’s response by adding some new information, and finally guides the child to repeat the information to make sure that s/he has learned it” (Fung et al., 2005, p.85). Fung et al. (2005) informed on several studies that have concluded the effectiveness of dialogic reading on typically developing children. Further, the researchers analyzed the effect of a modified version of this approach on Chinese children with a hearing impairment. Adaptations to this approach included using pictures as a form of multimodal stimulation to help children learn vocabulary words. Their study encompassed 28 children with moderate to severe hearing loss and their MTH. Participants were assigned into one of three conditions: dialogic reading, typical reading, and control. Mothers were provided with children books, a dialogic reading guide, and specific dialogic reading techniques they could implement with their children. After 8 weeks of intervention, children in the dialogic reading group had significantly higher improvement in vocabulary skills than children in the other two groups, as measured by a translated version of the Peabody Picture Vocabulary Test–Third Edition (PPVT–III).

Another method that was developed to enhance shared reading interactions, specifically for children with hearing loss, is the Shared Reading Project (SRP). Parents with typical hearing are taught how to read to their CHL by observing how parents with hearing loss read to their CHL children and by implementing the strategies they use. These strategies are summarized in the following 15 principles described by Schleper (1997):

1. Deaf readers translate stories using American Sign Language.

2. Deaf readers keep both languages visible (ASL and English).
3. Deaf readers are not constrained by the text.
4. Deaf readers re-read stories on a storytelling to story reading continuum.
5. Deaf readers follow the child's lead.
6. Deaf readers make what is implied explicit.
7. Deaf readers adjust sign placement to fit the story.
8. Deaf readers adjust signing style to fit the story.
9. Deaf readers connect concepts in the story to the real world.
10. Deaf readers use attention maintenance strategies.
11. Deaf readers use eye gaze to elicit participation.
12. Deaf readers engage in role play to extend concepts.
13. Deaf readers use ASL variations to sign repetitive English phrases.
14. Deaf readers provide a positive and reinforcing environment.
15. Deaf readers expect the child to become literate.

These principles were derived from research on how adults with hearing loss naturally read to CHL. The SRP involved a trained tutor with hearing loss that modeled and coached mothers on how to read to their CHL in ASL and how to implement the 15 principles. In addition, mothers were provided with books, videos showing the story signed in ASL, an activity guide, and the 15 principles (Delk & Weidekamp, 2001; Fung et al., 2005; Mueller & Hurtig, 2009).

DesJardin and colleagues (2014) implemented an intervention program where specific “Facilitative Language Techniques” (FLT) were used by parents with typical hearing when reading with their children who had mild to severe hearing loss. Sixty children with typical hearing and 45 children with hearing impairments participated in this study. The researchers’

analysis examined the effects of lower level FLT (e.g. labeling, and close-ended questions) versus higher level FLT (e.g. parallel talk and open-ended questions). Parents of children with hearing loss were found to use a greater number of lower level FLT than those parents of children with typical hearing. In turn this may prevent further language growth because parents may not be providing enough opportunities for language growth that are within their children's current abilities – within their zone of proximal development. Instead, they are limiting the interactions to less complex and challenging growth opportunities.

Social-emotional characteristics. Beyond the use of specific techniques while reading, Plessow-Wolfson and Epstein (2005) stated that providing the child with a positive and encouraging environment is fundamental. Fung et al., (2005) stated that high quality parent-child interactions are essential for the success of shared reading experiences. Researchers representing the National Institute of Child Health and Human Development stated that “supportive, warm, and engaged parent-child interactions are associated with the child's emerging competencies in social, cognitive, and linguistic domains throughout early and middle childhood” (NICHD, Early Child Care Research Network, 1999, p. 1399). With regards to literacy skills, it can be expected that children that are exposed to these types of interactions will create positive associations with books and reading. Dexter and Stacks (2014) concluded that the quality of shared reading between mothers and toddlers from low SES, was predictive of the children's receptive language skills. In the same line of thought, principle number 14 from the aforementioned Shared Reading Project highlights that “Deaf readers provide a positive and reinforcing environment” (Schleper, 1997). Parents with hearing loss do not tend to correct their children and instead allow them to make creative interpretations of stories, providing them with reassuring comments, promoting a positive and enjoyable environment.

Shared reading interactions need to be composed of these characteristics because such an environment leads to increased interest and motivation on the part of the child. A child's motivation is vital for the development of reading skills (Dirks & Wauters, 2015; Kamhi & Catts, 2012; Landry et. al, 2012; Snow, Burns, & Griffin, 1998). Once the child is in a responsive, supportive, and positive environment, and is thus motivated, it is highly probable that he or she will enjoy shared reading interactions, leading into a desire to continue seeking these experiences. Continuous, repeated practice, and attempts at reading both with adults and on their own are the basis for the development and enhancement of literacy skills. Thus, motivation and interest go hand in hand with ability achievement and level (Kamhi & Catts, 2012). Together, language enhancing techniques and positive social-emotional characteristics contribute to overall high quality shared reading interactions between children and their parents. Below is a description of how the quality of these interactions has important effects on a child's language and literacy development.

Contribution of Maternal Behavior to Quality of Shared Reading Interactions and Literacy Development

As previously stated, parents have a privileged place in promoting the literacy skills of their CHL, not only by frequently exposing them to books, but also by utilizing specific techniques that maintain attention, promote participation, and increase quality of language input and output. The degree of a child's involvement in the interaction allows for shared reading to be more effective, and parents play a unique role in motivating the child to be an active participant. In a sense, the opportunity for their children to grow up embracing and enjoying the act of reading lies in their hands. Several studies have looked at parent implementation of language enhancing techniques, but few have analyzed the impact of the parent's behavior on the overall quality of shared reading interactions. Both the techniques utilized, and maternal

attitudes/behavior can possibly influence literacy outcomes. Parental involvement is a fundamental factor in emergent literacy skills development (Dirks & Wauters, 2015). The present study analyzes the impact of technology enhanced shared reading on maternal behavior during this interaction. Mother communication skills not only encompass the use of expansions, questions, parallel talk, etc.; the *manner* in which these strategies are implemented may also play a role on the ultimate quality of parent-child interactions, and in turn, children literacy outcomes.

Dodici, Draper, and Peterson (2003) described diverse studies that have established strong correlations between maternal responsiveness and sensitivity, and a child's language and social skills. Kim and Mahoney (2004) stated that maternal responsiveness is said to be related to a child's rate of development. In addition responsiveness is associated with cognitive, communicative and social-emotional functioning (Dodici, Draper, & Peterson, 2003). Responsiveness is defined by several researchers as how appropriately a parent responds to the child's behaviors and intentions. According to Taylor, Anthony, Aghara, Smith, and Landry (2008) responsive parenting is one aspect of the environment reported to facilitate more optimal cognitive, social, and linguistic development (p.189). Sensitivity is defined as being aware and adapting to the child's needs and interests, following his or her lead, and monitoring them continuously. Early intervention may promote development by encouraging and training parents to become more responsive to their children. Therefore e-books created by Mueller and Hurtig (2009) include several features that provide parents with more and better resources to respond to their children when reading together, which in turn can make the interaction more enjoyable and plausible. Other maternal behaviors such as emotional tone (e.g. praise, smiles, and positive comments) and engagement (e.g. joint attention) have also been shown to be related to cognitive and linguistic outcomes. With regards to style of parental guidance, research has shown a

relationship between high levels of parental directedness (e.g. trying to change the child's behavior through commands and requests) and child's limited vocabulary (Dodici, Draper, & Peterson, 2003; Mahoney 2008).

Furthermore, Dodici, Draper, and Peterson (2003), conducted a longitudinal study (CTH from low SES) analyzing the above mentioned behaviors and their effects on children's language development at 14, 24 and 36 months. The researchers recorded and rated structured sessions that elicited teaching, play, and frustration behaviors between 27 caregivers and their children. Results showed that the following factors were strongly related to early literacy skills (e.g. receptive vocabulary, symbolic representation, and phonemic analysis): child language, parent language, emotional tone, joint attention, parental guidance, and parental responsivity.

Plessow-Wolfson and Epstein (2005) reported that the communication skills of CHL, ages 3-8 years, were linked to maternal reciprocal and reassuring behaviors. In the same manner, attachment has been shown to have influence over how mother and child interact and use scaffolding during shared reading. Successful interactions may be related to the child's comfort level and maternal approaches at attaining a desired level of comfort. These authors examined shared reading interactions between 7 dyads of mothers with typical hearing and their CHL. The age range for children in this study was 4.2 to 9.5 years. Mothers in this study were found to ask elaborated questions about the reading, engage children in reciprocal dialogue, and provide their children with enough and appropriate levels of scaffolding. This had an effect on the child's desire to continue reading and apparent enjoyment.

Taylor et al. (2008) make a strong case in favor of the effect that maternal responsiveness has on children's language and cognitive abilities. The researchers stated that the parenting style/environment plays a greater role in the development of children with special needs than that

of typically developing children. They define responsiveness as an “affective-emotional style ... with high levels of warmth and nurturance” which promotes a positive response from the child and their cooperation in the interaction (p.190). How does responsiveness promote cognitive, social and language development? It is hypothesized that a child can maintain attention as a parent continues to monitor their focus of attention and responds accordingly. The child thus does not have to use all of their cognitive resources in maintaining attention without any support, and they can then focus on understanding the interactions and constructing their own responses. Taylor et al. (2008) carried out a longitudinal study that followed 238 children at risk (very low birth weight) from 6 months to 8 years of age. Maternal responsiveness and child cognitive abilities were tracked at 6, 12, 24 months, and 3 and 4 years. Results suggested that maternal responsiveness and child cognitive abilities at 4 years predicted reading comprehension at 8 years of age.

It is important to take into account that correlation between maternal behaviors and child development can only be “inferred” since there are many factors that could be influencing these relationships (Taylor et al., 2008). In addition, influences can be bidirectional, as children’s development can also affect maternal behavior and vice versa, or both at the same time. However, the longitudinal study presented by Taylor et al. (2008) allows for the use of cross-lag analysis, a way to check influences on both directions. However, one must be cautious when examining these influences as the direction of causality can only be assumed without the appropriate analyses.

Defining Quality of Interactions: Analysis of Maternal Behaviors

There are two ways to analyze parent-child interactions: surveys and observations. Surveys depend on parental self-report of frequency and quality of behaviors/strategies used and

thus are not completely reliable sources of information. On the other hand, observation allows the researcher to analyze several details of parent-child interactions at once. Global rating scales have been found to be useful when assessing overall outcomes of interactions (Adamson, Bakeman, Deckner, & Nelson, 2012). Several researchers have developed observation protocols and rating scales to analyze parental behavior in varied interactions including play and reading.

The Kaderavek-Sulzby Book Reading Observational Protocol (KSBOP) was developed by Kaderavek and Sulzby (1998) after observing shared reading and toy-play interactions of 10 children with language impairment. This protocol was based on the social-constructionist models, highlighting the need to look at both the child and the mother as they both bring factors that influence these interactions. The authors wished to assess the degree of mother-child engagement, and the degree to which the interaction was successful. The KSBOP includes the following five sections: success of shared reading interaction, storybook selection, parent scaffolding, social/emotional climate, and verbal responsiveness. Raters write down observations of the behaviors included in the protocol and circle positive and negative statements that best characterize the observed interactions. It appears that this protocol is very subjective as statements are open to rater interpretation and opinion. In addition operational definitions are not given for important behaviors that are subjective in nature (e.g. appealing, enjoyment). After completing the protocol, one would only obtain descriptive details about the interaction and this does not allow for tangible and consistent comparison among interactions and different dyads.

Taylor et al. (2008) used a 5-point rating scale to code for maternal behaviors of warm acceptance and flexibility/responsiveness. Warm acceptance was defined as “having a relaxed overall style with their child; talking to their child in a positive way, including scaffolding; and having a positive tone and verbal praise, greater physical affection, close contact, and affect”

(p.194). Responsiveness was defined as mothers being “prompt and appropriate in their responses, showed greater sensitivity and contingency to children’s cues (e.g., followed the child’s lead rather than directed play) and pacing (e.g., speed of changing from one toy to the next), and accepted children’s needs and interest” (p. 194). This scale was used to evaluate the predictability of children’s decoding and reading comprehension skills based on maternal responsiveness during daily activities and play interactions.

Adamson et al. (2012) developed the Communication Play Protocol (CPP) which consists of 17 items that mainly assess the amount and quality of joint engagement during play-based interactions. The CPP contains a 7-point Likert scale and is divided in the following sections: joint engagement, child behaviors, parent behaviors, and shared topic. Although having a Likert scale provides more consistent ratings than those derived from the KSBOP, the CPP has minimal operational definitions.

Common behaviors assessed throughout the scales and observational protocols available are: responsiveness, enjoyment, engagement, affect, encouragement, sensitivity, pace of the interaction, and making accommodations to child’s interests (Adamson et al., 2012; Dodici, Draper, & Peterson, 2003; Kaderavek & Sulzby, 1998; Taylor et al., 2008). Worth mentioning is the fact that definitions and the degree to which they were operationally defined varied considerably across scales.

The Maternal Behavior Rating Scale (MBRS) developed by Mahoney and colleagues, and revised in 2008, encompasses several of the common behaviors assessed by other rating scales available. This was created to evaluate effects of intervention programs hoping to modify maternal interactive behaviors with children with intellectual disabilities (Mahoney & Powell, 1986). The scale was developed in 1985 and it has undergone continuous adjustments and

revisions throughout the years to ensure its efficacy in assessing maternal behaviors during play-based interactions. The MBRS-Revised has 12 behaviors: responsiveness, expressiveness, warmth, acceptance, sensitivity, effectiveness, praise, enjoyment, inventiveness, pace, achievement, and directiveness. The behaviors included in this scale were selected because the literature reports they are related to variability in children's cognitive, language, and social development. The MBRS-Revised (Mahoney, 2008) contains a 5-point Likert scale with descriptive and operationally defined behaviors, and specific examples for each point in the scale. Previous studies using this scale have attained high levels of interrater reliability (Diken & Mahoney, 2013; Kim & Mahoney, 2004; Mahoney, Boyce, Fewell, Wheeden, 1998; Mahoney & Wheeden, 1999; Mahoney, Wheeden, & Perales, 2004)

The MBRS-Revised (Mahoney, 2008) is of special interest to the current study since the use of e-Books and training/support provided to mothers participating in the current study were aimed at modifying their shared reading interactions. The operational definitions provided in his scale allowed for the implementation of assessing maternal behavior during shared reading. Furthermore, behaviors included in this scale are supported by the literature available as they have been found to influence children development. Modifications made to the original scale to account for the change in context – share reading interactions instead of play-based – are described below in the Methods section.

The Current Study

The aforementioned alarming literacy deficits of CHL call for urgent changes in early intervention and at-home reading practices. Fung et al. (2005) and DesJardin et al. (2014) explored the influences of language facilitation techniques used by mothers when reading to their CHL children. Furthermore Dodici, Draper, and Peterson (2003), Plessow-Wolfson and Epstein

(2005), and Taylor et al. (2008) described the influences of maternal responsiveness and other behaviors on the literacy skills of CHL children and overall quality of interactions. Mueller and Hurtig (2009) analyzed the effect of a fluent signing narrator on time spent reading and signed vocabulary acquired by MTH and their CHL.

However, no previous study has analyzed the effect that technology enhanced shared reading may have on maternal behaviors that contribute to high quality interactions between MTH and their young CHL. Given the limited research on this population and the use of technology enhanced reading, it is of extreme importance to analyze all factors that may play a role in fostering literacy skills in young CHL. The purpose of this study is to analyze the effect of the fluent signing narrator (embedded in e-books) on maternal behavior and quality of mother-child interaction, which as discussed above, also plays a role in developing strong language skills, and ultimately, enhancing literacy skills. The findings of this study will increase the current knowledge and provide more resources to implement evidence-based practice in promoting high quality shared reading interactions for parents with typical hearing, targeting language and literacy development in CHL. The questions this study seeks to answer are:

- What effect, if any, did the presence of the fluent signing narrator embedded in the e-books have on 10 maternal behaviors? (Sensitivity to child's interest, Responsivity, Effectiveness, Acceptance, Enjoyment, Expressiveness, Achievement Orientation, Verbal praise, Directiveness, and Pace)
- What relationships, if any, exist between ratings of maternal behaviors and results from Mueller and Hurtig (2009)? (Time spent with parent training books, number of correct answers, signed vocabulary acquisition, number and form of utterances produced by mother, Shared Reading Principles used)

Chapter 3: Methods

This study is an extension of Mueller and Hurtig (2009). The beginning of this chapter provides a summary of the procedures and criteria established by Mueller and Hurtig (2009). Sections titled “Measures” and “Procedure” on pages 27-32 describe the current study.

Participants

In order to participate in the study, children and their mothers had to meet the following inclusionary criteria:

- Hearing loss diagnosed prelingual
- Age range of 2 to 5 years
- Exposure to any form of sign language such as: Signed English, ASL, and/or Pidgin
- No co-occurrence of other disorders such as intellectual disability or autism
- Primary caregiver – typical hearing

Four dyads of mothers with typical hearing (MTY) and their children with hearing loss (CHL) were recruited for a study. In order to maintain confidentiality, names of children and mothers were changed as per the previous study. Below is a description of each dyad.

Dyad one. “Charlie” was four years, 10 months old at the time of the study. He was diagnosed with a moderate hearing loss in both ears that progressed to profound by two years and nine months. At age four, he received bilateral cochlear implants, and a mild hearing loss remained after implantation. Charlie attended school twice a week where he was accompanied by an itinerant teacher for the Deaf who used simultaneous signing and speaking when communicating with the child. Mother 1 is a special education teacher and she was familiar with shared reading and technology.

Dyad two. “Ivan” was two years, zero months old at the time of the study. He was diagnosed with mild to moderate, sloping to moderate sensorineural hearing loss on both ears at time of birth. He began using hearing aids in both ears at three months of age and used both speech and signs to communicate. He received exposure to sign language from an itinerant teacher of the Deaf once a week at school. Mother 2 wished for Ivan to become an oral-only English speaker. She had graduated from college and was a homemaker at the time of the study. Upon interview the at the end of Mueller and Hurtig (2009) study, Mother 2 exhibited difficulty accepting her child’s hearing loss and did not appear interested in learning sign language.

Dyad three. “Nancy” was three years, three months old at the time of the study. She has bilateral moderate hearing loss that was diagnosed at 14 months of age. At the time of the study, Nancy was only amplified with a hearing aid on her left ear, and had been using it for six months. Nancy used both single signs and vocalizations to communicate. Mother 3 was enrolled in sign language classes at the beginning of Mueller and Hurtig (2009) study. She appeared to be very interested in Nancy learning sign language as a mode of communication. At the time of the study she had completed some college but had not graduated and was a homemaker

Dyad four. “Wayne” was four years, eight months old at the time of the study. At birth, he was diagnosed with moderate, sloping, to severe sensorineural hearing loss bilaterally. At three months of age, his parents started using sign language to communicate with him, and by four months of age, he wore hearing aids bilaterally. His primary mode of communication was speech but he also used signs to communicate with people who knew sign language. He was exposed to ASL at school and at home from fluent Deaf tutors. Mother 4 is a speech-language pathologist (SLP) and she was in favor of a multimodal approach for her child’s communication. She started learning ASL upon Wayne’s hearing loss diagnosis.

Table 1. Characteristics of Children

Name	Age	Severity of Hearing Loss	Age at Amplification	Mode of Amplification	Mode of Communication
Charlie	4; 10	profound bilateral hearing loss	4 years	Bilateral cochlear implant	Combination of speech and signs
Ivan	2; 0	mild to moderate, sloping to moderate sensorineural hearing loss bilaterally	3 months	Bilateral hearing aids	Combination of speech and signs
Nancy	2; 3	moderate bilateral hearing loss	1 year 9 months	Hearing aid on left ear	Combination of speech and signs
Wayne	4; 8	moderate, sloping to severe sensorineural hearing loss bilaterally	4 months	Bilateral hearing aids	Primarily speech, also signs

Table 2. Characteristics of Mothers

Name	Occupation/SES	View of Sign Language	Other
Mother 1	Special educator	Valued sign support	Familiar with SR and technology
Mother 2	Homemaker/College graduate	Oral only	Difficulty accepting child's hearing loss
Mother 3	Homemaker/Some college	Supportive of sign	Enrolled in ASL class
Mother 4	SLP	Multimodal communication	Started learning ASL upon child's diagnosis at birth

Mother-child shared reading interactions

As part of the study, the four dyads were given sets of e-books during a five-week period. E-books were presented on touch screen PC tablets, and they contained pictures and questions about target vocabulary and story content. Half of the E-Books included videos of a fluent signing narrator, and the other half did not. E-books also contained the 15 principles provided by the Gallaudet Shared Reading Project. Mothers could access these tools as they wished. Dyads were videotaped reading each week in their homes.

Mothers received training on the use of E-books for both sets (signing narrator and no narrator). Mothers were provided with parent training e-books containing the signed version of the book every time regardless of condition. This allowed them to learn how to sign the story for those phases of the study where the child was presented with E-books that did not have the signing narrator. Specific strategies such as describing pictures, and making comments specific to each story were also included as part of the training items that were available to mothers throughout the five weeks of the study.

The study followed an ABABA withdrawal design. During baseline and withdrawal phases (A), the dyads were given a set of five books that did not contain the signing narrator. For treatment phases (B), participants were given a set of five books in which a signing narrator was present.

Measures

For the current study, a modified version of the Maternal Behavior Rating Scale (MBRS-R) developed by Mahoney, Finger, and Powell (1985) and revised in 2008, was used to measure the effect of the fluent signing narrator on maternal behaviors during shared reading. This global rating scale was selected because it was developed to analyze modifications to maternal behavior

in response to intervention, during play-based interactions (Mahoney, Boyce, Fewell, Spiker, & Wheeden, 1998). The purpose of this study is to identify key features that should be implemented in future early intervention parent-training programs that aim to modify shared reading experiences of MTH and their CHL. Since the MBRS is reported to be sensitive to changes in maternal behavior due to early intervention, it is the most adequate scale currently available. Mahoney and Powell (1986) stated that “Although this investigation [using the MBRS] focused only on mother-child interaction with toys, other situations may be used for assessing mother-child interaction as long as they are constant for all observations” (p.54). Recordings of mother-child shared reading interactions of the current study are considered to be constant as all dyads had access to e-books that contained the same formatting, features, and parental training and support. In addition, play-based and book sharing are both naturalistic context in which adults and children can interact (Girolametto, Hoaken, Weitzman, and van Lieshout, 2000).

The Mahoney et al. (1998) created scale scores based on a factor analysis of ratings for 150 dyads conducted by Boyce et al. (1996). Four factors were derived from this analysis in which it was determined that these four categories encompassed similar behavioral characteristics. Below are the scale scores and specific behaviors within each scale score:

- Responsive/Child oriented:
 1. Sensitivity to child’s interest
 2. Responsivity
 3. Effectiveness (Reciprocity)
- Affect/Animation:
 4. Acceptance
 5. Enjoyment
 6. Expressiveness
- Achievement Orientation:
 7. Achievement
 8. Verbal praise

- Directive:
 9. Directiveness
 10. Pace

Two behaviors from the original 12-item scale were not included in the current study – inventiveness and warmth – as they either did not apply to shared reading interactions or were considered to be too similar to other behaviors. For the purpose of this study, it is hypothesized that behaviors will be rated as follows: sensitivity, responsivity, effectiveness, acceptance, enjoyment, expressiveness, achievement, and verbal praise will receive high ratings (3-5); directiveness will be rated low (1-3); and pace will be rated 3 when signing narrator is present, signaling high quality interactions.

Modifying the MBRS. Modifications were made after reviewing several videos on the basis of the differences found between play-based and shared reading interactions. Play-based interactions allow for either mother or child to decide on what activities to engage and to what extent (e.g. using different toys, changing activities, arranging objects, etc.). On the other hand, shared reading interactions recorded for this study followed similar protocols for all participants and the formatting of eBooks was the same. For example, all dyads had access to a set amount of e-books at a time and all of these e-books contained the same features (narrator/no narrator, questions, feedback for responses, touching an individual word and viewing video of how to sign that word).

Behaviors specific to these e-book shared interactions such as the modeling, prompting and use of signs by mother and child were also incorporated to the MBRS definitions. In addition, operational definitions and specific examples of ambiguous behaviors (e.g. “hard-to-detect communication”, rejection, joy, pleasure, achievement, and encouragement) were included to increase reliability in rating the interactions. Other specific examples of modifications were

related to eBook formatting – having the mother/child click on pictures, change pages, answer questions. In addition, changes to the Likert scale were made to account for more moderate expressions of enjoyment and expressiveness that were noted to be common of the mothers in this study. It was important to make these accommodations as reading styles vary considerably in part due to cultural and socioeconomic differences (Kaderavek, Sulzby, 1998). Dependent variables for this research were the 10 behaviors listed above.

Example. The behavior “Responsivity” is defined as:

“...frequency, consistency and supportiveness of the parent's responses to the child's behaviors. Responses are supportive when they match the child's actions, requests and intentions. Responsivity is assessed in relation to child behaviors that both *demand a response* from adults as well as non-demand behaviors that may not be directed toward the adult (e.g. child making spontaneous comments or gestures, labeling pictures, or producing signs about the story, that are not directed toward adult). Child behaviors include play and social activity as well as facial expressions, vocalizations, gestures, signs of discomfort, body language, requests and intentions.”

This behavior is rated from 1 (Highly unresponsive) to 5 (Highly responsive). The complete five-point global Likert scale, along with specific examples of how these behaviors were exemplified in the shared reading interactions are provided in Appendix A.

Reliability. Mahoney et al. (2004) achieved 100% within one point agreement and 77% exact agreement when using the original 12 item rating scale in a study looking at the relationships between special education outcomes and parent-child play interactions. In the same manner, Kim and Mahoney (2004) stated their raters obtained overall exact agreement of 81%, which ranged from 62% (for effectiveness) to 86% (for expressiveness and sensitivity). Mahoney

(2009) suggests that interrater reliability should be established by having two raters watch a video together, rate the interaction, discuss the results and continue doing this for approximately 5 to 10 videos until raters report understanding of rating criteria. Two raters (the author, and another graduate student) reviewed a total of 13 videos together, looking at specific examples of each behavior included in the modified MBRS, rated the interactions and discussed results during the training phase of data collection. Scorers spent a total of 17 hours of training and scoring. Then each rater independently reviewed 11 videos and compared results. Raters looked at a 3-minute window in the middle of each video as Mahoney (2009) indicates that observations should last 3 to 7 minutes. He reports that there is greater difficulty obtaining high agreement percentages for longer observational periods. Within one point interrater agreement was 90% for a total of 6 videos. These 6 videos constituted 21% of the 28 videos that were utilized for data collection.

Procedure

For the purpose of this study, a lap-reading session (LRS) is composed of a mother-child shared reading interaction with one E-book. There were a total of seven LRSs per dyad. Given the fact that each LRS was not of the same duration, the middle 50% of each session was rated using the modified MBRS. After reviewing several LRSs, the author decided to rate the middle portion of each LRS given that beginnings and endings of sessions were not considered to be as representative of the whole interaction.

To calculate the middle 50% of each LRS, the author converted the total amount of minutes each LRS lasted into seconds, and then divided this number by two. For example, if a LRS ranged from minute 0:00 to minute 6:00, this is equivalent to 360 seconds. This number is then divided by 2 to measure the duration of 50% of the LRS ($360/2 = 180 \text{ sec} = 3 \text{ minutes}$). Finally,

a time frame is selected to leave approximately the same amount of time in the beginning and in the end of the LRS. This allows to observe the middle portion of the LRS. In the example above, the time frame selected to observe and rate would be 1:30 – 4:30, leaving exactly 1 minute and 30 seconds in the beginning and 1 minute and 30 seconds in the end, allowing to observe the middle 3-minutes of the session. LRSs were reviewed by the author of this study at least twice and no more than 3 times before determining final scores.

Analysis

Cohen's d effect size was calculated using mean ratings and standard deviations for each study phase (narrator vs. no narrator) per behavior and per child. Treatment effect was assigned to higher mean ratings in the following behaviors: sensitivity, responsivity, effectiveness, acceptance, enjoyment, expressiveness, achievement, and praise. Treatment effect was assigned to lower mean ratings for directiveness, as the less directive mothers were, the more optimal the interaction. For pace, treatment effect was assigned to mean ratings that were closest to 3, as a score of 3 signaled the desired average rate of behavior.

Chapter 4: Results

Results and discussion (see next chapter) will be presented as four separate case studies followed by patterns of behavior per study phase

Dyad one: Mother 1 and Charlie

Medium treatment effect was found for effectiveness, $d=0.71$ in favor of the no-narrator phases. Large treatment effect was found for sensitivity, $d = 0.81$; and directiveness, $d = 1.22$ in favor of the no-narrator phases (see Table 3). Mother 1 was rated as being more effective in engaging the child in the interaction, more aware of the child's interests (sensitivity), and less directive for e-books that did not contain the signing narrator. Medium treatment effect was found for behaviors of achievement, $d=0.71$; and praise, $d=0.73$, in favor of the narrator phases. Mother 1 was rated as being more achievement oriented, meaning that she aimed to promote the child's development through the interaction; and praised the child more often for his performance when reading e-books where the narrator was present. Please note that Cohen's d could not be calculated for the behavior of pace because both standard deviations were equal to zero.

Dyad two: Mother 2 and Ivan

Medium treatment effect was found for behaviors of enjoyment, $d = 0.74$; and expressiveness, $d = 0.67$, in the narrator phases (see Table 4). Large treatment effect was found for sensitivity, $d= 0.91$; acceptance, $d = 1.04$; achievement oriented, $d = 1.55$; and pace, $d = 0.95$, in the narrator phases. Mother 2 was rated as showing more enjoyment (smiles/laughter), being more expressive (verbal and nonverbal communication), more aware of the child's interest (sensitivity), more accepting of the child's behavior, more achievement oriented, and showing an average pace when reading e-books where the narrator was present.

Table 3. Results for Mother 1

	Mean	SD	Cohen's <i>d</i>
Sensitivity			0.81**
A	4.75	0.5	
B	3.5	2.12	
Responsivity			0.31
A	4	0.82	
B	3.5	2.12	
Effectiveness			0.71*
A	3.75	0.5	
B	3	1.41	
Acceptance			0.24
A	3.25	1.26	
B	3.5	0.71	
Enjoyment			0.3
A	2.75	0.96	
B	2.5	0.71	
Expressiveness			0.21
A	3.75	0.96	
B	4	1.41	
Achievement			0.71*
A	3.75	0.5	
B	4	0	
Praise			0.73*
A	2	2	
B	3.5	2.12	
Directiveness			1.22**
A	3.5	0.58	
B	4	0	
Pace			n/a
A	3	0	
B	4	0	

Table 4. Results for Mother 2

	Mean	SD	Cohen's <i>d</i>
Sensitivity			0.91**
A	2	1.22	
B	3.25	1.5	
Responsivity			0.18
A	3	1.22	
B	3.25	1.5	
Effectiveness			0.29
A	2.6	0.55	
B	2.75	0.5	
Acceptance			1.04**
A	3	0.71	
B	4	1.15	
Enjoyment			0.74*
A	3.2	0.45	
B	3.75	0.96	
Expressiveness			0.67*
A	3.4	0.55	
B	3.75	0.5	
Achievement			1.55**
A	4.4	0.55	
B	5	0	
Praise			0.46
A	3.2	1.30	
B	2.75	0.5	
Directiveness			0.29
A	4.4	0.55	
B	4.25	0.5	
Pace			0.95**
A	4.4	0.89	
B	3.5	1	

Note: SD (Standard Deviation); *d** = medium treatment effect; *d*** = large treatment effect.

Dyad three: Mother 3 and Nancy

Medium treatment effect was found for enjoyment, $d = 0.62$ in favor of the no-narrator phases (see Table 5). Large treatment effect was found for sensitivity, $d=0.80$; responsivity, $d=0.82$; and directiveness, $d=0.81$, for the no-narrator phases. Mother 3 was rated as showing more enjoyment, being more aware of her child's interest (sensitivity), more responsive, and less directive when the narrator was not present in the e-books. Large treatment effect was found for praise, $d=1.0$ when the narrator was present. She was rated as praising her child more often when the narrator was present.

Dyad four: Mother 4 and Wayne

Medium treatment effect was found for expressiveness, $d=0.63$, in favor of the no-narrator phases (see Table 6). Large treatment effect was found for effectiveness, $d=0.80$; acceptance, $d=1.74$; enjoyment, $d=1.68$; praise, $d=1.03$; directiveness, $d=1.03$; and pace, $d=1.14$, in favor of the no-narrator phases. Mother 4 was rated as being more expressive, more effective in engaging her child in the interaction, more accepting of his behaviors, showing more enjoyment, praising more frequently, being less directive, and having an average pace when the narrator was not present. Medium treatment effect was found for sensitivity, $d=0.63$, in favor of the narrator phases. She was rated as being more aware of Wayne's interest (sensitivity) when reading e-books where the narrator was present.

Table 5. Results for Mother 3

	Mean	SD	Cohen's <i>d</i>
Sensitivity			0.8**
A	1.33	0.58	
B	1	0	
Responsivity			0.82**
A	1.33	0.58	
B	1	0	
Effectiveness			0.26
A	1.67	1.15	
B	2	1.41	
Acceptance			0.26
A	1.33	0.58	
B	1.5	0.71	
Enjoyment			0.62*
A	2.67	0.58	
B	2	1.41	
Expressiveness			0.11
A	3.67	0.58	
B	3.5	2.12	
Achievement			0.26
A	4.67	0.58	
B	4.5	0.71	
Praise			1.0**
A	1	0	
B	2	1.41	
Directiveness			0.81**
A	4.67	0.58	
B	5	0	
Pace			0.31
A	4.33	0.58	
B	4	1.41	

Table 6. Results for Mother 4

	Mean	SD	Cohen's <i>d</i>
Sensitivity			0.63*
A	4.4	1.34	
B	5	0	
Responsivity			0.47
A	4.6	0.55	
B	4.33	0.58	
Effectiveness			0.8**
A	5	0	
B	4.67	0.58	
Acceptance			1.74**
A	4.40	0.55	
B	3	1	
Enjoyment			1.68**
A	4.4	0.89	
B	2.67	1.15	
Expressiveness			0.69*
A	3.6	1.52	
B	2.67	1.15	
Achievement			0.12
A	4.6	0.55	
B	4.67	0.58	
Praise			1.03**
A	2.2	1.64	
B	1	0	
Directiveness			1.03**
A	2	0.71	
B	2.67	0.58	
Pace			1.41**
A	3	0	
B	2	1	

Note: SD (Standard Deviation); *d** = medium treatment effect; *d*** = large treatment effect.

Table 7. Cohen's *d* for all four Mothers

	Sensitive	Responsive	Effective	Accept	Enjoy	Expressive	Achieve	Praise	Directive	Pace
1	0.81**	0.31	0.71*	0.24	0.3	0.21	0.71*	0.73*	1.22**	n/a
2	0.91**	0.18	0.29	1.04**	0.74*	0.67*	1.55**	0.46	0.29	0.95**
3	0.8**	0.82**	0.26	0.26	0.62*	0.11	0.26	1**	0.81**	0.31
4	0.63*	0.47	0.8**	1.74**	1.68**	0.69*	0.12	1.03**	1.03**	1.41**

Note: *d** = medium treatment effect; *d*** = large treatment effect; Green = In favor of the Narrator phases; Orange = In favor of the No-narrator phases

Chapter 5: Discussion

Summary

The purpose of the present study was to increase understanding of how maternal behaviors contribute to the quality of shared reading interactions and the influence this may have on early literacy development. Data interpretation will answer the following questions:

- What effect, if any, did the presence of the fluent signing narrator in the e-books have on maternal behavior?
- What relationships, if any, exist between ratings of maternal behaviors and results from Mueller and Hurtig (2009)?

Dyad one: Mother 1 and Charlie

Overall, Mother 1 was rated significantly better for sensitivity, effectiveness and directiveness when the narrator was not present. This mother was a special education teacher familiar with SR and technology, and she also valued sign support. All of these characteristics may account for her awareness and monitoring of Ivan's interests and her ability to engage and maintain his attention during the interaction without needing the narrator to provide added support. Also, since she was focused on signing the story, perhaps she did not have time/need to try to overly direct the interaction in a negative way. Her main objective was not to control what the child did, but to engage him in the stories she was signing. On the other hand, she was rated significantly better for achievement orientation and praise when the narrator was present. It may be possible that having the narrator sign the story allowed Mother 1 to focus on teaching vocabulary, asking questions and reinforcing correct responses instead of having to sign the story and maintaining the child's interest depending solely on her narration of the story.

Mueller and Hurtig (2009). Mother 1 used all of the parent training e-books at least once per study phase. Although she did not look at the Shared Reading Principles, she used the

story specific tips for up to 40% of the time spent on the training e-books for all of the phases. She reported that the SRP and story specific tips were helpful but given she was a special educator, she did not need to review them. This supports the conclusions made regarding her behavior ratings. She also stated she enjoyed e-books where the narrator was present the most because this provided her with the opportunity to learn different ways to sign stories. She learned 14 new signs and there was no effect for treatment phase. Charlie learned 23 target signs, and he showed a treatment effect in favor of the no-narrator phases of the study.

Charlie's mother average number of utterances did not show any significant differences per phases. She produced a greater proportion of directive statements during the narrator phases, and her mean behavior ratings also showed she was significantly more directive during these phases. Results report no effect of signing narrator on the number of SRP used by this mother. She was the only mother for which results generally showed no treatment effect. Likewise, for the current study she had the greatest variation. She did not show a clear pattern in favor of either phase.

Dyad two: Mother 2 and Ivan

Mother 2 was rated significantly better for sensitivity, acceptance, enjoyment, expressiveness, achievement and pace when the narrator was present. She was the only mother that showed such a clear pattern in favor of the narrator phases (see Table 7). This mother did not believe Ivan had a hearing impairment and she preferred an oral-only approach for her child's education. In addition, her signing skills were limited (see below). For these reasons, having the narrator may have functioned as a support that compensated for her limited signing skills and allowed her to focus on the quality of the interactions, instead of concentrating on narrating the stories. Also, since Ivan was the youngest participant, the added features provided by the narrator

could have influenced his level of attention and cooperation, facilitating the interaction and allowing Mother 2 to perform significantly better in behaviors that enhance the overall interaction.

Mueller and Hurtig (2009). Mother 2 was the only mother that used the parent training e-books only twice for the duration of the study. Meaning that she did not seek the signing training that other mothers obtained. In an interview conducted by the researchers, it was evident that she was not interested in learning sign language. Interestingly, she was the only mother showing clear treatment effects favoring the narrator phases for most of the behaviors. This relationship further highlights that the signing narrator was a source of support for this mother who was not prepared to sign the stories to her child. On the contrary, she reported that Ivan was not interested in the narrator, which made it difficult for her to capture his attention for e-books containing this feature. A relationship was found between the number of correct responses to embedded questions Ivan produced and his mother's praise rating. For the e-book where Ivan responded with the highest number of correct responses, his mother was rated a 4 for praise ("Praises frequently") and in the same manner, for the e-book with the lowest amount of correct answers, she received a 2 for praise ("Low praise"). Mother 2 learned a greater percentage of target signs (total of 16 signs) for phases where the narrator was present, which is congruent with all the aforementioned. Overall, she performed better in the behaviors rated and learned more signs for the narrator phases of the study. However, Ivan only learned 5 new signs. This finding is significant because although Mother 2 was rated significantly better when the narrator was present, meaning that she exhibited behaviors that contribute to a high-quality interaction, her child learned the least number of target signs from all four participants. This suggests that although the quality of the interaction was enhanced by the signing narrator, other factors could

have had a greater impact in the child's vocabulary acquisition. These factors include: lack of maternal interest in sign acquisition, negation of child's hearing loss, and maternal limited signing skills. Shared reading interactions of higher quality, without maternal interest and support in sign language, were not enough to promote signed vocabulary acquisition, which was one of the goals of the intervention. She used a greater average number of Shared Reading Principles during the no-narrator phases, perhaps as a way to compensate for the absence of the narrator.

Contradicting relationships were found between number and types of utterances produced by Mother 2 and her behavior mean ratings (refer to Table 4). On average, she produced a greater number of utterances during the no-narrator phases. Although she was rated significantly higher for expressiveness during the narrator phases, it is important to take into account that expressiveness also encompassed nonverbal expression, characteristics that are not captured in the count of number of utterances produced. She produced a greater proportion of questions during the no-narrator phase, but there was a large treatment effect for achievement in favor of the narrator phases. However, it must be noted that in order to obtain high ratings for achievement, mothers had to not only ask questions but to also model signs, prompt for sign production, and/or provide hand over hand assistance when needed/requested. Similarly, she produced a greater number of directive statements during the narrator phases, but did not show a treatment effect for the behavior of directiveness. This can be explained by the fact that ratings of directiveness not only included directive/controlling statements, but also actions taken by mothers such as holding a child's hand to prevent him from touching the screen or interrupting the child by moving on to the next page. These conclusions highlight that the modified version of

the MBRS provides an extensive view of maternal behaviors that average numbers and types of utterances cannot yield.

Dyad three: Mother 3 and Nancy

Mother 3 was rated significantly better for sensitivity, responsiveness, enjoyment, and directiveness when the narrator was not present. Recall that this mother was supportive of sign language and was enrolled in a sign language class. This may explain her desire to perform at her best when having to sign the story on her own because she was using her newly acquired skills. Having to use her signing skills may have motivated her to perform better and monitor Nancy's interest, respond to her in a supportive manner, and enjoy the interaction. Also, since she was focused on signing the story, perhaps she did not have time/need to try to overly direct the interaction in a negative way. Her main objective was not to be in control of the whole interaction, but instead to sign the story to the best of her ability. Conversely, praise was rated higher when the narrator was present. This might be due to the narrator reducing the added load of having to sign the story, and instead allowing Mother 3 to focus on reinforcing accurate responses/signs.

Mueller and Hurtig (2009). Mother 3 was the mother that spent the longest time using the parent training e-books for phases where the narrator was not present. She stated that she wanted to teach sign language to her daughter and found the parent training e-books very helpful. This supports the aforementioned claim regarding her motivation to enhance and use her signing skills. However, she also stated that she preferred books that contained the signing narrator because she was able to learn new signs from it. She spent her time looking at a variety of features and was the mother that spent the greatest percentage of time looking at pictures, text, and questions/responses. Of importance is the fact that Mother 3 learned the most new signs, 30,

out of all the mothers. She learned a greater percentage of target signs in the no-narrator phases, perhaps due to her increased amount of time spent on parent training e-books during these phases. In a similar manner, Nancy was one of the children that learned the most new signs, 23. The child learned a greater percentage of target signs for the narrator phases. Correspondingly, Mother 3 showed a large treatment effect for praise in favor of the narrator phases, which may explain Nancy's vocabulary acquisition as she received positive verbal reinforcement more often during these phases. Results from both the current study and Mueller and Hurtig (2009), support the conclusion that Mother 3 performed better behavior wise, learned more signs, and spent more time training in the no-narrator phases.

Dyad four: Mother 4 and Wayne

Mother 4 was rated significantly better for behaviors of effectiveness, acceptance, enjoyment, expressiveness, praise, directiveness and pace when the narrator was not present. Given that she was a speech-language pathologist and the most fluent signer, it is clear that she had the abilities, strategies, and shared reading experience that most favored the overall quality of the interaction without the need of support from the signing narrator. On the other hand, higher ratings for sensitivity when the narrator was present may be accounted by the fact that not having to sign the story herself allowed her to concentrate in identifying and monitoring Wayne's interests and communication behaviors. On the contrary, when the narrator was not present and she was focused on signing the story, she did not have a chance to provide this type of monitoring.

Mueller and Hurtig (2009). Similar to Mother 3, Wayne's mother spent more time looking at parent training e-books during the no-narrator phases. Although overall mothers did not look at the Shared Reading Principles frequently, Mother 4 reviewed them once. It was

reported that she spent approximately up to 50% of the time looking at story specific tips when using parent training e-books. As above mentioned she was the most fluent signer and results showed that she knew most of the target signs at pre-test and learned the remaining by post-test. This further supports the conclusion that she was rated better for most behaviors during the no-narrator phases because of her signing abilities and professional background. Moreover, Mother 4 stated that she enjoyed e-books where the signing narrator was not present because this allowed her to apply her signing abilities and she felt she was a “passive observer” when the narrator was present (Mueller & Hurtig, 2009, p. 23). Her view is directly supported by her mean ratings for the behavior of enjoyment, showing a large treatment effect in favor of the no-narrator e-books.

Mother 4 produced a greater proportion of average number of utterances for the no-narrator phases. In the same manner she produced a greater number of questions for the no-narrator phases. However, her mean ratings for achievement did not show any treatment effect. She also produced a greater number of directive statements while reading e-books where the narrator was not present but her mean ratings for directiveness showed she was significantly less directive (large treatment effect) during the no-narrator phases. The explanation provided for Mother 2 regarding the differences between the broader scope of the MBRS and quantifying statements also holds true for Mother 4.

Overall Patterns per Study Phase

Responsivity. Several previous studies conclude that maternal responsivity is one of the factors that plays a large role in a child’s motivation to seek and engage in parent-child interactions such as shared reading (Dexter & Stacks, 2014; Dodici, Draper, and Peterson, 2003; Kamhi & Catts, 2012; Kim and Mahoney, 2004; Taylor et al., 2008). Unexpectedly, responsivity

was the only behavior that only showed treatment effect in one of the mothers (see Table 7 below). Perhaps the technological feature of having a narrator in the e-book does not enhance nor diminish a mother’s desire to respond to her child. Salmon (2013) stated that a concern regarding the use of e-books is "whether the adult role during shared reading will be supplanted by technology" (p.90). These results indicate that the narrator did not assume the place of the mother during the interaction, a fact that is essential in supporting the use of technology enhanced shared reading. In no way should features of e-books intend to take over a mother’s leading role and input during shared reading and other interactions (Sosa, 2016).

Table 7. Cohen’s *d* for all four Mothers

	Sensitive	Responsive	Effective	Accept	Enjoy	Expressive	Achieve	Praise	Directive	Pace
1	0.81**	0.31	0.71*	0.24	0.3	0.21	0.71*	0.73*	1.22**	n/a
2	0.91**	0.18	0.29	1.04**	0.74*	0.67*	1.55**	0.46	0.29	0.95**
3	0.8**	0.82**	0.26	0.26	0.62*	0.11	0.26	1**	0.81**	0.31
4	0.63*	0.47	0.8**	1.74**	1.68**	0.69*	0.12	1.03**	1.03**	1.41**

Note: *d** = medium treatment effect; *d*** = large treatment effect; Green = In favor of the Narrator phases; Orange = In favor of the No-narrator phases

Variation. No clear patterns in favor of either phase were present for sensitivity, acceptance, expressiveness, and pace. This may signal that individual characteristics of the dyads play a greater role in establishing differences. In addition, these four behaviors may be considerably dependent on the mother's personality and interactive/parenting style, thus explaining the overall variation exhibited.

No-narrator phases. On the other hand, three behaviors – enjoyment, effectiveness, and directiveness – were rated as most optimal during the no-narrator phases of the study. Here we will take a closer look at the importance of these behaviors. Enjoyment is a key component of early shared reading experiences that is usually lacking in the interactions of MTH and their CHL. Several previous studies report parents with typical hearing feel frustrated and incompetent when trying to share books with their children who use sign to communicate (Delk & Weidekamp, 2001; Dirks & Wauters, 2015; Fung et al., 2005; Mueller & Hurtig, 2009; Plessow-Wolfson, & Epstein, 2005). Therefore, it is important to understand the underlying reasons for why mothers appeared to be enjoying the interaction more when the narrator was not present. One reason could be that during the no-narrator phases, mothers were responsible for maintaining the child engaged in the interaction and for providing clear narration of the stories. Perhaps mothers perceived a greater sense of accomplishment that was accompanied by signs of enjoyment (e.g. laughter, smiles) when their performance alone, made the interaction run smoothly, instead of depending on the narrator for support. Taking advantage of the parent training e-books (Mother 3 and 4) as a way to be better prepared ahead of time may have also allowed some of the mothers to enjoy the interaction. With regards to effectiveness, results may not be completely representative, as mothers showing significant treatment effects for this behavior were the previously described special education teacher and speech-language

pathologist (Mother 1 and 4 respectively). One can assume that these mothers had previous professional training and experience in keeping children engaged in activities and promoting reciprocal exchanges as the nature of their professions requires this.

Another unexpected finding was that mothers were less directive when the narrator was not present: there was a large treatment effect in favor of no-narrator phases for 3 out of 4 mothers. Directiveness is another behavior of importance for this population given the aforementioned parental feeling of frustration that leads them to be more controlling during the interactions. As mentioned in the literature review, increased parental control may create negative attitudes toward shared reading and to avoid these interactions. One explanation may be that having the narrator sign the story could have made the interaction more formal, making mothers feel as if the children absolutely had to look at the videos, or else they would miss the flow of the story. Since most mothers did not access the parent-training e-book during the signing phases of the story, the narrator was the only source of support in case the child asked them to label a picture or provide clarification regarding the story. In a sense, mothers had to be paying attention to the narrator too since they were learning and sharing the story at the same time. All of these factors could have influenced mothers to be more controlling of the child's actions, in an attempt to avoid distractions. Attention should be given to the possible relationship between optimal results for the aforementioned behaviors – enjoyment, effectiveness, and directiveness – during the no-narrator phases, as it can be argued that as mothers were effective in engaging the child in the interaction, they were able to enjoy it, and in turn, there was no need to be controlling of the child's actions. This is how an ideal shared reading interaction should unfold.

Narrator phases. Finally, achievement and praise were rated significantly higher when the narrator was present. These findings are especially noteworthy because achievement orientation is necessary for children to obtain the most of what is supposed to be a learning experience. Mothers who were rated high in achievement were not just reading for the sake of reading they were actively seeking to enhance their children’s development in the areas of signed vocabulary comprehension/production, reading comprehension, and making inferences (Almaguer & Pena, 2010; DesJardin et al., 2014; Fletcher, Perez, Hooper, & Claussen, 2005; Fung et al., 2005; Plessow-Wolfson, & Epstein, 2005). Since the ultimate goal of shared reading is to find ways to target/prevent the alarming literacy deficits of CHL, maternal achievement orientation is at the core of promoting early literacy skills. In a study conducted by Dexter and Stacks (2014), teaching behaviors observed in parents from low SES were similar to those of achievement (as defined and used in the current study). These researchers concluded that “parental teaching demonstrated the strongest relationship with overall shared reading quality” (p.407). This signals that achievement orientation not only helps target emergent literacy skills, but also contributes to the overall quality of the interaction. Then, what role could the signing narrator have played in these results? It is possible that having the added support provided by the narrator allowed the mothers to focus on their children’s active learning, instead of having to use up their resources in narrating the stories by themselves. Frequent use of praise comes hand in hand with achievement, as mothers reinforced actions/responses that showed their children were indeed learning. Furthermore, Dexter and Stacks (2014) stated that in addition to teaching behaviors, parental encouragement was “found important for promoting shared reading quality” (p.407). Parental encouragement in their study can be related to the definition and use of praise in the current study.

Implications

According to Dirks and Wauters (2015), no previous study had analyzed the role of technology enhanced shared (e-books) on the quality of shared reading interactions in CHL. Thus these results, although preliminary, provide useful insight for clinical practice. The effect of the narrator on maternal behaviors may be dependent on the mother's attitudes, education/ experience, engagement, and willingness to go through the parent training e-books. It appears that for mothers who support sign acquisition, are motivated to learn, and/or have experience in working with children with communication disorders, the added feature of the signing narrator does not necessarily enhance all the behaviors that are related to the quality of the interactions. However, the positive effects seen in behaviors of achievement and praise when the narrator was present must be emphasized, as their relationship to early literacy skills is essential. Since shared reading should be a pleasant interaction where parents are actively seeking the child's learning, the narrator's effect on these behaviors supports the use of technology enhanced SR. Although in this study mothers were less directive when the narrator was not present, this is a behavior that can be monitored and thus modified through parent training. On the contrary, the support provided by the narrator on achievement and praise is an accomplishment that should not be taken for granted. In addition, it should be highlighted that the signing narrator had significant positive effects in Mother 2 (please refer to Table 7) regardless of maternal negative attitudes toward signing. Furthermore, the effect of the narrator on child behaviors should also be taken into account when making decisions regarding the use of technology enhanced shared reading, as child behaviors can influence maternal behaviors and vice versa.

Limitations

Other factors that could have influenced the results besides maternal behavior include having other people in the room at the time of the shared reading sessions (e.g. younger siblings).

Other distractions include environment noise (e.g. TV, phone ringing, loud music) and family pets. Maternal intrinsic variables such as attitudes, parenting style, and overall parent-child relationships could have also influenced the results. In addition, given that the researcher was in the same room as the dyad recording the interaction, the Hawthorne effect could have taken place. This may mean that the shared reading sessions recorded may not be completely representative of what a typical interaction would look like because mothers were aware they were being recorded.

Directions for Future Research

The modified Maternal Behavior Rating Scale (MBRS) used in this study can continue to serve in identifying interactive behaviors that should be analyzed in the context of e-book shared reading interactions and those that are not necessary (e.g. behaviors that may be dependent on maternal intrinsic variables that cannot be controlled nor modified). Beyond the features included in the parent training e-books utilized in this study, future work should also incorporate explicit training in identification, monitoring, and modification of important behaviors that contribute to the quality of shared reading. Specific relationships between the quality of the interactions and the literacy outcomes of CHL should also be accounted for. Future research can identify specific e-book modifications that should be made. Factors such as programming considerations regarding multimedia features are outside the scope of this study.

Conclusion

Given the limited amount of evidence available, suggestions hereby presented are not definitive. Although results varied considerably from dyad to dyad, advantages provided by the signing narrator include a positive effect on maternal behaviors of achievement and praise. Overall, responsivity remained the same for most of the mothers regardless of study phase,

meaning that the narrator did not assume the place of the mother during the interaction.

Behaviors of effectiveness, enjoyment and directiveness were rated better when the narrator was not present. Besides the narrator, the quality of the interaction is still dependent on maternal attitudes, experience/education, and willingness to participate in training. Parents of children with hearing loss who use sign to communicate have a leading role in fostering early literacy skills. Since asking parents to read more often would not be enough, one must provide them with training and strategies that help them modify behaviors that contribute to high quality shared reading interactions to empower them in the struggle against literacy deficits in this population.

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Appendix A

Maternal Behavior Rating Scale (Revised - 2008) developed and made available by Gerald Mahoney.

The version that appears below was modified for the current research study by the author of this thesis.

Modified Maternal Behavior Rating Scale RESPONSIVE/CHILD ORIENTED

1. SENSITIVITY TO CHILD'S INTEREST.

This item examines the extent to which the parent seems aware of and understands the child's activity or play interests. This item is assessed by the parent's engaging in the child's choice of activity (e.g. clicking on picture, question, page the child wants to explore), parent's verbal comments in reference to child's interest and parent's visual monitoring of child's behavior or activity. Parents may be sensitive but not responsive - such as in situations where they describe the child's interests but do not follow or support them (e.g. they ignore a child's comment or gesture and continue reading).

Rating of [1]: Highly insensitive. Parent appears to ignore child's show of interest. Parent rarely watches or comments on child's behavior and does not engage in child's choice of activity (e.g. ignoring comments about pictures, pointing to pictures).

Rating of [2]: Low sensitivity. Parent occasionally shows interest in the child's behavior or activity. Parent may suddenly notice where child is looking or what child is touching but does not continue to monitor child's behavior or engage in activity.

Rating of [3]: Moderate sensitivity. Parent seems to be aware of the child's interests; consistently monitors child's behavior but ignores more subtle and hard-to-detect communications from the child (e.g. child shifting focus of attention, looking away, getting distracted, etc).

Rating of [4]: High sensitivity. Parent seems to be aware of the child's interests; consistently monitors the child's behavior but is inconsistent in detecting more subtle and hard-to-detect communications from the child (e.g. child shifting focus of attention, looking away, getting distracted, etc).

Rating of [5]: Very high sensitivity. Parent seems to be aware of the child's interests; The parent positions herself so that both the child and her are able to look at the e-book and signs made by either of them. The parent consistently monitors the child's behavior and follows interest indicated by subtle and hard-to-detect communications from the child (e.g. child shifting focus of attention, looking away, getting distracted, etc).

2. RESPONSIVITY.

This item rates the frequency, consistency and supportiveness of the parent's responses to the child's behaviors. Responses are supportive when they match the child's actions, requests and intentions. Responsivity is assessed in relation to child behaviors that both *demand a response* from adults as well as non-demand behaviors that may not be directed toward the adult (e.g. child making spontaneous comments or gestures, labeling pictures, or producing signs about the story,

that are not directed toward adult). Child behaviors include play and social activity as well as facial expressions, vocalizations, gestures, signs of discomfort, body language, requests and intentions.

Rating of [1]: Highly unresponsive. Parent responds infrequently to the child and usually only to behaviors that demand a response. *Less than 10% of the time* the parent reacts to the child's activities, facial expressions, vocalizations, gestures, body language, and intentions that do not demand a response (e.g. child making spontaneous comments, labeling pictures or producing signs).

Rating of [2]: Unresponsive. Parents respond to most of the child's demand behaviors but to *less than one fourth of the child's non-demand behaviors and intentions*. The parents' responses may be non-supportive in insofar as they stop the child's activity or redirect the child to do something different than what they were intending to do. They may also be mismatched to the child's behavior such as when parents label or comment on the child's activity but do physically react to the what the child is doing

Rating of [3]: Consistently responsive. Parents respond to almost all of the child's *demand behaviors and to at least one fourth of the child's non-demand behaviors* and intentions. Most of the parent's responses are supportive in insofar as they encourage the child's activity. *At least one half* of the parent's responses match the child's behavior such that the parent's responses are directly related to what the child is doing. For example, if the child is pointing to a picture, the parent responds with actions to the child's focus of interest; if the child is vocalizing or communicating the parent responds by vocalizing or communicating.

Rating of [4]: Responsive. Parents respond to almost all of the child's *demand behaviors and to about one half of the child's non-demand behaviors* and intentions. Most of the parent's responses are supportive in insofar as they encourage the child's activity. *Most* of the parent's responses match the child's behavior such that the parent's responses are directly related to what the child is doing. For example, if he points to a picture, the parent responds with actions to the child's activity; if the child is vocalizing or communicating the parent responds by vocalizing or communicating.

Rating of [5]: Highly responsive. Parents respond to almost all of the child's *demand behaviors and to most of the child's non-demand behaviors* and intentions including subtle and hard to detect gestures, vocalizations and other behaviors. The parent's responses are almost always supportive in insofar as they encourage the child's activity. *The majority of* the parent's responses match the child's behavior such that the parent's responses are directly related to what the child is doing. For example, if the child points to a picture the parent responds with actions to the child's activity; if the child is vocalizing or communicating the parent responds by vocalizing or communicating. .

3. **EFFECTIVENESS (RECIPROCITY).**

This item refers to the parent's ability to engage the child in the shared reading interaction. It determines the extent to which the parent is able to gain the child's attention, cooperation and participation in a *reciprocal* exchange characterized by balanced turntaking in shared reading or conversation.

Rating of [1]: Very ineffective. Parent is seldom engaged in any kind of joint or cooperative activity or communication with the child. The child may be actively engaged and may even be in close proximity to the parent, but the parent is usually not joining in

what the child is doing. The parent may attempt to elicit the child's cooperation, but the child either does not respond, or responds briefly and quickly disengages. Parent may give the appearance of helplessness where the child is concerned.

Rating of [2]: Ineffective. Parent is mostly ineffective in keeping the child engaged in joint or cooperative activity or communication. The child may be actively engaged and may even be in close proximity to the parent, but the parent is *only occasionally* successful at cooperating or participating with what the child is doing. In the few instances when the parent gains the child's cooperation, the interaction tends to last one or two turns before the child disengages. In such instances, the child may continue the activity without noticing or responding to the parent

Rating of [3]: Moderately effective. At least one third of the time parent is successful in engaging the child in book sharing or communication. Interactive sequences seldom last more than 3 to 4 turns before the child disengages, but such interactive sequences occur frequently during the observation. Interactive sequences may be dominated by either the parent or the child and are generally not characterized by a balanced reciprocal exchange of turns.

Rating of [4]: Highly effective. More than one half of the time parent is successful in engaging the child in shared reading or conversation. Interactive sequences generally last 5 or more turns at a time. With little prompting the parent is successful at encouraging the child to transition into this pattern of interaction. The majority of interactive sequences are characterized by a balanced, reciprocal exchange of interactive turns.

Rating of [5]: Extremely effective. Parent is able to keep the child willingly engaged in joint activity or communication throughout the majority of the interaction. Interactive sequences generally last a few minutes at a time before the parent or child disengages. Interactive sequences are almost always characterized by a balanced, reciprocal exchange of turns.

AFFECT/ANIMATION

1. ACCEPTANCE

This item assesses the extent to which the parent's behaviors and communications accept or affirm the child and what the child is doing. Acceptance can range from rejection, to no or few signs of approval, to a more active affirmation as reflected in interactions that indicate that the child's behaviors and communications are legitimate, good or worthy. Acceptance is measured primarily in terms of how parent's nonverbal and verbal behavior accept and affirm the child for who he or she is or what he or she is currently doing rather than for meeting the parent's requests or expectations.

Rating of [1]: Rejecting. Parent primarily interacts with the child by trying to get the child say or do things that the child does not appear capable of doing at the moment. Parent may express dissatisfaction with what the child is doing, and almost never takes delight in or encourages the child to communicate or follow along the way the child is able to do.

Rating of [2]: Low acceptance. Parent puts little pressure on the child to say or do things he is not yet able to do. However, parent shows little positive affect toward the child. Parent mostly remains neutral and almost never takes delight in or encourages the child to communicate or follow along the way the child is able to do.

Rating of [3]: Accepting. Parent expresses a general positive affect toward the child and occasionally expresses delight in child's actions or communications. While the parent affirms the child by frequently responding in a way that supports the child's actions or intentions, the parent also requests or prompts the child to do or say things that the child is unable to do.

Rating of [4]: Very accepting. Parent expresses enthusiasm and delight for the child's actions and communications. More than one half of the time, the parent's interacts in a way that affirms the child's actions and communications as legitimate and worthwhile. The parent may make a few suggestions or requests, but these are generally made to help the child communicate or do what they want more effectively.

Rating of [5]: High acceptance. Parent is effusive with delight and admiration of the child. Parent expresses intense positive affect in response to the child's actions and communications in a way that continually affirms the child as legitimate and worthwhile. The parent's suggestions or requests almost always support the child's actions and communications.

2. **ENJOYMENT.**

This item assesses the parent's enjoyment (showing joy, pleasure, and/or satisfaction through smiles and/or laughter) of interacting with the child. Enjoyment is experienced and expressed in response to the child himself -- his spontaneous expressions or reactions, or his behavior when interacting with his parent. There is enjoyment in child's being himself rather than the activity the child is pursuing.

Rating of [1]: Enjoyment is absent. Parent may appear rejecting of the child as a person (e.g. parent yells at the child, is annoyed by child).

Rating of [2]: Enjoyment is seldom manifested. Parent may be characterized by a certain woodenness. Parent does not seem to enjoy the child per se. This might be evident by parent not smiling or laughing at child's actions or comments that would normally elicit these types of behaviors.

Rating of [3]: Pervasive enjoyment but low-intensity. Occasionally manifests delight in child being himself, as evident by smiling and/or laughing at child's actions or comments.

Rating of [4]: Enjoyment is the highlight of the interaction. Enjoyment occurs in the context of a warm relaxed atmosphere. Parent manifests delight fairly frequently by smiling and/or laughing at child's actions or comments.

Rating of [5]: High enjoyment. Parent is noted for the display of joy, pleasure, delighted surprise at the child's unexpected mastery.

3. **EXPRESSIVENESS.**

This item measures the tendency of the caregiver to communicate and react emotionally toward the child. It assesses both the frequency of the parent's verbal and nonverbal communications as well as the intensity and animation of these communications.

Rating of [1]: Highly inexpressive. Parent may be characterized as quiet and uncommunicative during the interaction. When the parent speaks, affect is flat; voice quality is dull and facial expressions vary little.

Rating of [2]: Low overt expressiveness. Parent communicates occasionally during the interaction. Parent's body language, affect, voice quality and facial expression may be characterized as dull to neutral

Rating of [3]: Moderate overt expressiveness. Parent communicates consistently during the interaction. Parent's body language, affect, voice quality and facial expression may be characterized as ranging from neutral to mildly positive.

Rating of [4]: Overtly expressive. Parent communicates consistently during the interaction. Parent uses body language, voice quality and facial expression in an animated manner to express emotion toward the child. Parent is generally enthusiastic but not extreme in expressiveness.

Rating of [5]: Highly expressive. Parent communicates consistently during the interaction. Parent is extreme in expression of all emotions using body language, facial expression and voice quality. Appears very animated, these parents are "gushers" (effusive).

ACHIEVEMENT ORIENTATION

1. ACHIEVEMENT.

This item is concerned with the parent's encouragement of sensorimotor and cognitive achievement (e.g. learning and using sign vocabulary, answering questions about the e-book, making inferences from the e-book). This item assesses the amount of stimulation by the parent, which is overtly oriented toward promoting the child's developmental progress (though hand over hand assistance for sign production, and asking questions about the story). This item assesses the extent to which the parent fosters sensorimotor and cognitive development whether through modeling of signs, instruction on sign production, training, or sensory stimulation and includes the energy which the parent exerts in striving to encourage the child's development of sign vocabulary and literacy skills.

Rating of [1]: Very little encouragement. Parent makes no attempt or effort to get child to learn.

Rating of [2]: Little encouragement. Parent makes a few mild attempts at fostering sensorimotor development in the child by making vocabulary words somewhat salient, but the interaction is more oriented to reading for the sake of reading rather than teaching (e.g. parent reads the text but does not prompt child to produce sign or does not ask questions about the reading).

Rating of [3]: Moderate encouragement. Parent continually encourages sensorimotor development of the child either through play or training (*by means of one of the following*: modeling signs, prompting child to produce signs, or asking questions about the story) but does not pressure the child to achieve.

Rating of [4]: Considerable encouragement. Parent exerts some pressure on the child toward sensorimotor achievement, whether as unilateral pressure or in a pleasurable interactional way and whether wittingly or unwittingly (*by means of two of the following*: modeling signs, prompting child to produce signs, providing hand over hand assistance and/or asking questions about the story).

Rating of [5]: Very high encouragement. Parent exerts much pressure on the child to achieve. Parent constantly stimulates him toward sensorimotor development, whether through play or obvious training (*by means of three or more of the following*: modeling

signs, prompting child to produce signs, providing hand over hand assistance and/or asking questions – especially ones that go beyond the story’s plot/text). It is obvious to the observer that it is very important to the parent that the child achieve certain sign vocabulary and/or literacy skills.

2. PRAISE (VERBAL)

This scale assesses how much verbal praise is given to the child. Examples of verbal praise are "good boy," "that's my girl," "good job," "you are right." Praise in the form of smiles, claps or other expressions of approval are not included unless accompanied by a verbal praise. Praise may be given for compliance, achievement or for the child being himself.

Rating of [1]: Very low praise. Verbal praise is not used by the parents in the interaction even in situations which would normally elicit praise from the parent.

Rating of [2]: Low praise. Parent uses verbal praise infrequently throughout the interaction.

Rating of [3]: Moderate praise. Parent uses an average amount of verbal praise during the interaction. Parent praises about half of the situations which would normally elicit praise (e.g. answering a question correctly, producing a sign after prompting, responding to parental command/redirection).

Rating of [4]: Praises frequently. Parent verbally praises the child frequently for most situations that would normally elicit praise (e.g. answering a question correctly, producing a sign after prompting, responding to parental command/redirection).

Rating of [5]: Very high praise. Very high frequency of verbal praise from the parent even for behavior which would not normally elicit praise (e.g. subtle/spontaneous comments about the story, asking good questions).

DIRECTIVE

1. DIRECTIVENESS

This item measures the frequency and intensity in which the parent requests, commands, hints or attempts in other manners to direct the child's immediate behavior.

Rating of [1]: Very low directive. Parent allows child to initiate or continue activities of his own choosing without interfering (e.g. clicking on pictures, changing the page). Parent consistently avoids volunteering suggestions and tends to withhold them when they are requested or when they are the obvious reaction to the immediate situation. Parent's attitude may be "do it your own way."

Rating of 2: Low directive. Parent occasionally makes suggestions. This parent rarely tells the child what to do. He/she may respond with advice and criticism when help is requested but in general refrains from initiating such interaction. On the whole, this parent is cooperative and non-interfering.

Rating of [3]: Moderately directive. The parent's tendency to make suggestions and direct the child is about equal to the tendency to allow the child self-direction. The parent may try to influence the child's choice of activity but allow him independence in the execution of his reading, or he may let the child make his own choice but be ready with suggestions for effective implementation.

Rating of [4]: Very directive. Parent occasionally withholds suggestions but more often indicates what to do next or how to do it. Parent produces a steady stream of suggestive

remarks and may initiate a new activity when there has been no previous sign of inertia and/or resistance shown by the child.

Rating of [5]: Extremely directive. Parent continually attempts to direct the minute details of the shared reading interaction. This parent is conspicuous for the extreme frequency of interruption of the child's activity-in-progress, so that the parent seems "at" the child most of the time -- instructing, training, eliciting, directing, controlling. Parent is inflexible and does not allow child to have a say in the shared reading interaction.

2. PACE.

This item examines the parent's rate of behavior. The parent's pace is assessed apart from the child's; it is not rated by assessing the extent to which it matches the child's pace but as it appears separately from the child. Pace does not assess the speed at which parent speaks, rather, the pace at which parent allows the child to respond to questions and commands.

Rating of [1]: Very slow. Parent is almost inactive. Pace is very slow with long periods of inactivity.

Rating of [2]: Slow. Parent's overall tempo is slower than average. There may be inconsistency in the parents' tempo in which periods of inactivity (where parent allows child to explore e-book and respond) are followed by occasions of active participation.

Rating of [3]: Average pace. This parent is neither strikingly slow nor fast. Tempo appears average compared to other parents.

Rating of [4]: Fast. Parent's overall tempo is faster than average. There may be few brief periods of inactivity (where parent allows child to explore e-book and respond) that are followed by quick paced activity (e.g. moving from page to page, asking one question followed by another,) that provides child with little time to react.

Rating of [5]: Very fast. Parent's interactive tempo could be characterized as rapid

fire behavior. The pace of the parent's interactive tempo may not allow the child tim

Vita

Mar Alejandra Bonilla Yáñez was born in Ciudad Juarez, Chihuahua, Mexico. She graduated from Coronado High School in 2011. As an international student, she completed three years of Pre Speech-Language Pathology undergraduate courses and was accepted into the master's program in Fall 2014. At that time she started working as a master's research assistant under the Preparing Bilingually Certified Speech-Language Pathologists Grant from the U.S. Department of Education. In Spring 2016 she was awarded a Graduate School Travel Grant to present her thesis, in collaboration with another graduate student, at the 2016 Texas Speech-Language Hearing Association Convention in Fort Worth, Texas. She was selected to be Graduate Student Marshal of Students for the College of Health Sciences commencement ceremony.

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