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# Does an iPad Change the Experience? A Look at Mother-Child Book Reading Interactions

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Does an iPad Change the Experience? A Look at  
Mother-Child Book Reading Interactions

Kathryn L. MacKay

A dissertation submitted to the faculty of  
Brigham Young University  
in partial fulfillment of the requirements for the degree of  
Doctorate of Philosophy

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Educational Inquiry, Measurement, and Evaluation

Brigham Young University

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## ABSTRACT

### Does an iPad Change the Experience? A Look at Mother-Child Book Reading Interactions

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Doctorate of Philosophy

Researchers have long argued the importance of shared book reading and its potential impact on future reading growth. With the increasing popularity of e-books and the introduction of interactive iPad books, more and more parents are sharing books with their children in digital format. This may have a direct impact on the nature of the interactions that occur during young children's early book sharing experiences. This multiple-case study examined the nature of the interactions between six mother-child dyads as they read a story on an iPad compared with the interactions that happened during a traditional book reading. A coding system was developed to categorize behaviors during the reading sessions. The categories included (a) meaning talk, (b) text and print talk, (c) technology talk, and (d) the nature of the affective climate.

The results of this study indicate that mother-child traditional read-alouds and digital iPad read-alouds are different experiences. During digital readings there was an increase in the number of vocabulary-related (a subcategory of meaning) interactions but a decrease in the number of interactions related to text and print. The results also showed that as the dyad shared a digital storybook, they engaged in many interactions about the technological elements of the iPad texts, which may be important to the development of digital literacies in young children. The findings also indicate that a child is more engaged with digital texts than with traditional texts, which is important because engagement is an essential component in literacy development. However, sometimes the child's increased engagement with the digital texts resulted in both members of the dyad being less sensitive to the other. Digital storybook reading is a relatively new experience for many parents and thus, they may not know how to interact with their children in ways that promote the development of traditional and digital literacies.

Keywords: electronic books, family literacy, shared storybook reading, mother-child interactions, digital literacies, emergent literacy

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## Chapter 1: Introduction

It has long been established that reading aloud to young children is important to the development of their traditional literacy skills. Child Trends (2013) examined several research reports and found the following:

Young children who are read to regularly by family members experience multiple benefits. These include boosts in literacy development, as well as social-emotional gains, and increased likelihood of later overall school success. (p. 2)

Some researchers have claimed that the single most important activity for achieving reading success is parents reading aloud to their children (Bus, van IJzendoorn, & Pelligrini, 1995; Wells, 1985).

Much of the research focusing on mother-child book reading has specifically examined the type of talk that takes place during shared book experiences (Baker, Mackler, Sonnenschein, & Serpell, 2001; Hindman, Connor, Jewkes, & Morrison, 2008). Based on these studies, there appears to be two types of talk that parents and children engage in during book reading: meaning-based and skill-based talk. The type of mother-child verbal exchanges can influence the development of several key emergent literacy skills including comprehension and decoding skills (Whitehurst & Lonigran, 1998). For example, it is not surprising that parents and children who engaged in comprehension talk, such as inference or vocabulary discussions, assisted their children in developing meaning as they read together (Baker et al., 2001; De Temple & Snow, 2003). Similarly, parents who engaged in text talk, such as alphabet recognition and phonemic awareness, assisted their children in developing decoding and word-recognition skills that are necessary to access print (Baker et al., 2001; Hindman et al., 2008).

In addition to examining the type of talk parents and children engage in during a shared book reading experience, some researchers looked at the affective climate surrounding the experience. The affective climate refers to the emotional tone of the reading experience. A warm, supportive affective climate increased interest, motivation, and literacy development, which are important indicators of future reading skills (Baker et al., 2001; Bus & van IJzendoorn, 1995). For example, children who experienced warmth from their parent during book reading had more positive feelings toward reading and higher reading scores when they were in first grade (Bus et al., 1995).

These two areas of research illustrate the value of the mother-child read-aloud to literacy development, but what is meant by literacy development is changing. Toward the conclusion of the 20th century, a new term emerged in the discussions surrounding literacy education: *new literacies* (Buckingham, 1993; Leu, Kinzer, Coiro, & Cammack, 2004). New literacies usually refer to skills needed to access technology-related texts such as the internet, video games, social networking sites, e-readers, and iPad apps (Chandler-Olcott & Mahar, 2003; Gee, 2007; O'Brien, 2001). They are *new*, because they are needed to access texts that were not available to older generations. They are *literacies* because they are skills required to access, understand, and gain meaning from these new texts. New literacies have also been described using terms such as 21st-century literacies, internet literacies, multiliteracies, and digital literacies (Coiro, Knobel, Lankshear, & Leu, 2008). This study will use the term *digital literacies*.

The theory of digital literacies contends that, “the essence of reading is . . . change” (Leu et al., 2004, p. 1). Educators and researchers alike have realized that, because of the changing nature of literacy, literacy development may well have to be redefined. Although print-based literacy skills such as decoding and comprehension strategies are an important part of accessing

technology-based books, students not provided with instruction in digital literacy development may find themselves only partially literate. Leu et al. (2004) stated:

In an electronic environment, decoding for comprehension include decoding the strategic use of color; various clues that indicated hyperlinked books and graphics; the possible actions of meaning-bearing icons and animations; and pictures, maps, charts and graphs that are not static, but that can change to address questions that an interactive reader can pose to informational books during the reading act. (p. 1586)

Digital literacy has two competing definitions: standardized and conceptual (Lankshear & Knobel, 2006). Standardized digital literacy refers to the skills needed to access and utilize digital devices. These include the operational and functional elements needed to use the hardware and software associated with the different devices (McPake, Plowman, & Stephen, 2013). In contrast, contextual digital literacy refers to “the ability to creatively engage in particular social practices, to assume appropriate social identities, and to form or maintain various social relationships” (Jones & Hafner, 2012, p. 12).

The knowledge base surrounding the development of digital literacies in children is in its infancy. Most of the research has primarily focused on older children as they learn to access information through the internet or participate in social gaming environments (Gee, 2007; Lankshear & Knobel, 2003; Leu et al., 2004). Some researchers are just beginning to look at how both standardized (McPake et al., 2013) and conceptual (Wohlwend, 2009) digital literacies are developed in our youngest children.

When advances in technology provided an avenue for books to be available on the computer, some mother-child read-aloud sessions began to change. A few researchers interested

in the nature of the mother-child interactions as they read a book using a digital medium examined these interactions as parents and children share a story on a desktop or laptop computer using a CD-ROM book. Researchers found both similarities and differences in the quality and quantity of the talk when compared with the interactions surrounding a traditional book (Fisch, Shulman, Ackerman, & Levin, 2002; Kim & Anderson, 2008; Korat, Shamir, & Heibal, 2013; Korat & Or, 2010; Moody, Justice, & Cabell, 2010). But, the nature of books continues to change as children's books are now available on computer tablets (e.g., iPad, Kindle). In 2010, 81% of the top iPad book apps were children's titles (Friess, 2010). In 2011, 11% of the total children's book market was electronic books, a 169% increase from the previous year (Association of American Publishers, 2012). In an effort to compete with the iPad, in 2011 Amazon released a color version of its e-reader (Kindle Fire) with interactive elements to provide an avenue for reading children's picture books. Because of its affordability, by September of 2012, the Kindle Fire had obtained 22% of the domestic computer tablet market (Bleeker, 2012). In 2012, a survey revealed that 46% of children have read an e-book, up from 25% in 2010 (Milliot, 2013). Researchers have begun to address the impact of the use of computer tablets on young children's literacy development (Husbye, Buchholz, Coggin, Wessel-Powell, & Wohlwend, 2012; Wood, Pillinger, & Jackson, 2010). Still, little is known about interactions between parent and child as they read a book on a computer tablet. Once we understand how the digital tablet influences the nature of the mother-child interactions, then we can further investigate how they influence the subsequent development of children's early literacy skills, including digital literacies.

## **Purpose of the Study**

The purpose of this multiple-case study was to understand the nature of the verbal and affective interactions between a parent and child as they read a picture book on a computer tablet and to compare those interactions with those that occur during the reading of a traditional picture book. This study examined the verbal and nonverbal interactions and the affective climate generated by six mother-child dyads as they read books using an iPad tablet and a traditional book. Because mother-child read-alouds are most effective with young children (Bingham, 2007; Bus et al., 1995), the participants were children of kindergarten age (five to six years) and their mothers.

## **Research Questions**

The research questions were the following:

1. What is the nature of the verbal and nonverbal interactions of the mother and child when reading a book using a traditional book and an interactive computer tablet (iPad) book?
2. What is the nature of the affective climate during a mother-child read aloud when reading a book using a traditional book and an interactive computer tablet (iPad) book?

## **Definition of Terms**

*Affective Climate:* The emotional tone of a mother-child book reading experience including the warmth of the experience, the engagement of both the parent and child, and the amount of positive support provided by the parent.

*Alphabetic Knowledge:* The knowledge of letters as symbols and their associated names.

*Collective Case Study:* The exploration of multiple instrumental case studies that share a common condition or characteristic (Stake, 2006).

*Concepts of Print:* Awareness that print carries a message; there are conventions of print such as directionality, differences between upper and lower case, punctuation, and common book characteristics.

*Cultural-Historical Activity Theory (CHAT):* A theoretical framework based on Social Constructionist Development Theory that is used to describe the multiple components and processes of an activity and how they interrelate and influence each other and the activity (Leont'ev, 1978).

*Digital Books:* Books available in a digital format including CD-ROM books, internet books, and computer tablet apps.

*Digital Literacy (Conceptualized):* “The ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers” (Gilster, 1997, p. 1).

*Digital Literacy (Standardized):* The ways in which young children develop the competences and needed strategies to access, read, and create a variety of screen texts, specifically the operational and functional competences.

*Engagement:* An element of the affective climate of a mother-child book reading experience defined by the level of enthusiasm seen in both dyad members, the focus and persistence of the dyad during the reading experience, and the reading expression of the reader.

*Functional Competences:* Competences needed to access and utilize the software on a technological device. These include things such as interacting with the video and audio elements of the software, pushing icons and objects, moving through the software program, and selecting software options.



*Inference-Making Skills:* Literacy skills that help a reader understand the intent of the author including clarifying, connecting, and predicting.

*Instrumental Case Study:* A case study method used when the purpose of the study is to understand a particular issue rather than a particular case (Grandy, 2010).

*Interpsychological Domain:* The cognitive domain of the zone of proximal development (one of two domains identified by Goldstein [1999]). It explains what is happening cognitively in a social learning context. It explains growth in cognitive skills such as reading, math, and reasoning.

*Interrelational Domain:* The affective domain of the zone of proximal development (one of two domains explained by Goldstein (1999)). It explains what is happening emotionally in a social learning context. It explains things like learner motivation, interest, confidence, dedication, and persistence.

*Meaning-related Literacy Skills:* Literacy skills that contribute to the ability to comprehend the intent of the author including vocabulary skills, organizing and summarizing skills, and inference-making skills.

*New literacies:* The skills needed to access technology-related texts such as the Internet, video games, social networking sites, e-readers, etc.

*Operational Competences:* Competences needed to use a technological device, specifically those related to the hardware. These include things like turning on the device, controlling the volume, using the mouse, and locating software.

*Organizing and Summarizing Skills:* Skills that help a reader better comprehend a text through recalling, retelling, and confirming text order and content.

*Ownership:* Determined by who seems to have control in the book reading experience. Determined by who holds the book, who does the reading, and who interacts verbally and nonverbally with the book.

*Quintain:* “The object or phenomenon or condition to be studied—a target, but not a bull’s eye” (Stake, 2006, p. 6). In this study, the quintain is the nature of mother-child interactions during both traditional and digital book readings.

*Meaning-Related Skills:* Those skills needed to access the meaning of a book, including the activities related to vocabulary development, organizing and summarizing, and inference-making, including letter sounds, rhyming, alliteration, and predictable text.

*Phonemic and Phonological Awareness:* The conscious attention to the sounds of written language.

*Scaffolding:* The social support needed for growth in the zone of proximal development. It allows for “the gradual release of responsibility from the expert to the learner” (Bodrova & Leong, 1997, p. 11).

*Social Constructionist Development Theory:* A theory that examines how knowledge is jointly constructed as humans interact one with another. In relation to the development of young children, it refers to the process wherein adults or peers help children move from one level of understanding to another through the use of scaffolding.

*Support:* An element of the affective climate of a mother-child book-reading experience defined by the amount of meaning-related, text-related, and technology-related support provided by the parent to the child.

*Technology-Related Skills:* The operational and functional skills needed to access a digital storybook including turning on the digital device, adjusting the volume, selecting an app, turning the pages, and interacting with icons.

*Text:* The words of a piece of writing (Merriam-Webster, 2015).

*Text-Related Skills:* The skills needed to access the words on the page including things like concepts of print, alphabetic knowledge, phonemic and phonological awareness, and word knowledge.

*Vocabulary-related Skills:* Literacy skills that help develop a child's vocabulary including labeling, defining, and elaborating.

*Warmth:* An element of the affective climate of a mother-child book-reading experience defined by the proximity of the parent and child, the sensitivity of both members of the dyad, the willingness of the child to comply with the parent's requests, and the amount of positive-reinforcement provided by the parent.

*Word Knowledge:* The knowledge that words carry meaning, are made up of parts, and can be identified through the use phonics or by sight recognition.

*Zone of Proximal Development (ZPD):* "The distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers" (Vygotsky, 1978, p. 86).

## **Chapter 2: A Review of the Literature**

This chapter begins with a discussion of the theoretical framework that is helpful in understanding how parents and children interact as they read stories together. This is followed by a review of the large amount of literature regarding the nature of mother-child reading interactions as they read a print-based book as well as a review of the literature on mother-child read-alouds using a digital (CD-ROM) book. The chapter concludes with a discussion on the limited literature related to mother-child read-aloud interactions as they read a book on a handheld computer device such as an iPad.

### **Theoretical Framework**

One of the learning theories scholars use to understand how literacy skills are developed in young children is the social constructionist development theory (Vygotsky, 1978; Wood, Bruner, & Ross, 1976). This framework is helpful because it contends that learning occurs in the context of shared, meaningful activities (Vygotsky, 1978). A mother-child book-reading experience is an example of a shared, meaningful activity (Lynch, Anderson, Anderson, & Shapiro, 2008). Since quality mother-child read-alouds are known to contribute to the development of early literacy skills (Saracho & Spodek, 2010), several researchers used this theoretical framework as they studied mother-child interactions as they read stories together (Kim & Anderson, 2008; Kim, Kang, & Pan, 2011; Lynch et al., 2008). It is an important way of understanding why the nature of the verbal and non-verbal interactions that parents and children share during a read-aloud and the tone of the affective climate are important to the development of young children.

## **Social Constructionist Development Theory**

This section begins with a discussion of the social constructionist development theory, focusing on Vygotsky's zone of proximal development and Goldstein's (1999) *interrelational* and *interpsychological* zones. These theories help explain what happens as parents and children read a traditional book together. It concludes with a discussion of cultural-historical activity theory that is useful in understanding how a digital book may change a mother-child book-reading experience.

**Zone of proximal development.** Several scholars have asserted that emergent literacy behaviors are best understood when viewed through a lens framed by the Vygotsky model of learning (Berk & Winsler, 1995, Bodrova & Leong, 1997, Mason & Sinha, 1992). Vygotsky's theory of child development was based on the belief "that social interaction and children's participation in authentic cultural activities are necessary for development to occur" (Berk & Winsler, 1995, p. 4). It is only within these social cultural activities that high-level, complex thinking is developed. This high level of cognitive development occurs within the zone of proximal development (ZPD) (Vygotsky, 1978). The ZPD is "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers" (Vygotsky, 1978, p. 86).

Much of the book-talk surrounding mother-child read-alouds support the skills found in a child's zone of proximal development. Expanding on Vygotsky's ideas, Wood et al. (1976) used a metaphor to describe the social support needed for growth in the ZPD, that of *scaffolding* which allows for the "gradual release of responsibility from the expert to the learner" (Bodrova & Leong, 1997, p. 11). When Wood et al. (1976) first introduced the term, they were not

referring to scaffolding in a formal school setting. They were referring to those interactions that happen between an adult (usually a parent) and a young child. Parents provide scaffolding in different ways, but Wood et al. (1976) claimed that verbal discourse is at the center of all scaffolding.

Scaffolding plays an important role in the development of both the meaning-related and text-related emergent literacy skills (Berk & Winsler, 1995). This type of scaffolding takes place in many learning situations including mother-child book reading (Bus et al., 1995). Certainly, parental scaffolding during these book-reading experiences plays an important role in the development of both of these skills (Berk & Winsler, 1995; Bus & van IJzendoorn, 1995). But, learning how emergent literacy skills are developed through mother-child storybook discourse is more complex than scaffolding alone. Researchers have suggested that the emotional tone of the reading experience is important (Bus & van IJzendoorn, 1995; Sonnenschein & Munsterman, 2002). The emotional tone contributed to the affective outcomes of storybook readings including interest and motivation (Sonnenschein & Munsterman, 2002). The emotional tone of a mother-child read-aloud is best explained by Goldstein's (1999) lesser-known relational zone theory.

**Interrelational zone.** Goldstein (1999) explained that Vygotsky did not intend for the ZPD to exclude anything related to the emotional or affective tone of the learning environment. Vygotsky (as cited in Wertsch, 1985) wrote, "the separation of the intellectual side of our consciousness from its affective, volitional side is one of the fundamental flaws of all of traditional psychology" (p. 189). Though Vygotsky did little empirical research on the affective aspects of the ZPD, Goldstein drew upon Noddings' (1984) work in education and ethical care to expand on the affective elements of the ZPD. Goldstein divided the ZPD into two domains. She referred to the affective domain of the ZPD as the *interrelational zone*, which explains the

motivation (interest, confidence, dedication, and persistence) necessary for learning. This zone explains what happens affectively during a mother-child book reading. Goldstein referred to the cognitive domain of the ZDP (as explained by Vygotsky) as the *interpsychological zone*. This zone explains the scaffolding of cognitive concepts necessary for learning as discussed earlier. This zone explains what happens cognitively (meaning- and text-related) during a mother-child book reading. It is important to note that the two zones do not function independently of one another. Growth in both zones occurs interactively and is mediated by cultural routines including types of discourse (verbal interactions), behaviors, and tools (Berk & Winsler, 1995; Goldstein, 1999; Teale & Sulzby, 1987).

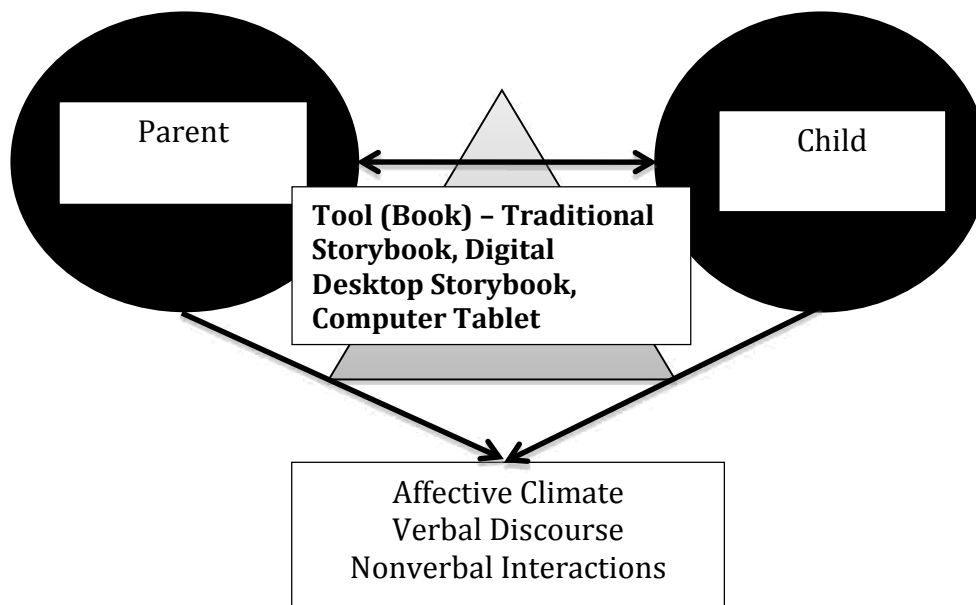
In addition to understanding what is happening in the interpsychological and interrelational zones, it may also be important to understand whether the type of book used in the reading influences the way parents and children interact. Building on Vygotsky's work (1978), Leont'ev (1978) and Engestrom (1999) developed the cultural-historical activity theory (CHAT), which helps in understanding how changing the type of book used in a mother-child read-aloud may influence what is learned or experienced.

### **Cultural-Historical Activity Theory (CHAT)**

A key component of the CHAT model is the significant role that cultural tools play in a learning activity (Leont'ev, 1978; Engestrom, 1999). They act as mediators of meaning between the participants. Because mother-child storybook reading is a type of learning activity that utilizes a tool (the book), CHAT becomes a helpful theory in explaining the impact that different types of books (traditional and digital) have on the parent and child as well as on the outcomes of the reading experience (Engestrom, 1999; Leon'tev, 1978). According to CHAT, how a tool is used in a particular activity is based on an accumulation of historical knowledge about the tool.

Participants in the activity bring with them their historical knowledge of the tool and, during the activity, socially transmit this knowledge to the other participants. During a mother-child book reading, both the parent and child bring with them knowledge about what a book is and how it is used. The book then becomes part of the experience influencing the mother-child interactions.

Engestrom (1999) uses a triangle to represent CHAT, but, for this study, I developed a representation of CHAT that focuses on storybook types (traditional or digital) as the mediating tool, parent and child as the subjects, and emergent and digital literacy skills as the final outcome, as illustrated in Figure 1. This figure illustrates how the tool mediates the mother-child read-aloud and influences the outcomes of the experience. According to CHAT, as the tool changes, in this case the type of book used (traditional or digital), so do the outcomes of the activity including the affective climate surrounding the mother-child book reading, the verbal discourse and the nonverbal interactions occurring as they share the story.



*Figure 1. CHAT and mother-child storybook reading model.*



In order to better understand how changing the type of book used influences mother-child reading interactions, it is important to review the research about how parents and children interact as they read a traditional storybook and a digital storybook. There is substantial research about mother-child book reading using a traditional book (Bus et al., 1995; Hindman et al., 2008; Neuman, 1996; Scarborough & Dobrich, 1994), but research about parents and children reading together using a digital book, though growing, is limited (Fisch et al., 2002; Korat & Or, 2010; Moody et al., 2010; Krcmar & Cingel, 2014).

### **Mother-Child Book Readings**

This section begins with a description of the literature review criteria and process. This is followed by a review of the large body of literature (based on these criteria) available about mother-child book readings using a traditional printed book. It also includes a discussion of the emergent literacy skills that are strengthened as parents scaffold their children's literacy development during traditional book-reading experiences. This is followed by a review of the limited literature about mother-child book readings using a digital storybook on a desktop computer including a discussion of digital literacies needed to access these stories.

The literature search centered on two topics: mother-child storybook reading using a traditional book as the mediating tool and mother-child storybook reading using a digital book as the mediating tool. Three criteria were established for searching the literature on these topics. First, because this review is limited to parent and child interactions as they read together, only studies that examined the nature of those interactions were considered, including verbal interactions, non-verbal interactions, and the affective climate surrounding the experience. Studies about the amount of reading or the relationship of other home literacy activities to book reading were excluded, as were studies in which the adult reader was someone other than a

parent. Second, because two seminal literature reviews were completed in the mid-1990s (Bus et al., 1995; Scarborough & Dobrich, 1994), only articles published after 1995 were included.

Third, to focus on the effect of mother-child interactions on *emergent* literacy skills, the search was limited to studies involving children ages 3-8.

### **Literature Search Process and Criteria**

The review process began as articles, books, and documents based on the established inclusion criteria were gathered. Studies related to mother-child book reading using a traditional book were grouped in five categories: (a) comprehension studies, (b) text-related/decoding studies, (c) genre studies, (d) affective climate studies, and (e) literature reviews and meta-analyses. Studies related to mother-child book reading using a digital book were grouped into three categories: (a) CD ROM/Desktop studies, (b) computer tablet studies, and (c) digital literacies in young children. Several studies fell into more than one category.

The following keywords were used to search *ERIC* and *Google Scholar* databases: *joint book reading, shared storybook reading, young children AND book talk, mother-child book talk, mother-child dyads AND reading, mother-child AND electronic books, mother-child AND e-books, tablet computers AND young children, and digital literacy AND young children*. Out of the 279 articles found in the first phase of the search, 44 met the inclusion criteria and were used for this literature review. In addition, prominent journals and citations from seminal articles were searched. Also included were noteworthy books by prominent scholars in the areas of joint book reading. These articles and scholars were identified by citation counts found in Harzing's (2010) open-source program *Publish or Perish*, which uses the *Google Scholar* database. Citation counts are often used to identify the impact of a scholar and his or her writings in a particular field of study. The database *ProQuest* was also searched for dissertations and theses

using the same search keywords. By the end of the search, 86 articles and books, three dissertations, and one thesis were selected to review. Of these, 49 are included in this review. These 49 research pieces are discussed in the following section, beginning with a discussion of the research about mother-child read-alouds using a traditional storybook as the mediating tool.

### **Traditional Books**

For over a hundred years, the mediating tool in book-reading experiences of parents and young children was the traditional picture book. Researchers studied the effects of these mother-child book readings on the development of emergent literacy skills in young children (Bus & van IJzendoorn, 1995; Bus et al., 1995; Leseman & de Jong, 1998). Some specifically looked at the development of emergent meaning-related and text-related skills in the *interpsychological* domain during mother-child readings and found that the amount and quality of the talk about these skills influenced a child's future literacy development (Bus et al., 1995; Hindman et al., 2008; Neuman, 1996). Meaning-related skills are thought of as comprehension skills and encompass the processes of developing vocabulary, organizing, summarizing, and making inferences to enhance meaning-making (Thurlow & van den Broek, 1997). Text-related skills are the behaviors needed to access the print by understanding how the symbols on the page translate to sounds and words (Whitehurst & Lonigan, 1998). Many, but not all, of these studies found a correlation between mother-child talk in the interpsychological zone and future reading achievement (Senechal & LeFevre, 2002). Other researchers examined how the affective climate (interrelational zone) of a mother-child read-aloud session influenced these emergent meaning and text-related interactions (Baker et al., 2001; Bus & van IJzendoorn, 1995; Bus et al., 1995). These researchers looked at the warmth of the reading experience (Sonnenshein & Munsterman, 2002), the amount of support provided by the parent (Bus, 2004), and the engagement of both the

mother and the child in the reading experience (Ortiz, Stowe, & Arnold, 2001; Sonnenshein & Munsterman, 2002). These researchers found that a warm and supportive affective climate positively influenced the number of meaning and text interactions during the mother-child read-aloud. Though there is some disagreement about the strength of the relationship between mother-child book reading and future academic achievement, most researchers found that the relationship was statistically significant (Bus et al., 1995; Lonigan, 1994; Scarborough & Dobrich, 1994).

Because it is important to understand the type of talk that happens in both the interpsychological and interrelational domains, the following sections review the research on mother-child read-alouds in each of these domains. The section on the interpsychological domain focuses on meaning-related activities (i.e., vocabulary, summarizing and retelling, inference making) and text-related activities (i.e., talking about concepts of print, phonemic and phonological awareness, alphabetic knowledge). The interrelational domain focuses on the affective climate of the mother-child reading experiences (i.e., warmth, support, and engagement).

**Interpsychological domain.** Parent scaffolding in a shared book reading can be an important component of the development in the interpsychological domain. Studies have shown that parents and children focus the majority of their scaffolding talk on meaning-related rather than text-related literacy skills (Hindman et al., 2008; Lynch et al., 2008). However, some researchers found that when the child attempted to do some of the reading, there was more talk related to text-based skills (Baker et al., 2001).

***Meaning-related literacy skills.*** Scaffolding of meaning-related literacy skills during a mother-child read-aloud often happens through the use of questions asked by the parent and

child. Several scholars examined the types of questions parents and children asked during a storybook reading (Ewers & Brownson, 1999; Whitehurst, 2009). Whitehurst (2009) identified the question types using the following categories: (a) recall prompts (e.g., “Can you tell me what happened to the little boy?”), (b) open-ended prompts (e.g., “Tell me what is happening in this picture.”), (c) wh-prompts (e.g., what, where, when, why, and how questions), and (e) distancing prompts (e.g., “Did you ever fall down a hill?”). Some researchers examined labeling talk (Ard & Beverly, 2004; Justice, 2002; De Temple & Snow, 2003; Reese & Cox, 1999). In this type of talk, the parent does not ask a question but rather points to a picture in the book and gives it a label (e.g., “Look at the red ball.”). Other scholars examined gestures as simple as pointing at a picture to draw a child’s attention to a particular object (Baker et al., 2001).

These types of interactions elicited meaning-related literacy talk including talk that developed in three meaning-related literacy categories as follows: (a) developing vocabulary, (b) summarizing, and (c) inference making. The following sections look at the mother-child read-aloud research involving the meaning-related emergent literacy skills in these three areas and the mother-child interactions that influence them.

*Developing vocabulary.* The results from some studies provide evidence that mother-child book reading improved vocabulary development (Reese & Cox, 1999; Senechal & LeFevre, 2002). Many of the wh-prompts, specifically the what (e.g., “What is a crown?”) and where (e.g., “Where was Jack when he fell?”) prompts were shown to assist in the development of a child’s vocabulary (Whitehurst, 2009). Hindman et al. (2008) found parents used vocabulary-enhancing questions and comments more often than they used the higher-order type questions including predicting and inference-making questions. Though questioning prompts can promote vocabulary development especially in children with high vocabularies (Senechal,

1997), much of the research supports the idea that labeling or describing talk and pointing gestures are more effective in vocabulary development for children with smaller vocabularies (De Temple & Snow, 2003; Justice, 2002; Reese & Cox, 1999).

*Summarizing.* Summarizing requires readers “to determine what is important in what they are reading, to condense this information, and to put it into their own words” (National Institute for Literacy, 2001, p. 45). During a mother-child storybook reading, recall prompts may be one type of interaction that could assist in the development of a child’s understanding of story organization and summarization (Whitehurst, 2009), but no research was found specifically focusing on parents’ use of these type of prompts and their relation to summarizing skills.

While little is known about the influence of mother-child interactions on summarization skills, researchers did look at a child’s spontaneous talk during a read-aloud and its effect on these skills. Kim et al. (2011) focused on these spontaneous utterances (rather than responses to a parent’s comments or questions) during a joint book reading and their relationship to the child’s retelling abilities (e.g., summarizing) and found that children’s spontaneous utterances were related to a child’s retelling ability. The results also showed that children who had a larger number of spontaneous utterances included more organization features in their retelling. The authors acknowledged a glaring limitation of this study was that while all of the dyads had some familiarity with the book, some of the dyads might have had significantly more experience, which may have influenced the quality of the retelling.

*Inference-making.* Because books do not contain every piece of information needed to make sense of the material, readers rely on inference-making strategies to fill in the missing pieces (Thurlow & van den Broek, 1997). These strategies include making predictions, drawing conclusions, and finding connections to previous experiences and knowledge (Duke & Pearson,

2002). Inference making is an automatic process for a competent reader, but new or struggling readers find it difficult to attend to multiple elements of a story at one time. Thurlow & van den Broek (1997) stated that, “with repeated practice, even complex tasks can eventually require less attention; that is, they can become more automatic” (p. 165).

Mother-child interactions during a storybook reading can provide an opportunity for repeated practice necessary to help inference-making skills become automatic. Wh-prompts (e.g., “Why do you think Jack fell down?” “What happened to the water in Jack’s pail?”) and distancing prompts (e.g., “Remember when you fell down at the park?”) assist in the development of a child’s inference-making skills (Whitehurst, 2009). Parents can also point to pictures when asking prediction questions. This simple pointing behavior provides a scaffold for the child to access the information.

Baker et al. (2001) looked at the frequency of inference-making talk. The researchers labeled inference-making interactions as nonimmediate content-related talk. They found that inference-making talk was more prevalent than vocabulary development talk (e.g., labeling, describing) or summarizing and organizing talk (e.g., retelling). Though these findings differ from Hindman et al. (2008), who found more vocabulary-related talk than inference-making talk, the difference may be explained by the age of the children in the study. Hindman et al. (2008) looked at preschool children who may have needed more vocabulary support, whereas Baker et al. (2001) studied first-grade children who may have needed more inference-making support (De Temple & Snow, 2003; Justice, 2002; Reese & Cox, 1999).

Similarly, Lynch et al. (2008) found that mother-child book readings provide an opportunity to practice inference-making skills, specifically those of clarifying or conclusion drawing. Not only did they find that parents participated in this type of talk, but they also found

significant positive correlations between mother-child *clarification* interactions and the child's overall literacy achievement as measured by the TERA-2 (a standardized measurement of meaning construction, alphabetic knowledge, and conventions of print; Reid, Hresko, & Hammill, 1989). Baker et al. (2001) also found that inference-making talk was related to reading achievement for middle-income, white dyads, as measured by the Woodcock-Johnson Tests of Achievement (Woodcock, McGrew, & Mather, 2001). No statistical relationship was found for the other three subcultures used in this study, but they did find a positive correlation for all groups between the amount of inference-making talk and a child's willingness to read more challenging books in second and third grade.

In summary, researchers studying mother-child interactions involving the development of meaning-related literacy skills have found that labeling talk, known to be helpful in developing vocabulary, occurred most often when the child had a smaller vocabulary. However, when the child had a larger vocabulary, inference-making talk was most common and most effective. Parents seemed to naturally adapt the type of scaffolding based on their child's ZPD. In addition, inference-making talk correlated to higher reading scores in white, middle-class children and higher reading persistence in all subcultures.

***Text-related literacy skills.*** There is less evidence supporting the idea that mother-child book reading interactions involving text-related emergent literacy skills correlated to future reading achievement. A number of study results showed that parents have few, if any, interactions with their child about text-related skills. In fact, an overwhelming number of study results showed that meaning-related talk occurs at a far greater frequency than text-related talk—as much as a 10:1 ratio (Hindman et al., 2008; van Kleeck, Stahl, & Bauer, 2003). Recent researchers, using eye-tracking software, discovered that children look at illustrations much more



than they look at print (Evans & Saint-Aubin, 2005; Justice, Skibbe, Canning, & Lankford, 2005). This may be due, in part, to the fact that many of the studies use books that are not conducive to text-related interactions. The majority of the studies surrounding mother-child reading used a narrative book as the mediating tool. Narrative storybooks lend themselves to meaning-related interactions because the storyline is the main focus of the reading experience.

The following sections look at the research involving three different types of text-related mother-child interactions that may influence the development of emergent literacy skills. These include the following: (a) concepts of print, (b) phonemic and phonological awareness, and (c) alphabetic knowledge.

*Concepts of print.* Research results support the idea that focusing interactions around concepts of print increased a child's scores on a print assessment (Justice & Ezell, 2004), but studies have shown that the typical child's interactions with concepts of print during a shared book reading were implied rather than explicitly discussed (Ezell & Justice, 2000; Hammett, van Kleeck, & Huberty, 2003). The child watched the parent open the book and turn the pages, but the parent rarely pointed to print or tracked her reading with her finger. Stadler and McEvoy (2003) found that genre influenced interactions around concepts of print. When the book was an alphabet book, the parents' print concept behaviors significantly increased when compared with reading a narrative storybook.

*Phonemic and phonological awareness.* Phonemic and phonological awareness skills rely on "a conscious awareness of the sound components of words" (van Kleeck, 2003, p. 303). These skills include rhyme, rhythm, alliteration, syllabication, and segmentation. The results from some studies have shown that phonemic and phonological awareness are not improved by

mother-child book sharing (Whitehurst et al., 1994). However, this may be due to the type of book used in the studies.

Interested in this possibility, Neuman (1996) examined the influence of predictable and rhyming books on mother-child interactions. Low-income mother-child dyads recruited from Head Start classrooms in a large metropolitan area participated in the study. The parents received training on ways to have phonemic phonological interactions with their children while reading these types of books. Results indicated that the type of book used did influence discourse. As expected, narrative books elicited meaning-related talk, but books with predictable and/or rhyming books elicited “a collaborative form of reading together, with parents and children interactively responding to rhymes and rhythms” (Neuman, 1996, p. 509).

*Alphabetic knowledge.* Book genre may also influence the talk surrounding letters and words. Though letter knowledge is clearly a predictor of future reading achievement (Scarborough, 1998), most researchers found that it is not an outcome of mother-child storybook reading (Hindman et al., 2008; Senechal & LeFevre, 2002; Stadler & McEvoy, 2003; van Kleeck, 2003). Some researchers who used alphabet books found that parents paid more attention to the print, including letters and words, and this attention increased as the children become older (Bus & van IJzendoorn, 1988), but other researchers found that an alphabet book did not promote more letter talk (Hindman et al., 2008). Alphabetic talk also increased when the child was a beginning reader. Scholars found that there was more print-related talk when the child became the reader instead of just listening to the parent read (Baker et al., 2001).

In summary, researchers studying mother-child interactions involving the development of text-related literacy skills found little talk about these skills. However, a few researchers have found that when alphabet, rhyming, or predictable books were used, parents and children did talk

about concepts of print, phonemic and phonological awareness, and alphabetic knowledge. In addition, if parents were trained to utilize these types of interactions, there was an increase in their use during a mother-child read-aloud.

**Interrelational domain.** The affective climate is part of the interrelational domain of the ZPD. It is the “most powerful predictor of children’s motivation for reading” (Sonnenschein & Munsterman, 2002, p. 318). Much of the research in this domain focused on the role that mother-child attachment played in explaining differences in parent-preschooler interactions during storybook readings (Bus, Belsky, van IJzendoorn, & Crnic, 1997; Bus & van IJzendoorn, 1995). Researchers found that the parents in the “insecure dyads were less able to make text understandable” (Bus, 2004, p. 182). The children in these dyads had fewer responses, both verbal and nonverbal, than the children with more secure relationships. Many of their interactions were labeled as *irrelevant* or having nothing to do with the story. They were often discipline- or compliance-related.

Affective climate can also change from one reading to another, even with a secure mother-child dyad. For example, when a parent does not find a book enjoyable, the affective climate may change as the parent’s verbal and nonverbal clues give the child an indication of those negative feelings (Bus, 2004). Some scholars looked at the affective climate in a mother-child book reading without first assessing the security of the dyad by focusing on the elements of warmth, support, and engagement in the individual reading session (Baker et al., 2001; Leseman & de Jong, 1998; Sonnenschein & Munsterman, 2002).

**Warmth.** Warmth was assessed by examining both the parent’s and the child’s behaviors including physical contact and reading expression. Sonnenschein and Munsterman (2002) used the following criteria for evaluating the warmth of the physical contact in 30 diverse

(economically and ethnically) mother-child dyads: (a) no contact, (b) sitting next to each other, (c) arm around the child and/or child on the lap. Reading expression was measured by the tonal quality of the parent's voice, imitation of character voices, and expressions suggesting emotion. The researchers found that children who experienced a warm environment had more positive feelings toward reading and higher reading scores when they were in first grade. It is unknown whether this was a direct effect or an indirect effect. Some researchers believe the warmth of the reading environment led to the reading of more challenging books, which led to higher reading scores (Baker et al., 2001). Warmth is also measured by a parent's sensitivity to a child's engagement. Sonnenshein & Munsterman (2002) found that sensitivity was demonstrated when parents asked if the child was enjoying the story, acknowledged the child's feelings, made eye-contact with the child, and helped the child maintain focus.

***Support.*** In addition to the warmth of the reading environment, the amount of support provided by a parent influences the affective climate. Some parents supported their child by making deviations from the story to explain or extend concepts—meaning-related support (Martin & Reutzel, 1999). Other parents supported their child by offering help with text-related literacy skills. Several research study results showed the more support a parent provided, the more positive the affective climate (Bus, 2004; Clingenpeel & Pianta, 2007; Sonnenshein & Munsterman, 2002). Baker et al. (2001) found the affective climate of the reading experience depended on the type of support given by a parent. The researchers examined the in-home climates of mother-child dyads as they shared a storybook. When interactions focused on meaning-related skills, there was a correlation between parental support and a positive affective climate, but when the talk changed to text-related skills, the correlation became negative. In

addition, the researcher found that a positive affective climate created by meaning-related interactions predicted children's third grade reading ability.

**Engagement.** Though support is an important element of a storybook interaction in the interrelational zone, perhaps the most important element of the reading atmosphere is the level of engagement of both the parent and the child (Ortiz et al., 2001). In fact, engagement is an important predictor of later reading achievement—more important than the frequency or type of interactions during a storybook reading (Crain-Thoreson & Dale, 1992). Levels of engagement are demonstrated by the amount of attention the parent and child pay to the book-reading experience, their demeanors and facial expressions, and the amount of verbal interactions (Sonnenschein & Munsterman, 2002).

Ortiz et al. (2001) wondered if parents could be taught to use some of these behaviors to increase the amount of engagement in their mother-child read-aloud sessions. Mother-child dyads were videotaped three times in a laboratory setting as they read a book together. After the first reading, the parents assigned to the experimental group were given a handout explaining ways to make shared reading more engaging. The ideas included following the child's lead, using positive feedback, and proper book selection. Both groups were asked to fill out a parent report and to keep logs of their home reading activities. After the second and third readings, the researchers reviewed the handout with the parents in the experimental group. Results indicated that children in the intervention group showed greater increases in engagement than the children in the control group.

In summary, researchers examining the influence of the affective climate on a child's reading found that a warm reading environment correlated to higher future reading scores and that engagement was a predictor of future reading achievement. In addition, parents were

successfully taught to increase their child's reading engagement. And finally, the type of parental support offered during the book reading influenced the climate. Support around meaning-related literacy skills positively increased the affective climate, whereas support around text-related skills decreased the affective climate.

The previous section represents the research about the nature of mother-child book readings using a traditional book but a small body of research also exists where scholars looked at the nature of mother-child book readings using a digital book. Because digital books provide an opportunity to not only support the development of traditional emergent literacy skills but also digital literacy skills, a review of that research begins with a discussion about emergent digital literacies in young children. This is followed by a review of the literature surrounding mother-child digital book reading.

### **Digital Books**

With the introduction of digital books for young children in the later part of the 20th century, a few researchers began looking at how these new book types influenced the affective climate of a mother-child book reading as well as the number and quality of their meaning- and text-related interactions (Fisch et al., 2002; Moody et al., 2010). Digital books differ from traditional books in many ways. They are not meant to mimic traditional books but rather to add to the book-reading experience. They include audio and video components that are not found in traditional storybooks. They sometimes have built-in read-to-me options as well as reading-support tools. In addition, they often provide interactive icons that respond to touch, and some have music soundtracks and sound effects. CHAT suggests that because traditional books and digital books are different cultural tools, the reading experience between the parent and child is changed.

Scholars have begun to think about the different skills that young children need in order to access digital books. Towards the conclusion of the 20th century, a new term emerged in the discussions surrounding literacy education: *new literacies* (Leu et al., 2004). New literacies usually refer to skills needed to access technology-related texts such as the Internet, video games, social networking sites, e-readers, and iPad apps (Chandler-Olcott & Mahar, 2003; Gee, 2007; O'Brien, 2001). The broad umbrella of new literacies encompasses several specific literacies including *internet literacies*, *digital literacies*, and *multimodal literacies* (Coiro et al., 2008; Levy, 2009; McPake, Stephen, Plowman, & Berch-Heyman, 2008). This study focuses on digital literacies.

Lankshear and Knobel (2006) identified two competing definitions of the term *digital literacy*: conceptual and standardized. Gilster (1997) introduced the conceptual definition when he said that digital literacy is “the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers” (Gilster, 1997, p. 1). Digital literacy defined in this way involves competences in “knowledge assembly, evaluating information content, searching the Internet, and navigating hypertext” (Lankshear & Knobel, 2006, p. 13). In contrast, the standardized definition of digital literacy refers to the specific “tasks, performance, [and] demonstrations of skills” (p. 13) needed to access digital texts. Digital literacy defined this way involves competences in accessing and utilizing specific computer hardware (e.g., touch screens, joysticks, keyboards) and software (e.g., Word, Excel, Minecraft).

Most of the research about how children develop digital literacies (both conceptual and standardized) is focused on older children and adolescents (Chandler-Olcott & Mahar, 2003; Gee, 2007; O'Brien, 2001). There is little research about how very young children develop these

literacies. There is no research about the development of digital literacies in young children during a mother-child read-aloud, however some researchers have examined how young children gain standardized digital literacies at home (Plowman, 2015; Plowman, Stevenson, Stephen, & McPake, 2012). McPake et al. (2013) found that through technology play in their homes (sometime supported by parents and sometimes not), young children gained important standardized digital literacies. They defined digital literacies as the ways in which young children develop the competences and needed strategies to access, read, and create a variety of screen texts. These digital literacies skills include the basic competences needed to operate specific digital devices including the hardware and software associated with the digital texts.

Because of the limited relevant literature available surrounding the development of conceptual digital literacies in young children, this literature review and subsequent study focused on standardized digital literacies (Lankshear & Knobel, 2006; McPake et al., 2013). Just as young children must learn how to access and read a traditional storybook, they must learn how to access and read a digital storybook. Once they have developed these digital skills, they can then continue to develop the more conceptual digital literacies as defined above (Lankshear & Knobel, 2006).

McPake et al. (2008) investigated the development of standardized digital literacies in young children by studying the competences needed to access digital texts. Using case studies, they observed that young children acquired basic competences in three domains of digital literacy that correlated with the domains found in the acquisition of print literacies. These domains are operational, social, and cultural.

Operational competences in digital literacies are those needed to access a technological device. Operational competences were divided into two categories: technical and functional,



with technical referring to hardware skills and functional referring to software and user-interface skills. Plowman and Stephen (2003) expanded this competence further when they discussed other operational elements including “the development of the sensorimotor skills necessary for computer interaction . . . [and] the ability to navigate nontraditional texts” (p. 156). Other researchers used the term *screen literacies* developed by Turbill (2001) when describing the operational competences needed to access digital texts. They examined how young children responded to audio and video feedback (Hillman & Marshall, 2009), used troubleshooting techniques to deal with technological glitches, gained experience with the way “sounds, images, and texts interact,” (p. 40) and learned to use the tools necessary to access digital texts (e.g., touch screen, mouse;) (Ba, Tally, & Tsikalas, 2002).

Interested in how digital books influence book readings, some researchers examined how children interacted with digital storybooks (CD-ROM and online versions) using a desktop computer. Some of these studies did not include parents in the book reading sessions (Ciampa, 2012; de Jong & Bus, 2004; Korat & Shamir, 2008) and therefore did not meet the literature search criteria for this study. Instead, support was only provided by the software program itself. Four research studies did include parents in the reading experiences, two using quantitative methods (Korat & Or, 2010; Moody et al., 2010) and two using a qualitative case-study approach (Fisch et al., 2002; Kim & Anderson, 2008).

Though the literature is limited (Salmon, 2014), the next sections discuss the four identified studies. It begins with an overview of each study. This is followed by a review of the studies’ results organized around the interpsychological and interrelational zones. The interpsychological zone includes the studies that looked at meaning-making activities (e.g., vocabulary, summarizing and retelling, inference making) found in mother-child digital read-

alouds. It does not include text-related activities (e.g., talking about concepts of print, phonemic and phonological awareness, alphabetic knowledge) because none of the studies addressed this issue. Because one of the researchers looked at medium-specific skills (technology or book), this section also includes a discussion of those findings. Researchers in only two of the studies looked at the interrelational domain of digital book readings (Fisch, et al., 2002; Moody, et al., 2010), which suggests the need for more research in this area.

Kim and Anderson (2008) compared the number of mother-child interactions in a traditional book reading to a digital book reading and also looked at the complexity of the meaning-related interactions. They conducted a case study using one mother and her two sons, a three-year-old and eight-year-old. They compared the mother-child interactions by looking for differences in the number of interactions and the type of talk based on the age of the child. The researchers were not only interested in the differences across book type but were also interested in the differences based on the age of the child.

Fisch et al. (2002) limited their study to the examination of meaning-related literacy skills and the affective climate. They conducted an exploratory case study using seven mother-child dyads from the New York City metropolitan area, recruited through a Sesame Street Workshop database. The dyads read two online storybooks as they were videotaped. The mothers were also interviewed following the experience. The researchers were not only interested in interactions involving meaning-related literacy skills, but also in who drove the experience—the parent or the child. The researchers did not have the dyads read a traditional book to make comparisons; rather they compared their findings with the findings of past researchers (Pellegrini, Perlmutter, Galda, & Brody, 1990), which created validity issues. It is not known

whether these mother-child dyads would have interacted in similar or different ways than the dyads in the previous studies. Text-related skills were not addressed.

Moody et al. (2010) also looked at the affective climate and the meaning-related interactions of mother-child read-alouds but they also examined medium-referencing or technology-related skills. These are skills needed to access the books through technology including clicking the mouse, clicking on icons, and interacting with animated elements. Moody et al.'s (2010) quantitative study used a larger sample (25 African-American Head Start preschoolers and their parents) as they read both traditional storybooks and digital storybooks on a desktop computer. Like Fisch et al. (2002), they were interested in the differences in interactions based on book type and also based on who (parent or child) was leading the experience. Each mother-child dyad completed three book readings: (a) adult-led e-storybook, (b) child-led e-storybook, and (c) adult-led traditional storybook.

Korat and Or (2010) looked at the amount of mother-child discourse and the responsiveness of the child to the mother's initiations. They used an even larger sample of 48 Israeli kindergarten children and their mothers. They were interested not only in the differences in the interaction behaviors between a printed book and a digital book, but also between two different types of digital books—a commercial book and an educational book created by the researchers. Each dyad was randomly assigned to one of the following book reading groups: (a) reading a commercially printed book, (b) reading the digital version of the commercially printed book, (c) reading a researcher-created educational book, or (d) reading the digital version of the researcher-created educational book.

The following sections look at the results of three of the four studies. The results of Fisch, et al. (2002) are not discussed because of the validity issues created when they did not use

within-subject comparisons as explained above. The authors of the study stated that “the data must be interpreted with caution” (p. 444).

**Interpsychological domain.** This section contains discussion about the skill developed in the interpsychological domain—meaning-related and technological-related interactions. None of the four studies looked at text-related literacy skills so this area is not discussed. One study also focused on the nature of the interactions in the interrelational zone, and this is also discussed.

**Meaning-related literacy skills.** Kim and Anderson’s (2008) case study looked at the overall complexity of all types of meaning interactions. They used the terms immediate and non-immediate talk to define the type of meaning-making interactions that happened during the traditional and digital storybook readings. Immediate talk was defined as more concrete, where “children rely on their immediate physical environment, such as the words and illustrations; non-immediate talk requires children to go beyond their immediate physical environment to talk about things and events not physically or temporally present” (p. 215). Non-immediate talk included making connections to previous experiences and drawing on prior knowledge to help interpret the book. They found that while the number of mother-child interactions was greater during the print version of the story, the complexity of the meaning-making interactions was greater during the digital readings. This was true for both the three-year-old and eight-year-old child, though the complexity differences were greater for the older child.

Moody et al. (2010) identified the following three categories to label the meaning-related literacy skills: (a) labeling interactions, (b) story/comprehension related interactions, and (c) interactions involving external references. These labels indicated the researchers were looking at interactions supporting vocabulary development and inference making. Korat and Or (2010)

looked at the mothers' cognitive talk that specifically expanded meaning. This talk included vocabulary interactions and inference-making interactions.

*Developing vocabulary.* Because *labeling* interactions are known to increase vocabulary development (Ard & Beverly, 2004; De Temple & Snow, 2003; Reese & Cox, 1999), Moody et al. (2010) were interested in comparing the number of labeling interactions occurring around each book reading. Results showed adult-led traditional storybook interactions produced significantly more labeling interactions than the e-storybook interactions. Korat and Or (2010) also found that the printed books yielded more vocabulary-related (labeling and defining) interactions than either of the digital books.

*Inference-making.* The type of *story/comprehension* interactions coded by Moody et al. (2010) involved making predictions and drawing conclusions. The results showed no statistical differences in the number of story/comprehension interactions or the number of external references for the two adult-led storybook readings, digital or traditional. But when the child led the digital book reading, there were significantly fewer meaning-related interactions than when the mother was leading the experience. Korat and Or (2010) found that meaning-making talk was not as complex when the dyad read the digital versions of the books. Rather most of the talk related to vocabulary activities such as defining and labeling (though this also decreased during the digital readings). There was less complex talk involving inference-making activities such as making connections or inferences about information not contained in the book.

In summary, digital books only slightly altered the nature of the interactions surrounding meaning-related literacy skills as a parent and child read a book together. Specifically, when the parent read a digital storybook, the total amount of vocabulary development talk decreased but the number of child-initiated vocabulary interactions increased. In addition, the only significant

change in the interactions about inference-making skills was the decrease in talk when the child was leading the interaction or in the complexity of the inference-making interactions.

**Medium-specific skills.** Moody et al. (2010) also created a coding category (medium-specific referencing) to evaluate the number of interactions during the readings involving the tools, both the traditional book and the digital book (e.g., “Help me click here.” “Can I turn the page?”). In some ways, this is similar to the category examined in the traditional storybook studies that looked at concepts of print (e.g., page turns, finding the title and author), but Moody et al. added examined technology-based interactions during the digital readings. Again, they found no significant difference between the medium referencing of a traditional book and a digital book.

**Interrelational domain.** Moody et al. (2010) are the only researchers to examine the affective climate of the mother-child digital-book-reading experiences. They examined the affective climate surrounding the three different reading conditions. This was done by adapting the Minnesota Teaching Task instrument, which is used to assess the affective and behavioral quality of mother-child dyads during play sessions. The measure used three scales: (a) persistence, (b) enthusiasm, and (c) compliance. These three scales can also be thought of in terms of warmth (compliance) and engagement (persistence and enthusiasm).

**Warmth.** Compliance is an indicator of the warmth of a book-reading experience. It measures a child’s willingness to listen, comply with requests, offer timely responses, and follow directions. Moody et al. (2010) found no significant difference in the level of compliance across the three book interactions.

**Engagement.** Persistence is an indicator of engagement and was labeled when the child was seen pointing at the book, turning the pages, commenting on the story, and asking questions

(Moody et al., 2010). The persistence scale did indicate significant positive differences between the book-reading experiences. Results showed that there was a significant difference in the level of persistence during the adult-led e-storybook-reading when compared to the other two experiences.

Enthusiasm is also an indicator of engagement in the reading experience. Enthusiasm was labeled when the child acted with “vitality, confidence, and eagerness during the book reading experience” (p. 302). It was demonstrated by laughing, smiling, and positive comments. Results showed there was no difference in the level of enthusiasm across the three book-reading experiences.

In summary, it was difficult to determine what happened in the interrelational zone as parents and children read books on a desktop computer. There was no change in warmth as measured by compliance and mixed results for engagement as measured by persistence (more during the traditional reading) and enthusiasm (no difference between readings).

**Computer tablets.** When computer tablets were introduced, so was the opportunity to make the new tools more like a traditional book. They are smaller than desktop computers and also portable. A parent and child can sit on a couch together to read a book on the tablet’s screen. The tablet can be shared or passed back and forth as the parent and child interact. However, these new tools also have some of the same elements as the desktop book—animation, follow-along reading, and interactive elements. Computer tablets come in various formats. The most popular e-book readers are the Kindle, the Nook, and the iPad (Roxburgh, 2012), with additional tablet options currently being developed and marketed.

Despite the fact that books have been available on computer tablets (e.g., iPads, e-readers) for several years (the Kindle was introduced in 2007), only two research studies were found in which scholars examined the types of interactions that occur when parents and children read books using this mediating tool (Chiong, Ree, Takeuchi, & Erickson, 2012; Krcmar & Cingel, 2014). Chiong, Ree, Takeuchi, & Erickson (2012) studied mother-child book readings using a Quick Study design. A Quick Study is a research format that allows researchers “to rapidly probe new platforms to determine whether they warrant further investigation” (p. 3). They compared the book-reading interactions of 32 mother-child dyads across three book formats: print books, basic e-books, and enhanced e-books. Basic e-books were defined as those books that did not have interactive elements other than swiping the screen to turn the page. They more closely mirrored the traditional storybooks. The enhanced e-books had interactive touch screens with icons and sounds. The researchers compared the number of meaning-related interactions, the child’s story comprehension, and the level of child engagement. Krcmar and Cingel (2014) used a quantitative design where they coded mother-child verbal interactions of 70 mother-child dyads. They used eighteen a priori coding categories related to storyline content and book format. The next sections discuss the findings of these two studies in the interpsychological domain and the interrelational domain.

***Interpsychological domain.*** Chiong et al. (2012) found that both parents and children engaged in a similar number of meaning-related interactions when they compared the traditional storybook reading with the basic e-book reading. However, they found that when the dyads read the enhanced e-book, the number of meaning-related interactions decreased. They also found that the child’s story recall ability decreased with the enhanced e-book. Krcmar and Cingel (2014) found similar results. Children comprehended significantly more as they read the



traditional book. In addition, the traditional storybook reading produced more meaning-related talk. But Krcmar and Cingel (2014) also looked at format-related talk and found that the e-book readings produced more talk related to the book format – in this case technology-related talk.

***Interrelational domain.*** Both Chiong et al. (2014) and Krcmar and Cingel (2014) evaluated an element found in the interrelational domain. Chiong et al. (2014) looked at child engagement. They found that the enhanced e-book was more engaging for the children than either the basic e-book or the traditional book. Engagement was a composite of the number of mother-child interactions, parent-book interactions, child-book interactions, and signs of enjoyment. Krcmar and Cingel (2014) counted the number comments that were corrective (e.g., “Don’t touch the scissors!”) or related to the environment (e.g., “Please don’t climb on me.”). They referred to these comments as distraction talk. These types of interactions influence the warmth of the reading experience. The researchers found that these types of interactions were more frequent when the dyads were reading the digital storybooks than when they were reading the traditional storybooks.

Because Chiong et al.’s (2014) research was a Quick Study, they acknowledged its limitations and encouraged additional research in the area of mother-child computer tablet book readings. Krcmar and Cingel’s (2014) study was a response to their recommendation for further research. Their study provided important insight into mother-child book-reading interactions as they read digital books on computer tablets, however the scope of their study was limited to two types of meaning-related interactions (evaluative and questioning) and did not separate the meaning interactions into the more specific areas of vocabulary, organizing and summarizing, and inference making as was done by several researchers looking at mother-child book-reading interactions during traditional and CD-ROM book readings (Baker et al, 2001; Moody et al.,

2010). Krcmar and Cingel (2014) did look at medium-specific interactions, but did not separate these interactions into more specific areas to determine if they were talking about operational or functional elements of the digital book format. In addition, they did not specifically evaluate the nature of mother-child text-related interactions (Hindman et al., 2008; van Kleeck et al., 2003). They also looked at only small part of the affective climate of mother-child book readings (Sonnenschein & Munsterman, 2002; Moody et al., 2010).

### **Conclusion**

Mol and Bus's (2011) meta-analysis found over 100 studies where scholars examined mother-child book-reading experiences using a traditional book. The results of these studies illustrate that traditional mother-child book-reading experiences can improve both meaning and text-related literacy skills in young children if the affective climate is warm and supportive. In contrast, only eight studies were found where researchers looked at mother-child interactions during a digital book-reading experience. Of these eight studies, only two looked at interactions when the book format was a computer tablet and one of those two studies was a Quick Study. These researchers limited their research to a few types of meaning-related interactions and did not specifically examine text-related interactions. They studied some elements of the affective climate but did not address other important elements identified by previous mother-child book reading research (Baker et al., 2001; Bus & van IJzendoorn, 1995; Sonnenschein & Munsterman, 2002). In addition, they did not look specifically at the interactions surrounding the standardized digital literacies as defined by McPake et al. (2013). Unlike traditional mother-child book-reading experiences, much is still unknown about how parents and children interact as they read a digital storybook.

Because of the limited nature of this research, further study was needed to understand the nature of mother-child interactions while reading a digital story using a computer tablet. More specifically, a study was needed to explore the nature of mother-child digital storybook reading in the areas of meaning-, text-, and technology-related interactions as well as the affective climate of these experiences. The purpose of this study was to gain understanding of these interactions specifically focusing on the nature of the mother-child verbal and non-verbal interactions and the affective climate during traditional and digital book readings using a multiple-case study approach.

### Chapter 3: Method

The research method I used to answer the study's questions was multiple-case (or collective) study as defined by Stake (1995). Multiple-case studies are based on a collection of instrumental case studies and was an appropriate method for understanding the research questions associated with this study for several reasons. First, when the questions focus on a quintain (verbal and non-verbal interactions and the affective climate) rather than a specific case, as does this study, then instrumental case study, is the best method to use according to Stake (2006). Second, because I was interested in how this quintain was manifest in more than one case, multiple-case study became a useful method to understand the quintain's similarities and differences across cases.

#### Material Selection

Because the type of book influences the type of communication (Teale & Sulzby, 1987), the book selection process was purposeful and based on the following criteria: (a) quality and likeability of the book; (b) availability in two book formats, traditional and iPad; (c) type and quality of tablet's video and audio elements; and (d) emphasis on basic reading/coding skills and/or meaning-related talk. These criteria are discussed in detail below. After reviewing a number of books based on the previous four criteria, a narrative book, *The Tale of Peter Rabbit* (Potter, 1902), and a beginning reader book, *Green Eggs and Ham* (Seuss, 1960), were selected.

**Quality and likeability.** Tunnell, Jacobs, Young, and Bryan (2011) defined a good book as "one created by a knowledgeable and skilled author in which the elements of literature measure up under critical analysis" (p. 10). These elements of quality literature include engaging characters and plots, powerful language, and artful illustrations that increase a child's ability to engage in and understand a story. One critic (Ross, 1996) claimed that *The Tale of Peter Rabbit*

(Potter, 1902) is a story “created for reading” (Ross, 1996, p. 210). It contains a relatable protagonist, an adequate amount of tension, and a satisfying conclusion. Potter used precise vocabulary such as “implored him to exert himself” (p. 33) and understatement such as “he had heard about cats from his cousin, Little Benjamin Bunny” (p. 46). This type of writing provides opportunity for vocabulary and inference-making discussions. In addition, Lear (2007) stated that *The Tale of Peter Rabbit* is a “perfect marriage of word and image” (p. 154). It requires both the pictures and the words to fully tell the story.

Dr. Seuss is known for his iconic characters and his rhythmic, rhyming writing style. He won three Caldecott Honor medals for his imaginative illustrations (Association for Library Service to Children, 2014a), the Laura Ingalls Wilder medal for his substantial contribution to children’s literature (Association for Library Service to Children, 2014b), and a special Pulitzer Prize in 1984 for his “special contribution over nearly half a century to the education and enjoyment of America’s children and their parents” (The Pulitzer Prizes, 2014, para. 13).

Equally, if not more important than the literary quality of a book, is its overall appeal to young children (Tunnell et al., 2011). Though a book’s likeability may vary from child to child based on individual tastes and experiences, several well-known titles seem to have a wide range of appeal. One way to judge a book’s appeal is to examine its printing history. Longevity in print can indicate which books children enjoy from generation to generation. Based on publishing longevity, *The Tale of Peter Rabbit* (Potter, 1902) and *Green Eggs and Ham* (Seuss, 1960) have wide appeal. Roback, Britton, and Turvey (2001) of *Publisher’s Weekly* listed *The Tale of Peter Rabbit* as the number two best-selling English-language book of all time. *Green Eggs and Ham* is on *Publisher’s Weekly*’s list as the fourth best-selling English-language children’s book.

Because picture books apps are a relatively new commodity, there are currently few models available to use for evaluation purposes (Bird, 2011). Common Sense Media is a nonprofit organization that rates media, including picture book apps, based on age appropriateness, learning value, and entertainment value (Shuler, Levine, & Ree, 2012). The apps for both *Green Eggs and Ham* and *The Tale of Peter Rabbit* were selected as among the best children's apps for the iPad based on their quality. *Green Eggs and Ham* is listed as one of the best book apps for children by Common Sense Media (2014a) who praised it for its loyalty to the print classic, interactive elements that support reading development, and ease of use. *PopOut! The Tale of Peter Rabbit* iPad app received a five-star rating by Common Sense Media (2014b) for its video (e.g., pop-up book features) and audio elements (e.g., music, sound effects) as well as usability. In addition, both apps met at least six of the eight criteria listed in *The School Library Journal* as important when evaluating the quality of a picture book app. These include the ability to easily skip to different parts of the book, art that is well integrated with the words, the quality of the narration, and the ability to turn off the narration (Bird, 2011).

**Availability.** Because the research questions focus on mother-child interactions as they read a book on an iPad, it was important to choose books that were available in the following two formats: (a) traditional book, and (b) an interactive tablet (e.g., iPad). Although the selection of books available in both formats was somewhat limited, both *The Tale of Peter Rabbit* (Potter, 1902) and *Green Eggs and Ham* (Seuss, 1960) were available. The iPad apps are *PopOut! The Tale of Peter Rabbit* (Potter, 2011) and *Green Eggs and Ham* (Seuss, 2011).

**Video and audio elements.** Books available on interactive tablets such as the iPad offer an oral narration option plus several different types of interactive icons, activities, and games. Some of these book apps take well-known book characters and put them into a series of

children's activities such as coloring books, mazes, and games. Others are more comparable to the traditional book versions of the stories but have interactive elements such as narration options, music, interactive icons and words, and navigation menus. For this study, *The Tale of Peter Rabbit* and *Green Eggs and Ham* were chosen because the iPad versions have high quality interactive elements that are related directly to the story (e.g., swiping for page turn, clicking to have the computer read, interacting with moveable illustrations) but had no gaming elements (e.g., mazes, plot options, coloring pages), making them more comparable to the traditional books. Though there is value in the book apps that offer more activities and games (e.g., motivation, persistence, problem-solving), they were not selected because this study is examining the nature of mother-child book-reading interactions while reading both traditional and digital books and making comparison across book-type. This study is an initial investigation of mother-child digital book reading interactions providing a starting point for further research.

**Book emphasis.** Some types of books lend themselves better to talk involving literacy skills related to meaning making while others provide more opportunities for text-related literacy talk. Alphabet and beginning reader books create opportunities for talking about letters and sounds, word patterns, and rhyming, whereas storybooks tend to produce more meaning-related talk (Lane & Wright, 2007). *Green Eggs and Ham* (Seuss, 1960), a beginning reader, was chosen because it could create more opportunities for text-related literacy talk. It contains rhyming words, repeated word patterns, and a simpler vocabulary. *The Tale of Peter Rabbit*, a storybook, was chosen because it could create more meaning-related literacy talk. It is above the reading level of most five-year-olds, has a more complex story line, and uses some vocabulary that may not be as familiar to young children.

## Case Selections

The criteria I used to select the cases were the following: (a) the dyad's previous experience with technology, (b) the dyad's previous experience with mother-child read-alouds, (c) the child's age, and (d) the mother's availability and willingness to be a study participant.

Because I did not want the novelty of technology to be a factor in the book-reading experiences, it was important that the mothers and children participating in the study had previous experience with technological devices including hand-held devices such as a smart phone or computer tablet. In addition, since I was looking at the changes that happened when the text-type changed, it was also important that storybook readings were a regular part of the dyads literacy experiences. The age of the child was also a criterion. Mother-child reading interactions have the greatest impact on the literacy development of younger rather than older children (van Kleeck, Stahl, & Bauer, 2003), and researchers have found that parents and children engage in more text-related interactions when the child is a beginning reader (Bus & van IJzendoorn, 1988). Thus, five-year-old children were selected for this study because they are most likely to be in the beginning stages of reading development. Finally, the study required a large time commitment, so ability and willingness to participate became important criteria. In this study, mothers were used rather than fathers because of their availability. This was consistent with the majority of the past research examining mother-child book readings that also involved mothers rather than fathers (Bus & van IJzendoorn, 1995; Clingenpeel & Pianta, 2007, Fisch et al., 2002; Sonnenschein & Munsterman, 2002).

The six cases were selected from 48 children enrolled in a university laboratory school kindergarten class located in the Mountain West. I used a selection survey to screen for the above criteria (see Appendix A). Because of the extended time commitment for this study, each



mother was given a VISA gift card for \$150 as compensation (\$25 for completing the survey, \$25 for the post-reading interview, and \$25 for each mother-child reading session).

### **Participants**

Once six dyads were selected as participants for the study, I needed to gain a better understanding of the backgrounds of each case. In order to accomplish this, I asked each mother to complete a survey that provided me with additional demographic information as well as home literacy and technology behaviors and attitudes (see the survey in Appendix B). I also collected a literacy assessment for each child from his/her kindergarten teacher (see an example in Appendix C). Additional home literacy and technology information was gathered as I interviewed each mother (see Appendix D). I gained a sense of each child's disposition during a play session (see Appendix E). Finally, using a post-observation questionnaire, I asked each mother about her child's personality as well as the nature of her relationship with her child (see Appendix F).

To organize the demographic information, I created a background summary for each case (see an example in Appendix G). Some of the demographic information is presented in Table 1. I have included the remainder of the background information in the descriptions that follow. These descriptions are presented in the following order: (a) Chantel and her mother; (b) Alia and her mother; (c) Ian and his mother; (d) Juan and his mother; (e) Selina and her mother; and (f) Tyler and his mother.

Table 1

*Demographic Information by Case*

Dyad Information	Case					
	Chantel	Alia	Ian	Juan	Selina	Tyler
Child's Age	5 years 4 months	5 years 8 months	5 years 5 months	5 years 9 months	5 years 3 months	5 years 7 months
Child's Ethnicity	White	White	White	Hispanic	White	White
Child's Primary Language	English	English	English	English	English	English
Mother's Age	44	34	29	41	31	43
Mother's Ethnicity	White	White	White	Hispanic	White	White
Mother's Primary Language	English	English	English	Spanish	English	English
Mother's Education	B.S.	B.S.	B.S.	High School	B.S.	B.S.
Mother's Employment	Family Business	None	None	None	None	Public Relations
Family Income <sup>a</sup>	High	High	Low	High	High	High
Child lives with	Parents Sis (16) Bro (15) Bro (10)	Parents Grandma Sis (7) Sis (3)	Parents Bro (2) Bro (10 months)	Parents Bro (3)	Parents Bro (8) Sis (2)	Parents Bro (14) Sis (12)

<sup>a</sup>High = over \$60,000, Middle = \$30,000 - \$59,000, Low = 0 - \$29,000

**Chantel and her mother.** On her post-observation questionnaire, Chantel's mother indicated that she and Chantel have a warm relationship. She reads to Chantel every night as she did with all of her other children. When asked about the nature of these mother-child book-reading experiences, she said, "I usually read the book straight through while Chantel listens, though sometimes we stop and talk about what is happening. Chantel's literacy assessment indicated that she is at or above grade-level in all literacy areas and reads on a beginning first-grade level. Chantel spends at least one hour a day using a computer. Her use is limited to playing educational games or watching PBS videos. Her mother's parent survey responses also indicated that Chantel spends about 15 minutes a day using her mother's iPhone.

**Alia and her mother.** On her post-observation questionnaire, Alia's mother indicated that she and Alia sometimes have a contentious relationship. She stated that Alia requires a lot of attention and, because she has two other children and is expecting a baby, she sometimes does not have the time to give Alia the attention she needs. However, she does take time to read to Alia daily. During her mother interview, Alia's mother said that within the last two months, Alia has begun to show an interest in learning to read and can now read a few beginning-reading books. Her kindergarten assessment indicated that she reads on an end-of-kindergarten level. Her mother also reported on the survey that Alia spends about one-and-a-half hours daily watching television or playing video games. She also watches shows on her mother's iPad and iPhone on a daily basis.

**Ian and his mother.** According to the post-observation questionnaire, Ian and his mother have a good relationship, but sometimes she is frustrated because he has a short attention span and has a difficult time focusing. She stated that he is full of energy and prefers to play outdoors. However, she does read to him each night before he goes to bed. During her

interview, she said that he learned to recognize the alphabet letters and identify their sounds before he was two-years-old and now reads above grade level. Though Ian is blind in one eye, this does not seem to affect his literacy learning. Ian's mother reported that he is experienced with using technological devices including Leap Frog, smart phones, iPads, and computers. His mother believes that "technology is a great tool for young children but that it needs to be used in proper ways and proportions." Though she views technology in a positive light, she tries to limit the amount of time Ian spends using it each day.

**Juan and his mother.** During her mother interview, Juan's mother expressed concern regarding her relationship with Juan. She is concerned that Juan may have Attention Deficit Disorder because he has difficulty focusing at home and in school. He is easily frustrated and has difficulty managing his emotions and said that "if he doesn't get his way . . . [he] becomes moody or aggressive." Because Juan is temperamental, his mother works hard to not upset him. She said, "I have to always try to please him . . . or he will just snap." Juan's mother reported that she reads to Juan almost every evening. According to Juan's literacy assessment, he performs above grade level and reads on an end-of-first-grade level. His mother said that he doesn't "really like to read and she has to fight him or reward him to get him to do it." On the survey she reported that Juan is allowed to watch television for 30 minutes a day. He plays games on her iPhone for 15 minutes a day. Juan also plays computer games on the family's laptop computer and iPad several times a week.

**Selina and her mother.** On her post-observation questionnaire, Selina's mother reported that she and Selina have a "happy relationship" and that Selina is "an easy-going, delightful child." Selina and her mother read together in the morning before school. Her mother explained in her interview that, because Selina is learning to read, they share the reading responsibilities.

Selina's literacy assessment indicates that she knows all of her letters and letter sounds and reads on an upper-first-grade level. Selina loves to use her parents' iPhones to play games. The family does own an iPad but, according to the parent survey, Selina only uses it about once a month.

**Tyler and his mother.** On her post-interview questionnaire, Tyler's mother described their relationship in the following way: "[Tyler] prefers me to make his food, get him dressed, put him to bed. He likes to have me near him. He is quiet around others but at home he sometimes acts out in inappropriate ways (scratching, hitting, name-calling)." Tyler and his mother routinely read books together at bedtime. She reads him chapter books because neither she nor Tyler are interested in reading the beginning-reader books Tyler brings home from school. As a toddler, Tyler was diagnosed as developmentally speech delayed. However, now Tyler speaks well and, according to his academic records, is on or above grade-level in all content areas. He reads on a first-grade reading level. Tyler began interacting with technology at a young age. During the mother interview, his mother indicated that by the age of two, he used his mother's iPhone for "alphabet flashcards, memory games, taking pictures, typing, and watching videos." Now that Tyler is older, he prefers to use it to play games like Minecraft and spends over an hour a day doing so.

### **Data Collection**

I used two data sources for the multiple-case study. The main data sources were four mother-child book-reading observations for each case. A secondary source was an interview with each mother. The following sections provide the data collection process for each of the two data sources.

**Observations.** Observations were the primary data source for this study because they illustrate “how the phenomenon appears in context” (Stake, 2006, p. 27). Observations usually take place in the setting where the quintain being studied naturally happens. This was not the case for this study. The natural environment for examining this study’s quintain, mother-child book-reading interactions, would most likely be their own home. However, because of the need to capture the mother-child book reading interactions from multiple angles, the observations took place in a research room at the university laboratory school. In order to understand the nature of the verbal and nonverbal interactions, it is important to not only videotape the participants as they read together, but also capture what interactions are happening with the physical text (e.g., pointing, page turning, clicking). The research room has multiple cameras to focus on these different aspects of the reading experience including the actual text. The room has two hidden cameras to capture the experience from multiple angles. One camera is located in front of the dyad and captured the interactions that happened between the parent and child. The other camera is located behind the dyads and focused on the books (traditional and digital) being read in order to capture the physical, nonverbal interactions with the books. There is also a one-way mirror for live observations. This location was also selected because of its convenience and accessibility for the mothers. They were often at their child’s school as they regularly dropped off and picked up their children.

An attempt was made to create as natural an environment as possible for the mother-child book-reading observations. The room at the lab school has a family-room environment with couches, chairs, books, and toys. The children visited the room previously for their play session and interview. They also used the room for various small-group activities with their kindergarten class.

Each dyad was observed individually on four occasions. The length of the observations varied depending on how long each dyad chose to spend with the books. On each occasion, the parent was given one of the four books (the digital or traditional versions of *Green Eggs and Ham* or the digital or traditional versions of *The Tale of Peter Rabbit*) and instructed to read it with their child as they normally would. When the dyad read a computer tablet book, I put the book's title page on the screen and said, "The screen has some interactive elements you are welcome to use." No other instructions were given and no mention was made of my interest in the interactions during the reading process. The order of reading was balanced between dyads to see if the interactions differed from a first or second reading of the book (see Appendix H). I observed each session from behind the observation window and created field notes on the interactions I was confused about or needed additional information about in order to better understand what was happening. I used these notes to create the interview protocol for each mother's interview. These sessions were also videotaped using two cameras.

**Mother interview.** Mother interviews were also a data source (Stake, 1995). I conducted a semi-structured interview with each mother after the four book-reading sessions were completed. The purpose of these interviews was twofold. First, I asked questions related to the background of each case as discussed in an earlier section. Second, I used the interviews to gain the mother's perspectives and interpretations of what was happening during each book reading to triangulate my interpretations of the nature of the mother-child interactions. I showed each mother portions of her book-reading observation videos and asked her to interpret what was happening. I used this information to confirm or disconfirm my interpretations (Yanchar, 2011). In addition, there were times during the book readings where I was unsure of why something was

happening and I wanted to ask about her understanding of the experience to learn from her insight.

### **Data Analysis**

There are two phases to the data analysis process in multiple-case studies. The first phase is the *within-case* analysis and the second is the *cross-case* analysis (Stake, 2006). When conducting the within-case analysis, each dyad was treated as unique with its own story to tell. Efforts were made to understand each case as a single case study looking for understanding of the book-reading experiences by identifying themes for each dyad as well as the background information that shed light on the reading experiences of each case. After each case was individually reviewed and a report generated, a cross-case analysis was conducted in which I formed assertions based on similarities and differences among the cases.

**Within-case analysis.** The within-case analysis focused primarily on the book-reading observation session triangulated with data from the mother interview. Because of the large amount of previous research about mother-child book-reading interactions, much is already known about the nature of these interactions as they read a traditional text (Baker et al, 2001; Hindman et al, 2008). Based on this body of research, I used a priori coding categories to analyze the observation sessions. During the analyses process I also allowed for the emergence of new categories (i.e., word parts, word supply, and compliance) as situations arose that were not adequately explained by the a priori categories. From these categories, I identified themes for each case that appeared across the four book-reading observations. Following the data analysis for each case, I wrote an individual case report based on the findings (see Appendix I).

**Data sources.** There were two main sources of data used for the within-case analysis. The first was the six book-reading observations for each dyad. The second was the interviews I



conducted with each mother after their final book reading. The analysis process for each of these data sources is discussed in the following sections.

*Observations.* The videos for each of the mother-child book-reading observations videos were uploaded to *Transana*, a video analysis computer software program. With the aid of this program, I, along with the help of a research assistant, transcribed each of the videos. These transcriptions included all the verbal and non-verbal mother-child interactions for each book reading. The transcripts connect automatically to the video feed, which allowed me to view the transcripts and videos simultaneously. Using the videos and transcripts, I analyzed the mother-child reading sessions for each case using a four-stage process. Each stage focused on a different aspect of the study's quintain. For each stage, I watched the four observation videos for a specific case and focused on a different element of the mother-child interactions during each viewing.

During the first, second, and third stages, I looked at the verbal and nonverbal interactions related to text, meaning, and technology, respectively. Each verbal and nonverbal interaction during the book-reading observation was coded as being meaning-related, text-related, or technology-related. If an interaction did not fit within one of these three categories, I looked for the possible emergence of a new coding category. In addition, some interactions were labeled as irrelevant (e.g., interactions about something else in the room, talk about being thirsty, and discipline talk). These irrelevant interactions were not discarded but rather were used in determining the affective climate of each book reading as well as what the mother and child were talking about. Many of the interactions were coded under more than one area (see Tables 1, 5, and 7 for examples). During the fourth stage, I examined each observation video to understand the affective climate surrounding the book-reading experiences. The four stages of the

observation analysis were completed for all six dyads and are explained in more detail in the following sections.

The first stage in analyzing the observation videos and transcripts consisted of coding and counting the text-related verbal and nonverbal interactions occurring during each of the four book readings and identifying who (mother or child) initiated each interaction. I examined the transcripts and video to find the text-related interactions. Table 2 shows examples of text-related interactions in both the traditional and digital storybook readings of *Green Eggs and Ham*.

Once identified, these interactions were coded based on the type of text interaction that occurred. Separate but parallel coding systems were developed to label both the mother's and the child's text-related behavior. The coding system included a priori categories and subcategories based on previous studies of mother-child book readings (e.g., tracking print, identifying book parts, pointing to letters) and are listed in Table 3 (Baker et al., 2001; Fisch et al., 2002). A priori codes are utilized in case studies when the research literature has previously identified expected coding categories (Stake, 1995). The coding system also included categories that emerged as I examined the transcripts and videos (e.g., supplying words, reading for support). As I analyzed the transcripts during stage one, I noticed that the mothers and children were engaging in text-related talk that was not explained by the a priori categories. For example, when Alia's mother provided reading support for her daughter by pointing out that a word was a compound word as seen in Table 1, none of the a priori categories sufficiently described this type of interaction. Thus, the category labeled *word knowledge* emerged along with the subcategory labeled *word parts*. Other subcategories emerged in a similar fashion as seen in Table 3.

After the text-related interactions were coded, I counted and recorded the number of interactions in each category and sub-category. I also counted and recorded who initiated the text-related interactions in each category for each case (see Appendix J for the number of text-

Table 2

*Text-Related Interactions*

Book Type	Type of Interaction		
	Verbal	Nonverbal	Verbal/Nonverbal
Traditional	C: (reading incorrectly) <i>I do not . . .</i> M: (Points at <i>would</i> ) Would C: (goes back to correct) <i>I would not like them in a box.</i>	C: (reading, stops on the word <i>say</i> and looks at mom) M: (looks at child and then tracks print) C: <i>Say</i>	M: What kind of a compound word is that? (points at the word) C: And . . . you? M: Any C: Any. M: Any what? That's the first part. C: Any of. M: (Tracks print) <i>Anywhere.</i>
Digital	C: <i>Not in the dark, not in a tree, not in a car, you will . . . me be.</i> M: <i>You let me be.</i> C: Yeah, <i>You let me be.</i>	C: (reading) <i>Do you like green eggs and ham?</i> M: (tracking print)	C <sup>a</sup> : <i>May</i> M: See how these two words (pushes <i>say</i> ) rhyme? I: <i>Say</i> C: <i>May, I say!</i>

*Note:* C = child; M = mother; I = iPad, Italicized words or phrases indicate the individual is reading the printed words in the book.

<sup>a</sup>This was also coded as a technology-related interaction

Table 3

*Text-Related Coding Categories*

Category	Sub-category	A Priori or Emerged
Concepts of Print	Tracking print with finger	A Priori
	Pointing to print	A Priori
	Identifying book components	A Priori
Phonemic and Phonological Awareness		A Priori
	Talking about letter sounds	A Priori
	Sounding out words	A Priori
	Chanting or noticing rhyming	A Priori
	Repeating alliteration	A Priori
	Completing predictable texts	A Priori
Alphabetic Knowledge		A Priori
	Pointing to letters	A Priori
	Talk about letter names	A Priori
	Looking for letters	A Priori
Word Knowledge		Emerged
	Identifying sight words	Emerged
	Point to picture for word support	Emerged
	Talking about word parts	Emerged
	Supplying the word	Emerged

related interactions found in each case). Examples of how different text-related interactions were coded are shown in Table 4.

The second stage mirrored the first stage, but this time I looked for meaning-related interactions. Meaning-related codes included information about vocabulary, summarizing, and inference-making as seen in Table 5 (Baker et al., 2001; Fisch et al., 2002). Examples of interactions identified as meaning-related are seen in Table 6. As with the affective and text-related coding systems, this coding system began with a priori categories and allowed for other categories to emerge. It is interesting to note that no new meaning-related coding categories emerged, as seen in Table 6. The a priori categories sufficiently explained all of the meaning-related interactions. I also counted and recorded who initiated the meaning-related interactions in each category for each case (see Appendix K for the number of meaning-related interactions found in each case). Examples of how different meaning-related interactions were coded are shown in Table 7.

This stage was similar to stages one and two, though this time I coded, counted, and recorded interactions involving technology. Examples of interactions identified as technology-related are seen in Table 8. A priori coding categories were informed by prior research about interactions surrounding technology (Plowman & Stephen, 2003). The technology-related interactions were divided into two coding categories—operational and function (McPake et al., 2008), as illustrated in Table 9.

Operational interactions were those needed to access a technological device, those that are medium-specific to the iPad (e.g., selecting an app, adjusting the volume). The functional interactions were those involved with the specific software applications—the book apps (e.g., swiping to turn a page, touching the screen to have the computer do the reading). Again, the

Table 4

*Coding Nonverbal and Verbal Text-Related Interactions*

Interaction	Category	Subcategory	Initiated
Example 1			
Child: (reading incorrectly) <i>I do not . . .</i>	Concepts of print	Pointing at a word	Mother
Mother: (Points at <i>would</i> ) <i>Would</i>			
Child: (goes back to correct) . . . <i>I would not like them in a box . . . Wait</i>			
Example 2			
Mother: What kind of a compound word is that? (points at the word)	Word knowledge	Talking about word parts	Mother
Child: And . . . you?			
Mother: Any	Word knowledge	Supplying the word	Mother
Child: Any			
Mother: Any what? That's the first part	Word knowledge	Talking about word parts	Mother
Child: Any of.			
Mother: <i>Anywhere.</i>	Word knowledge	Supplying the word	Mother

Table 5

*Meaning-Related Coding Categories*

Category	Subcategory	A Priori or Emerged
Vocabulary		A Priori
	Describing (defining, labeling)	A Priori
	Elaborating	A Priori
Organizing and Summarizing		A Priori
	Recalling/Retelling	A Priori
	Confirming	A Priori
Inference-making		A Priori
	Clarifying	A Priori
	Connecting	A Priori
	Predicting	A Priori

Table 6

*Meaning-Related Interactions*

Book Type	Type of Interaction		
	Verbal	Nonverbal	Verbal/Nonverbal
Traditional	<p>M: I don't know why he is so afraid to try them. Maybe green is a scary color for him.</p> <p>C: Maybe he doesn't— maybe he hasn't tried them before. Maybe he tried them but he didn't like them.</p> <p>M: Yeah.</p> <p>C: Or maybe he's . . . Maybe he, he hasn't tried them and he thinks they're yucky.</p> <p>M: Has that ever happened to you?</p> <p>C: Yeah.</p> <p>M: You think they're gross until you try it?</p>	<p>M: <i>Mr. McGregor came up with a sieve</i> (points to the sieve) <i>which he intended to pop on top of Peter.</i></p>	<p>C: (reading) <i>Sam-I-am. I do not like green eggs and ham. Who is Sam-I-Am?</i></p> <p>M: (Laughs) (Points at Sam-I-am)</p>
Digital	<p>I: <i>And then, feeling rather sick, he went to look for some parsley.</i></p> <p>M: Parsley helps your tummy feel better.</p>	<p>I<sup>a</sup>: <i>Mr. McGregor hung up the little jacket and the shoes for the scarecrow.</i></p> <p>M: Pushes on the scarecrow icon to make it move.</p>	<p><sup>a</sup>C: <i>I do not like green eggs and ham.</i> (pushes on Sam) (Smiles) (Laughs). He doesn't know what he is doing.</p> <p>M: (Smiles) He's just like, "La la la."</p> <p>S: "I'm not doing anything! I'm just steering."</p>

Note: C = child; M = mother; I = iPad; Italicized words and phrases indicated that the individual is reading the written words in the book.

<sup>a</sup>Also coded as a technology-related interaction



Table 7

*Coding Nonverbal and Verbal Meaning-Related Interactions*

Interaction	Category	Subcategory	Initiated
<p>Example 1</p> <p>Child: (reading) <i>Sam-I-am. I do not like green eggs and ham. Who is Sam-I-Am?</i></p> <p>Mother: (Laughs) (Points at Sam-I-am)</p>	Vocabulary	Describing (labeling)	Child
<p>Example 2</p> <p>Mother: I don't know why he is so afraid to try them. Maybe green is a scary color for him.</p> <p>Child: Maybe he doesn't—maybe he hasn't tried them before. Maybe he tried them but he didn't like them before.</p> <p>Mother: Yeah.</p> <p>Child: Or maybe he's . . . Maybe he, he hasn't tried them and he thinks they're yucky.</p> <p>Mother: Has that ever happened to you?</p> <p>Child: Yeah.</p> <p>Mother: You think they're gross until you try it?</p> <p>Child: Yeah.</p>	Inference-making	Clarifying	Mother
<p>Child: Or maybe he's . . . Maybe he, he hasn't tried them and he thinks they're yucky.</p> <p>Mother: Has that ever happened to you?</p> <p>Child: Yeah.</p> <p>Mother: You think they're gross until you try it?</p> <p>Child: Yeah.</p>	Inference-making	Connecting	Mother

Table 8

*Technology-Related Interactions*

Book Type	Type of Interaction		
	Verbal	Nonverbal	Verbal/Nonverbal
Traditional	n/a	n/a	n/a
Digital	<p>I: . . . <i>and their names were Flopsy, Mopsy, Cotton Tail, and Peter.</i></p> <p>M: I like her accent.</p> <p>C: What?</p> <p>M: I like her accent.</p> <p>C: Smiles</p> <p>M: You know why I like her voice?</p> <p>C: Why?</p> <p>M: Because it kinda sounds like the woman . . . Beatrix Potter.</p>	<p>C<sup>a</sup>: (Swipes the iPad to turn the page. The page doesn't turn)</p> <p>M: (Swipes the iPad to turn the page).</p>	<p>M: Which one looks like Peter Rabbit (referring to the story app selections on the iPad home page)</p> <p>C: (Points to an app)</p> <p>M: Yeah! K, pick that one</p> <p>C: (Selects Peter Rabbit app)</p> <p>M: K</p>

*Note:* C = child; M = mother; I = iPad; Italicized words and phrases indicate the individual is reading the written words in the book.

<sup>a</sup>Also coded as a text-related interaction

Table 9

*Coding Nonverbal and Verbal Meaning-Related Interactions*

Interaction	Category	Sub-category	Initiated
Example 1			
iPad: . . . <i>and their names were Flopsy, Mopsy, Cotton Tail, and Peter.</i>			
Mother: I like her accent.	Functional	Responding to Audio Clues	Mother
Child: What?			
Mother: I like her accent.			
Child: Smiles			
Mother: You know why I like her voice?			
Child: Why?			
Mother: Because it kinda sounds like the woman . . . Beatrix Potter.			
Example 2			
Mother: Which one looks like Peter Rabbit (referring to the story app selections on the iPad home page)	Operational	Accessing the Story App	Mother
Child: (Points to an app)			
Mother: Yeah! K, pick that one			
Child: (Selects Peter Rabbit app)			
Mother: K			

process provided a way for coding categories to emerge as the transcripts and videos were reviewed (e.g., verbal encouragement to interaction with an icon).

Because the a priori categories were developed for all children's tablet apps, several sub-categories emerged that were picture book specific. For example, as I read the transcripts and watched the video of Chantel's *Green Eggs and Ham* digital book reading, I noticed that she and her mother engaged in two different types of operational interactions. They talked about how to access the correct story app on the iPad, but also, during the book reading, found themselves interacting about other operational elements of the computer tablet. When the music accompanying the story was too loud, they talked about how to turn it down; when the iPad screen went dark, they interacted about how to reactivate the screen. These two different types of operational interactions led me to create two subcategories, *accessing the story* and *problem solving*. Additional subcategories emerged within the functional category in a similar manner (e.g., talking about pushing on words, talking about pushing on icons, talking about turning the pages). The a priori categories and sub-categories along with those that emerged are listed in Table 10. (See Appendix L for the number of technology-related interactions found in each case). Examples of how different technology-related interactions were coded are shown in Table 10.

After I coded the number of technology-related interactions, I noticed a possible pattern. When the dyad was reading the digital books, most of the interactions were related to technology. They did not appear to talk much about text and meaning. Wanting to explore this further, I decided to count the number of words for both mother and child in each reading that were related to technology, meaning, and text. First I counted the total number of words spoken by the mother and the child for each book reading. I went back to the transcripts looking for the

Table 10

*Technology-Related Coding Categories*

Category	Subcategory	A Priori or Emerged
Operational (about the device)	Accessing the story	A Priori
	Problem-solving	Emerged
		Emerged
Functional (about the app)	Selecting reading	A Priori
	Responding to audio clues	A Priori
	Responding to visual clues	A Priori
	Talking about pushing words	Emerged
	Talking about pushing icons/verbal encouragement	Emerged
	Talking about turning pages	Emerged
	Pushing a block of words to have the iPad read	Emerged
		Emerged

verbal interactions that were coded as being meaning, text, and technology related or irrelevant (as explained above) and counted the total number of words for each area. After obtaining these counts, I calculated the percentages for each reading (see Appendix M).

The process I used to understand the affective climate of each book reading session was different than the process used in stages one through three. The affective climate for each book-reading session was analyzed using an a priori coding system. This decision was based on previous research studies where scholars used a rating scale to analyze the affective climate of mother-child traditional book readings. The a priori categories for this study were informed by Sonnenschein and Munsterman's (2002) study of the affective climate of mother-child book readings and the Adult-Child Interactive Reading Inventory (ACIRI) (DeBruin-Parecki, 2007), which includes a portion on affective climate coding categories. Although both Sonnenschein and Munsterman (2002) and the creators of the ACIRI looked at the affective climate of mother-child book readings using traditional books, some of their coding categories also lend themselves to interactions around technology-based books. The a priori categories were the following: (a) engagement, (b) warmth, and (c) support. Each of these categories had several a priori sub-categories as seen in Table 11.

Because categories often emerge when conducting case study research, I was open to creating new categories and/or subcategories (Stake, 1995). A fourth category did emerge—ownership. Two sub-categories also emerged—technology support (mother) and compliance (child) as shown in Table 11. These additional category and sub-categories were included in the observation analysis of all six cases. The final affective climate coding system included four categories and eleven sub-categories. Following is an explanation of the process used to evaluate the affective climate of each book reading.

Table 11

*Affective Climate Categories*

Category	Subcategory	A Priori or Emerged
Engagement	Persistence	A Priori
	Enthusiasm	A Priori
	Focus	A Priori
	Reading Expression	A Priori
Warmth		A Priori
	Physical Proximity	A Priori
	Reinforcements <sup>a</sup>	A Priori
	Sensitivity to the Child Compliance <sup>b</sup>	A Priori Emerged
Support <sup>a</sup>		A Priori
	Comprehension Support Text Support	A Priori A Priori
	Technology Support	Emerged
Ownership		Emerged

*Notes:* <sup>a</sup>Mother only; <sup>b</sup>Child only

All of the subcategories were evaluated using a rating scale based on frequency counts. Though rating scales are often associated with quantitative studies, numerical data have been used in qualitative studies (Engestrom, 1991; Engestrom, 2001; Engestrom & Engestrom, 1986; Engestrom, Engestrom, & Suntio, 2002), including those looking at the “common resources of human expression, meaning, and communication” (Yanchar, 2011, p. 182). The rating scale used in this study to count the behaviors related to the affective climate subcategories was the following:

1. 0 indicates that there was no evidence of the behavior during the book reading.
2. 1 indicates that the behavior occurred infrequently (1-2 times during the book reading).
3. 2 indicates that the behavior occurred some of the time (3-4 times during the book reading).
4. 3 indicates that the behavior occurred most of the time (4 or more times during the book reading).

After the subcategory scores were calculated, they were used to determine the broader category (i.e., engagement, warmth, and support) scores. Each category score was an average of its subcategory scores (with the exception of ownership as described below). In addition, a total affective climate score was calculated for both the mother and the child based on the average of the category scores (See Appendix N for the affective climate information for each case).

The only category to emerge was the ownership category and it was not coded using the above rating scale. As I watched the videos, I noticed that the children appeared to have more control of the reading experience when they were sharing digital books as opposed to the traditional books. They held the iPad, turned the pages, and interacted with the digital elements



of the books. The a priori categories did not provide a way to fully represent this occurrence and, thus, I created the ownership category. The rating scale numbers were not helpful in explaining ownership because it was more of a whole-experience phenomenon rather than one that could be observed on different occasions throughout the reading. I scored the ownership category by describing who appeared to own the reading experience, the mother, the child, or both. This description was determined by who did the reading, held the book, turned the pages, and verbally and nonverbally engaged with the books. (See detailed descriptions of categories and subcategories along with examples in Appendix O).

*Mother interviews.* The mother interview was used to gain the mother's perspectives and interpretations of what was happening during each book reading (see Appendix P). I showed each mother portions of her book-reading observation videos and asked her to interpret what was happening. As I was coding those portions of the book-reading observations, I referred back to the mother interview transcript to ensure that my coding matched the mother's interpretation of the event. If it did not, then I changed the codes to reflect the mother's interpretation, as she was the one living the experience (Yanchar & Williams, 2006). For example, during the traditional reading of *Green Eggs and Ham*, Tyler's mother repeatedly pointed to the exclamation marks in the book without saying anything. I was not sure why she was doing this. So, during the mother interview, I played back this portion of the reading and asked for her perspective. The following conversation ensued:

Me: I noticed that you were pointing to exclamation points as Tyler was reading. Tell me about that.

Mother: Lately, we've been talking more about that, like, "Your voice goes up," and "You do it loud." And especially when something is all caps, he knows like you

yell that. That's why I was trying to do that, to get him to be a little more expressive.

Based on Tyler's mother's explanation, I coded these nonverbal interactions as a text-related interaction related to concepts of print.

The next section describes the process I used to identify the themes found in the individual cases. Themes were identified by analyzing the coding categories discussed above. Some of the themes were seen in all of the cases, some in a few cases, while others were unique to individual cases.

**Themes.** Identifying themes is a way of systematically observing a case and quantifying qualitative data (Lapadat, 2010). It is used to “manage large volumes of data . . . for organizing and summarizing, and for focusing the interpretation” (p. 926). The nature of this study's quintain and the relevant literature that guided the data analysis process provided an organizational framework for the study's categories and themes (Stake, 2006). This organizational framework included the following four areas:

1. Affective Climate
2. Meaning-related Interactions
3. Text-related Interactions
4. Technology-related Interactions.

As data sources for each case were analyzed, themes related to each of these thematic areas emerged. This happened in a three-step process. First, I looked for themes across the four readings at the area level (i.e., affective climate, meaning-related, text-related, and technology-related). I specifically looked at the frequency counts for each area of interaction and who initiated the interaction. As mentioned above, frequency counts are sometimes used to

understand interactions based on CHAT (Engestrom, 1991, Engestrom, 2001, Engestrom & Engestrom, 1986; Engestrom, Engestrom, & Suntio, 2002). I compared the number of interactions in each area across the different readings looking for differences in frequency counts or rating scale numbers based on frequency counts and who initiated the interactions. When I saw a difference between the digital readings and the traditional readings for both storybooks, that area rose to the level of a theme. For example, when Alia and her mother were reading the traditional version of *Green Eggs and Ham*, they engaged in 54 interactions that were text-related. When they read the same book using the digital version, they had 18 text-related interactions. The same pattern was seen in their readings of *The Tale of Peter Rabbit*. This led to the creation of the theme about text interactions decreasing during the digital readings.

Second, I looked for themes at the category level. For example, under the area of meaning-related interactions, I looked at the number of interactions that were related to categories of vocabulary, organizing and summarizing, and inference-making for each reading. For example, when Chantel and her mother were reading the digital version of *The Tale of Peter Rabbit*, they engaged in 25 interactions in the vocabulary category. When they read the traditional version of the same story, they engaged in only nine. A similar pattern was found in their *Green Eggs and Ham* reading. In both stories, the mother initiated the majority of the interactions in the vocabulary category. Therefore, this finding about interactions in the vocabulary category became a theme.

At times I found no differences in the areas and categories across readings, but I did find differences in the sub-categories. When these differences were consistent, the sub-category led to the creation of a theme. For example, in the category of warmth under the affective climate area, I saw no consistent differences in the total warmth scores, but I did see consistent

differences in the scores of the sub-category of sensitivity. Thus, a theme was created based on this information.

As themes were seen in each of the individual cases, I recorded them and the factors that led to their inclusion (Stake, 2006) (see Appendix Q for theme factors). The list began small, but grew as each case was analyzed, as illustrated in Table 12. For convenience, theme abbreviations were created. The themes and their abbreviations represent the change in the interactions from the traditional book readings to the digital book readings. For example, the theme abbreviation *Increase in Vocabulary* means that there were more vocabulary-related interactions in the digital readings than in the traditional readings. Nine themes were eventually identified during the within-case analysis. Because the theme list grew as I analyzed each of the cases, I went back to the data for each case to see if any of the later identified themes were present in the earlier cases. This information was recorded using analyst notes (Stake, 2006; see example in Appendix R).

Third, I went back to the data again to determine the extent to which each theme was seen in each case. I used Stake's (2006) rating system to determine whether a theme was highly manifest, moderately manifest, or not present in each case. For example, if theme one was seen in both of the digital readings, then I labeled it as being highly manifest. If it was seen in one of the two digital readings, I labeled it as moderately manifest. If it was not present in either of the digital readings, it was not listed as a theme for that case. This information was recorded in the analyst notes (see an example in Appendix R). At the conclusion of this process, I wrote a case report for each of the six cases (see an example in Appendix I).

Table 12

*Study Themes*

Number	Thematic Area	Theme	Theme Abbreviation
1 <sup>b</sup>	Meaning	Vocabulary interactions increase with the digital readings	Increase in Vocabulary
2 <sup>a</sup>	Meaning	Mother-initiated meaning-related interactions increase with the digital readings	Increase in Mother-Initiated Meaning
3 <sup>a</sup>	Text	Text interactions decrease with the digital readings	Decrease in Text Interactions
4 <sup>a</sup>	Technology	The majority of the interactions during the digital readings were about technology	Interactions about Technology
5 <sup>a</sup>	Affective Climate	Mother's total affect decreases with the digital readings	Decrease in Mother Affect
6 <sup>a</sup>	Affective Climate	Child's total affect increases with the digital readings	Increase in Child Affect
7 <sup>a</sup>	Affective Climate	Child's engagement increases with the digital readings	Increase in Child Engagement
8 <sup>c</sup>	Affective Climate	Sensitivity to the other decreases for both mother and child during the digital readings	Decrease in Sensitivity
9 <sup>b</sup>	Affective Climate	Child has more ownership during the digital readings	Increase in Child Ownership

*Notes:* <sup>a</sup>Theme created from an overall area

<sup>b</sup>Theme created from a category

<sup>c</sup>Theme created from a subcategory

**Cross-case analysis.** Though each of the six cases was analyzed individually and differed from one another in several ways, they were bound together by the common quintain—the nature of the verbal and nonverbal interactions and the affective climate while reading traditional and digital storybooks. In the cross-case analysis, the focus shifted from trying to understand each case individually to trying to understand the quintain across cases. I examined the individual case reports looking for the similarities and differences in each case. For this cross-case analysis, I followed the multiple-case study analysis outlined by Stake (2006).

The process now “shift[ed] from analysis to synthesis” (Stake, 2006, p. 76). Stake (2006) suggests that themes identified in the individual case studies be synthesized to make cross-case assertions related to the quintain. He describes this process as “less a time of following procedures and more a time of interpretation and composition” (p. 76). I used the following process to make my assertion (Stake, 2006): (a) merged the findings from each case study; (b) made a list of tentative assertions; (b) revisited each case report to determine if the assertions needed to be expanded or collapsed; and (c) made a final assertion list.

I merged the findings by creating a document that listed each of the themes and their level of manifestation in each case (see Appendix S). I noted that several of the themes were evident in multiple cases either highly or moderately manifest. I needed to make a determination about the criterion that would be used to elevate a theme to the level of an assertion. My initial criterion was that the theme needed to be highly manifest in the majority of the cases to reach the level of an assertion. Using this criterion, I made a list of the assertions as seen in Table 13.

Table 13

*Initial Cross-Case Assertions*

#	Thematic Area	Assertion	Related Themes	Case Evidence
1	Technology	The majority of the interactions when reading the digital books were related to technology	4	M – 1,2,5,6 m – 3, 4
2	Affective Climate	The child was more engaged with the digital books.	7	M – 2,5,6 m – 1, 4

*Notes:* M = highly manifest; m = moderately manifest

After making the initial case assertions, I went back to the individual case reports to determine whether or not these assertions adequately represented what was happening across all six cases. I noticed that the assertions were missing some important elements of many of the cases. For example, it was important to report that in many of the cases, the mother and child engaged in more vocabulary-related interactions during the digital readings than they did during the traditional readings. This finding was manifest in all of the cases but only highly manifest (evidenced in both digital readings) in two of the six cases and moderately manifest (seen in one of the two digital readings) in the other four cases. I felt it was important that the assertion list be expanded to include some of these additional findings.

I went back to the merged themes document and changed the criterion for inclusion in the cross case assertions in order to present a more accurate picture of the similarities in the nature of the mother-child interactions in the six cases (Stake, 2006). The new criterion was that a theme became an assertion if it was moderately or highly manifest in five of the six cases. I amended the initial assertion list from three to five assertions based on the criterion that assertions were

based on those themes that were either highly or moderately manifest in five of the six cases.

This new criterion expanded the assertion list as seen in Table 14. Each assertion represents one of the study themes with the exception of assertion four. Because theme six and seven were closely related to each other (category and sub-category), I merged these two themes into one assertion.

Table 14

*Final Cross-Case Assertions*

#	Thematic Area	Assertion	Related Themes	Case Evidence
1	Meaning	Vocabulary interactions increase when reading a digital book	1	M – 2 m – 1,3,4,5,6
2	Text	Text interactions decrease when reading a digital book.	3	M – 2, 5 m – 1,3,6
3	Technology	The majority of the interactions when reading the digital books were related to technology. <sup>a</sup>	4	M – 1,2,5,6 m – 3, 4
4	Affective Climate	Child engagement increases when reading the digital books	6 <sup>a</sup> 7 <sup>a</sup>	M – 3, 6 m – 1,3,4,5 M – 3, 5, 6 m – 1, 2,4
5	Affective Climate	Sensitivity to the other member of the dyad decreases when reading the digital books.	8	M – 1,2,5 m- 3, 6

Notes: M = highly manifest; m = moderately manifest

<sup>a</sup>Assertion four merges two study themes into one assertion



## Chapter 4: Findings

This chapter focuses on the cross-case findings about the nature of the verbal and nonverbal mother-child book reading interactions that were common across the six cases. These cross-case findings were derived from the analysis of the six individual cases. The within-case reports discussing the individual case results are located in Appendix I. The *Green Eggs and Ham* readings for Juan and his mother were not used because, before the traditional book reading, the mother told her child that he was being observed and would receive money if he behaved. During her interview, his mother confirmed that this motivation changed the way Juan behaved during this reading.

### Cross-Case Findings

This chapter is organized using the five cross-case assertions introduced at the conclusion of chapter three. The assertions are as follows: (a) vocabulary interactions increase when reading a digital book (meaning-related), (b) text interactions decrease when reading a digital book (text-related), (c) the majority of the interactions when reading a digital book are related to technology (technology-related), (d) child engagement increases when reading a digital book (affective climate), (e) sensitivity to the other member of the dyad decreases when reading a digital book (affective climate). These assertions were created based on the study themes highly or moderately manifest in five of the six cases. In order for a theme to be labeled as highly manifest in a case it needed to be present in the readings of both books (*Green Eggs and Ham* and *The Tale of Peter Rabbit*). Moderately manifest cases exhibited the theme in one of the book readings (*Green Eggs and Ham* or *The Tale of Peter Rabbit*). This chapter discusses each assertion with accompanying explanations and examples.

**The nature of the meaning-related interactions.** Meaning-related interactions were dyads' exchanges that assisted in making meaning from the story. These included interactions about vocabulary, organizing and summarizing, and inference-making. The first assertion states that the number of interactions about vocabulary (i.e., labeling, defining, and elaborating) increased when the dyad was reading a digital book. This assertion was seen in both the *Green Eggs and Ham* readings and *The Tale of Peter Rabbit* readings and in all six of the cases, as seen in Table 15. It was highly manifest in two of the cases and moderately manifest in the other four cases.

Table 15

*Number of Vocabulary-Related Interactions*

Reading	Highly Manifest		Moderately Manifest				Total
	Alia	Ian	Chantel	Juan	Selina	Tyler	
<i>Green Eggs</i>							
Traditional	5	1	3	n/a <sup>a</sup>	6	9	24
iPad	12	5	3	n/a <sup>a</sup>	15	14	49
Increase/ Decrease	+7	4	0	n/a <sup>a</sup>	+9	+5	+25
<i>Peter Rabbit</i>							
Traditional	9	7	10	2	8	5	41
iPad	10	13	25	8	7	2	66
Increase/ Decrease	+1	+6	+15	+6	-1	-3	+25

Note: <sup>a</sup>*Green Eggs and Ham* reading for this dyad was not used

There were three sub-categories of the vocabulary-related interactions – labeling, defining, and elaborating. The labeling sub-category was used to label those interactions where the mother or child made a verbal or nonverbal reference to a picture and then provided the name or label of the picture. The defining sub-category was used to label those interactions where the mother or child provided a short definition for a particular word such as *chamomile tea* or *gooseberries*. The elaborating sub-category labeled vocabulary-related interactions that went beyond a short word definition to a longer explanation.

Most of the vocabulary-related interactions during the digital book readings were labeling interactions as seen in the following example:

Selina: (Pushes on the picture of the cliff)

iPad: Cliff. Cliff. (iPad voice says this and the word *cliff* pops onto the screen.)

Mother: Ok. That's a cliff.

Though the dyads mostly engaged in many labeling interactions during the digital readings, there were times when the digital elements provided opportunities for them to engage in interactions involving the other vocabulary sub-categories (i.e., defining, elaborating), as seen in Table 16.

Sometimes the dyads used the digital elements of the storybook apps to expand their vocabulary beyond what appeared in the written text. During the digital *Green Eggs and Ham* reading, Alia pushed a picture on the screen and a labeling word appeared. In addition to showing the written word, the iPad voice said the word, and Alia and her mother responded as illustrated below:

iPad: *Would you, could you on a boat?*

Alia: (Pushes mast)

iPad: *Mast.*

Alia: Mast?

Mother: (Points at mast) That's this tall part right here. It holds up the sail.

Table 16

*A Vocabulary-Related Interaction with Three Sub-Categories*

Interaction	Subcategory
Mother: (Reading) <i>Mr. McGregor came up with a sieve, which he intended to pop upon the top of Peter, but Peter wriggled out just in time, leaving his jacket behind him.</i>	
Chantel: (Turns page)	
Mother: Wait, I want to show you what a sieve is. (Turns page back) In case you're interested.	Labeling
Chantel: (Pushes on the sieve and it comes down over Peter)	
Mother: (Points to the sieve) Oh, there it is. That's a sieve. It's kind of like a colander. See it? And he's going to put it on top of him (Points to Peter) and make it a cage, huh? But just in time, Peter scooted away. (Pushes on Peter)	Defining Elaborating

Similar interactions occurred during the digital readings of *The Tale of Peter Rabbit*. For example, when large gooseberries dropped down the page, Chantel and her mother responded by discussing not only the gooseberries, but also the gooseberry net where Peter became trapped, as seen in the following exchange:

Mom: Do you know what? I don't think I've ever seen a gooseberry. Do you think those are gooseberries?

Chantel: Yeah! (Pushes three gooseberries to make them "pop")

Mom: Huh. (Pushes gooseberry to make it “pop.”) They look like they have little paper wrappers. Do you think there’s a berry underneath that paper wrapper?

Chantel: Yeah.

Mom: (Points at net) Well, I wonder if the net is to hold the gooseberries so they don’t fall on the ground or something. (Points at Peter) And his button got caught in one of the little holes of the net, so that’s why he couldn’t move.

Chantel: (Pushes Peter) (Pushes gooseberries twice) Yeah. (Pushes bush up and down three times) (Pushes Peter) (Pushes gooseberries four times)

Though vocabulary-related interactions often increased with the digital readings, this was not always the case (see Appendix K). During one of the digital readings, the dyad did not use the interactive elements of the digital texts, so there was not an increase in vocabulary talk. When Chantel and her mother read the digital version *Green Eggs and Ham*, they did not discover the screen was interactive, so their digital reading mostly mirrored their traditional reading. Additional vocabulary-related interactions did not occur. In two of the digital readings of *The Tale of Peter Rabbit* (cases five and six), vocabulary-related interactions also did not increase. In Selina’s case, the dyad engaged in vocabulary-related talk equally during both the digital and traditional readings. However, in Tyler’s case, he and his mother engaged in very few interactions of any type. They only had a total of 15 interactions (eight meaning-related and seven technology-related) during the entire reading and only two of these were vocabulary-related (see Appendix K). During all of the readings, Tyler and his mother had fewer interactions than any of the other five dyads, which may be attributed to Tyler’s mother’s overall view of her interactions with her children. During the mother interview, Tyler’s mother stated the following:

And all of my kids are so, “Let me do it by myself,” . . . with my first one it was so hard because I had these visions of “I’m going to teach you all these things,” and he could care less. . . . The last thing he wants to do is learn anything from his mother. And so for me, learning over the years that it really doesn’t matter what you’re doing. If you have that book in front of you and you’re together, you’re reading. So, really trying to keep a balance of moving things along being engaged but not being overbearing.

**The nature of the text-related interactions.** Text-related interactions were those in which the dyads engaged in verbal or nonverbal activities about the reading and decoding processes (i.e., concepts of print, phonemic/phonological awareness, alphabetic knowledge, and talk about sight words and word patterns). Table 17 illustrates the percentage of talk during each reading that was text-related.

The dyads engaged in text-related talk in various ways. Some engaged in more text-related talk during the *Green Eggs and Ham* readings, others during *The Tale of Peter Rabbit* readings, as seen in Table 17. Some talked about text during both readings. One pattern emerged that rose to the level of an assertion. Assertion two states that the percentage of talk about text decreased during the digital readings, as seen in Table 17. This was highly manifest in three of the cases and moderately manifest in two others.

Most of the dyads engaged in more text-related talk when the child was participating in the reading process. For many of the book readings, the child read fewer words during the digital book readings than during the traditional book readings because the dyads chose the *Read-to-Me* option. For example, Alia read over half of the traditional *Green Eggs and Ham* book but read only a few pages during the digital experience where she chose to have the iPad

voice read most of the pages. During the traditional reading, Alia and her mother engaged in more text-related talk (67%) than they did during the digital reading (40%), as seen in Table 18. This same pattern was seen in both book readings in Ian's and Savannah's cases, and in one book reading in Salina's and Tyler's cases. It was not seen in Juan's case in which the interactions were mostly about behavior-related issues even when Juan was the reader (see Appendix I for the within-case report).

Table 17

*Percent of Talk that was Text-Related*

Reading	Highly Manifest			Moderately Manifest		Not Manifest
	Alia	Ian	Selina	Chantel	Tyler	Juan
<i>Green Eggs</i>						
Traditional	67% <sup>b</sup>	26% <sup>c</sup>	34% <sup>b</sup>	2%	12% <sup>c</sup>	n/a <sup>a</sup>
iPad	40% <sup>c</sup>	4%	3%	10%	15% <sup>b</sup>	n/a <sup>a</sup>
Increase/ Decrease	-27%	-22%	-31%	+8%	+3%	n/a <sup>a</sup>
<i>Peter Rabbit</i>						
Traditional	8%	26% <sup>b</sup>	32% <sup>c</sup>	13% <sup>c</sup>	38% <sup>c</sup>	.5%
iPad	3%	12% <sup>c</sup>	3%	0%	0%	.6%
Increase/ Decrease	-5%	-14%	-29%	-13%	-38%	+1%

Notes: <sup>a</sup>Green Eggs and Ham reading for this dyad was not used

<sup>b</sup> the child read more than ½ of the book

<sup>c</sup> the child read less than ½ the book

There were some instances where the child read some of the written text during the digital book readings (Alia, Ian, and Tyler), but the amount of text-related talk between the mother and child was still lower during the digital readings than during the traditional readings. An explanation for this could be the change in who offered the decoding support during the reading. During the traditional readings, the mother offered reading support. She talked about letters, helped sound out words, supplied unknown words, tracked print, and talked about word patterns. During the digital readings, the majority of the text support was offered by the iPad. The only text support offered by the iPad book apps was that of supplying unknown words.

An illustration of this difference is seen when Alia read both the traditional and digital versions of *Green Eggs and Ham*. A text-related interaction during the traditional reading is found in Table 18. During this interaction, Alia's mother offered three types of text-related support (letter support, sound support, and word supply). In contrast, a text-related interaction during the digital reading of the same book is presented in Table 19. The iPad app offered one type of text-related support (word supply) as Alia read a similar passage. The mother did not provide any text-related support during this interaction, which was quite common during their digital readings (see Table 19).

During the mother interview, Alia's mother explained why she did not offer additional support, saying, "Alia could touch different things on the page and it would show . . . it would show the word and say the word, and so that was really helpful in teaching her to see the word and learn it, and so that was really fun for her to just be tapping and for me to be watching. She could do it all on her own without me." She went on to explain that this independence gave Alia more confidence in her own abilities.



Table 18

*Text-Related Support – Traditional Reading*

Interaction	Support Type	Supporter
Alia: (misreads) <i>Would you...</i>		
Mother: (Points at first letter - C) The first letter.	Focus on letters	Mother
Alia: (misreads) <i>Do...</i>		
Mother: <i>Cou . . .</i> (Tracks print)	Supplies sounds	Mother
Alia: <i>Could you eat. . .</i> (misreads)		
Mother: (Tracks print) <i>would you . . .</i> (Tracks print)	Supplies word/Tracks print	Mother
Alia: <i>In a car?</i>		
Alia: (rereads) <i>Could you, would you in a car?</i>		
Alia: Uh . . . <i>Green?</i> Looks at mom for help)		
Mother: E. . . eeeee		
Alia: <i>Eat them, eat them here. . . here. . .</i>	Supplies sound	Mother
Mother: (Tracks print) Good. (Points at <i>they</i> )		
Alia: There?	Tracks Print	Mother
Mother: <i>Here. They.</i> (tracks print)		
Alia: <i>Are!</i>	Supplies Word/Tracks Print	Mother

Table 19

*Text-Related Support – Digital Reading*

	Interaction	Support Type	Supporter
Alia:	<i>I . . .</i> (Pushes on the word <i>would</i> )		
iPad:	<i>Would.</i>	Supplies word	iPad
Alia:	<i>I would not . . .</i> (Tracks print) (Pushes on the word <i>could</i> )		
Ipad:	<i>Could</i>	Supplies word	iPad
Alia:	<i>Could</i> (Pushes on the word <i>not</i> )		
iPad:	<i>not</i>	Supplies word	iPad
Alia:	<i>in a car</i> (Tracks print)		

**The nature of the technology-related interactions.** Technology interactions were those in which the dyad engaged in verbal and/or nonverbal exchanges about the operational and functional elements of the digital device (iPad) or the digital books (storybook apps). My third assertion is that the majority of the talk during the digital readings was about technology (see Table 20). Technology talk included interactions about the operational elements of the iPad and the functional elements of the storybook app. During the traditional book readings, the majority of the talk was meaning-related in all cases, but during the digital readings talked centered more on technology than on meaning or text.

At times, these interactions overlapped and were categorized as both meaning and technology interactions. For example, when Ian and his mother are reading the digital version of *Green Eggs and Ham*, the following exchange occurs:

Ian: (Pushes on the sky. Pushes on a picture of a hook)

iPad: Sky. Hook.

Ian: Hook?

Mother: Hook. See? (Points to the hook and rope) It like loops on to hold it up. It hooks the rope.

The interactive picture of the hook led to a meaning-related discussion elaborating on the definition of a hook.

Table 20

*Percent of Talk that was Technology-Related*

Reading	Highly Manifest			Moderately Manifest		Not Manifest
	Alia	Selina	Tyler	Ian	Chantel	Juan
GEI <sup>a</sup>	51%	60%	57%	56%	51%	n/a <sup>c</sup>
PRI <sup>b</sup>	84%	65%	57%	28%	48%	.6%

a = *Green Eggs and Ham* - iPad Text

b = *The Tale of Peter Rabbit* - iPad text

<sup>c</sup>*Green Eggs and Ham* reading for this dyad was not used

Ninety-one percent of the technology interactions dealt with functional elements of the digital books (see Appendix F). For example, when Tyler and his mother were reading the digital version of *Green Eggs and Ham*, they engaged in interactions related to the operational elements of the iPad on two occasions and in interactions related to the functional elements of the book app on 32 occasions. This is similar to what was seen in all but two of the digital book readings, where the dyads had very few interactions related to technology (see Appendix F). The following is an example of a functional interaction as seen in Juan's case, and is illustrative of what was seen in the other cases:

Juan: (Pushes bunny pop-up button 12 times) Look how fast it goes. (Smiles)

Juan: (Pushes bunny pop-up button 7 more times) Look how fast they're doing. (Pushes another bunny pop-up button 8 times)

Mom: They're fast eaters, eh? (Looks at child)

Juan: (Pushes another bunny pop-up button twice)

Though much fewer in number, some interactions did involve the operational elements of the iPad. The reason there were fewer of these types of interactions is because they usually occurred only at the beginning of digital readings as the dyad accessed the storybook app. Operational interactions did occasionally occur during the middle of a reading if the dyad tried to adjust the volume on the iPad or encountered a problem that took them out of the storybook app, but this rarely happened. The following example illustrates a typical operational interaction as Ian and his mother are attempting to locate the *Green Eggs and Ham* storybook app:

Ian: (Trying to access the story) I want to push.

Mother: K, can you find which one it is?

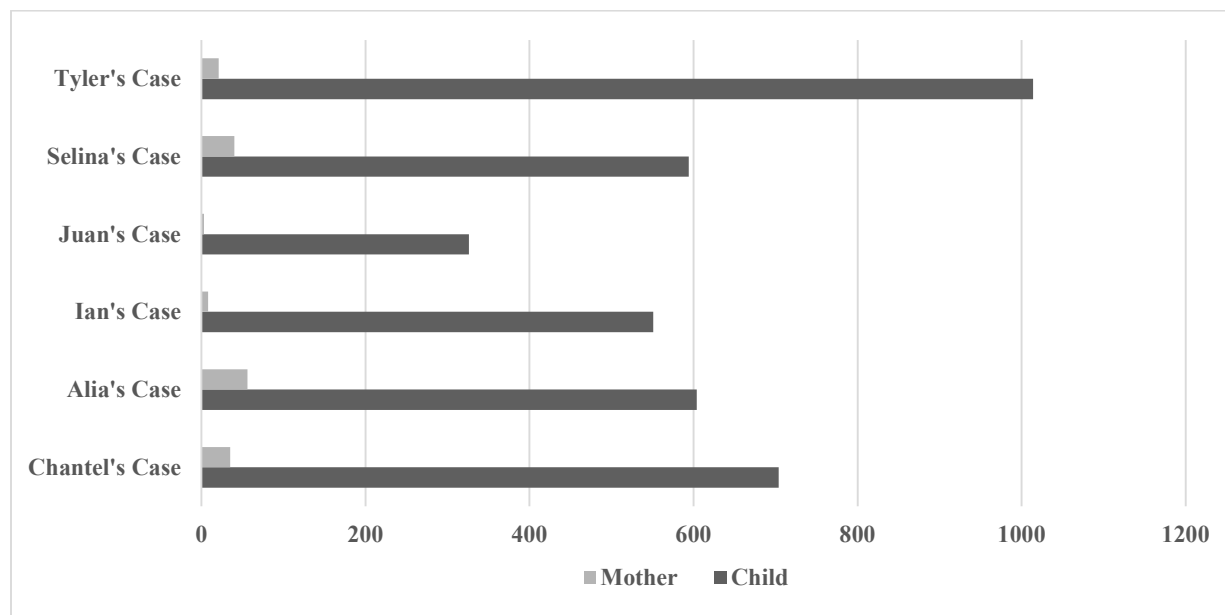
Ian: (Swipes the *Green Eggs and Ham* icon. The app does not open)

Mother: I think you have to push.

Ian: Oh. (Pushes on *Green Eggs and Ham* icon)

Mother: Good job.

In all of the digital readings across all cases, the child interacted with the technological elements of the digital books more often than the mother, as seen in Figure 2. The children pushed the interactive icons and words in the books over and over again as they smiled and laughed. Some of the mothers would also smile and laugh as their child did this, but none physically engaged with the interactive elements more than a few times.



*Figure 2.* Number of times the mother and child physically interacted with the digital elements of the iPad book (both storybooks combined).

Though some of the mothers seemed to enjoy watching their child interact with the icons, others appeared bothered by their child's actions. In the following example, Chantel's mother attempts to stop Chantel from interacting with the digital elements:

Chantel: (Pushes on the pictures of the bunnies six times while the iPad is reading.)

iPad: *His mother was busy cooking. She wondered what he had done with his clothes. It was the second little jacket and pair of shoes that Peter had lost in a fortnight!*

Mother: Do you know what a fortnight is?

Chantel: No. (Pushes on the pictures of the bunnies eight times.)

Mother: (Pulls child's hand away from iPad)

Mother: Two weeks.

Chantel: (Pushes picture twice) Whoooo! (Pushes on the picture of the bunnies 4 times)  
 (Pushes on the picture of the mother bunny)

Mother: Come on. Let's hear what happens in the story.

Chantel's mother confirmed her frustration in the mother interview when she said, "Do I just let her go or . . . You know? Because it was something we'd really never done before, so . . . I felt like I was just sitting there, you know, watching her play." Though not all of the mother's visually exhibited frustration during the book reading observations, five of the six expressed similar concerns during the mother interviews.

An interesting phenomenon related to the interactive nature of the digital screens occurred as three of the dyads read the traditional versions of the storybooks. The children began pushing on the illustrations or words on the paper page, pretending that they moved or made sounds. This only occurred after they had previously read one of the digital storybooks. For example, Ian and his mother read the digital version of *The Tale of Peter Rabbit* before he read the traditional storybook. As they were reading the traditional version, Ian would touch the illustrations and make the sound effects he'd heard in the digital version as illustrated below:

Ian: Oh, I want you to do it how we did, um, (Looks at mom) on the computer.

Ian: (Pushes on the illustration of Flopsy) (Imitates iPad noise by squeaking) (Smiles)

(Laughs) (Looks at mom)

Mother: (Smiles) (Looks at child) (Laughs) You want it to squeak like it did on the iPad?

All right, turn the page.

Ian: (Smiles) (Laughs) (Looks at mom) You do it!

Ian continued to push on the illustrations and make noises for three more pages. At that point, his mother asked him to "stop being silly." He did not comply, so she stopped the reading

experience so he could “get the sillies out.” She had him do jumping jacks until he was ready to settle down. In her mother interview, she explained that Ian has trouble sitting still for long periods, and she thought this was why he started pushing on the illustrations.

In summary, the majority of the mother-child interactions during the digital readings were technology-related. Most of these interactions were about the functional elements of the storybook apps. The child engaged with the interactive icons available with the digital books far more than the mother. In addition, sometimes the interactive nature of the digital icons transferred to the traditional book readings as the child pretended that the illustrations responded to physical touch.

**The nature of the affective climate.** Two of the cross-case assertions refer to the affective climate during the book readings. The first relates to the child’s engagement with the readings. The second refers to both the mother’s and child’s sensitivity to one another as they read the stories together. The following sections discuss these two assertions.

My fourth assertion is that the child’s engagement increased when reading the digital storybooks. The engagement category consisted of four sub-categories – enthusiasm, persistence, focus, and, when applicable, reading expression (see Appendix N for scores in each sub-category). Engagement was also measured by the length of time the dyad spent reading the storybook. The increase in the child’s engagement score was highly manifest in three of the cases and moderately manifest in the other three, as illustrated in Table 21.

Table 21

*Child's Engagement Scores*

Reading	Highly Manifest			Moderately Manifest		
	Ian	Selina	Tyler	Chantel	Alia	Juan
<i>Green Eggs</i>						
Traditional	2.00	2.75	2.00	2.50	2.77	n/a <sup>a</sup>
iPad	2.75	3.00	2.25	2.0	3.00	n/a <sup>a</sup>
Increase/ Decrease	+.75	+.25	+.25	-.50	+.23	n/a <sup>a</sup>
<i>Peter Rabbit</i>						
Traditional	1.00	2.50	1.33	1.67	2.33	.75
iPad	1.75	2.67	2.00	3.00	2.33	3.0
Increase/ Decrease	+.75	+.17	+.66	+1.33	0.00	+2.25

Note: <sup>a</sup>*Green Eggs and Ham* reading for this dyad was not used

These scores were based on a 0 to 3 rating scale with the largest score possible being 3.0. This increase was seen in ten of the eleven book readings. In five of the readings, the increase was .75 or greater, and in one reading was as large as 2.50. In one of the readings there was no change in the child's engagement score, and in four of the readings, the increase in the engagement score was small (.17 to .25). Though small, it was nonetheless present.



An example of an increase in child engagement during the digital storybook readings was seen in Tyler's case. During the traditional reading of *Green Eggs and Ham*, Tyler continually checked to see how many pages were left before the story was over. When asked why she thought Tyler was doing this, his mother said, "He doesn't like to read picture books. He's the youngest in the family and none of the other kids read picture books. . . He probably didn't think the story was enough exciting. He likes *Star Wars* and *Magic Treehouse* books." However, during the digital reading of the same book he did not look ahead to see when the book would be over. He stayed focused and engaged throughout the reading.

Another example of the increase in child engagement is shown in Table 22 where Ian and his mother read a section of the traditional and digital versions of *Green Eggs and Ham*. The difference in the child's engagement was not only seen in the child's verbal interactions, but it was also sometimes observable in the child's body language, as seen in Figure 3.

Though time spent reading each book was not a part of the affective climate rating scale, it did emerge as another indicator of engagement. The dyads spent more time reading the digital books than they did reading the traditional books, as shown in Table 23. The increase in the time spent with the digital books was seen in ten of the eleven readings. It was true for all the *Green Eggs and Ham* readings and five of the six *The Tale of Peter Rabbit* readings.

The increase in time ranged from about three-and-a-half extra minutes, as seen in Alia's digital reading of *The Tale of Peter Rabbit*, to almost 18 minutes, as seen in Alia's digital reading of *Green Eggs and Ham*. It was not true when Selina and her mother read *The Tale of Peter Rabbit*. They spent more time with the traditional storybook because Selina wanted to be the reader and the words were extremely difficult for her. Her mother spent quite a bit of time

Table 22

*Example of Child's Engagement*

Traditional Reading	Digital Reading
Ian: (Reading) <i>Would you like them here or there?</i>	Ian: (Reading) <i>Would you like them here or there?</i>
Mother: (Points to picture) Here or there.	Ian: (Pushes picture of a hat)
Mother: (Turns page)	iPad: Hat.
Mother: (Reading) <i>I would not like them here or there. I would not like them anywhere. I do not like green eggs and ham. I do not like them, Sam-I-am.</i>	Mother: I didn't know it did that.
Mother: (Looks at child)	Ian: (Turns page back one) (Pushes Sam's friend. Pushes hat. Pushes Green eggs. Pushes dish. Pushes fork. Pushes Sam-I-am)
Mother: (Turns page)	iPad: Sam's friend. Hat. Green eggs. Dish. Fork. Sam-I-am.
	Ian: (Smiles, Laughs) (Turns page) (Turns two pages back)
	Mother: All right, should we keep reading?
	Ian: I want to go back and see everything I missed.
	Mother: You want to go and do it on every single one?
	Ian: (Smiles, looks at Mom) Yes! (Pushes Sam-I-am. Pushes ham)
	Ian: (Continues interacting with multiple icons)
	Mother: (Looks at child) All right, can you start reading?
	Ian: Yeah . . . (begins reading)



*Figure 3.* Illustrates that Ian is less engaged with the traditional book than with the digital book.

Table 23

*Time Spent Reading Each Book*

	<u>Highly Manifest</u>				<u>Moderately Manifest</u>	
	Chantel	Alia	Ian	Tyler	Juan	Selina
<i>Green Eggs</i>						
Traditional	9:37	21:06	13:46	14:52	n/a <sup>a</sup>	14:19
iPad	16:39	38:57	15:00	24:45	n/a <sup>a</sup>	19:43
Increase/ Decrease	+7:02	+17:51	+1:14	+9:53	n/a <sup>a</sup>	+5:24
<i>Peter Rabbit</i>						
Traditional	12:04	12:54	25:19	20:23	10:12	20:20
iPad	22:01	16:21	35:59	24:45	13:50	14:13
Increase/ Decrease	+9:57	+3:27	+10:40	+3:22	+3:38	-6:07

*Note:* <sup>a</sup>*Green Eggs and Ham* reading for this dyad was not used

supporting her as she decoded the words. Selina was not the reader when they read the iPad version of the story.

My fifth assertion is that during the digital book readings, both the mother and child were often less sensitive to each other than during the traditional book readings. Evidence for this assertion was seen in two different ways. First, there was a decrease in the sensitivity score (a sub-category of warmth) in most of the cases. This decrease was observed both the child's and the mother's sensitivity scores in five of the six cases. Second, the children answered fewer of the mothers' questions during the digital book reading than during the traditional book reading. The sensitivity score was a measurement of how aware each member of the dyad was that the book-reading experience was a social experience. For example, did they look at the other member of the dyad? Did they adjust their behavior based on the other's comments or actions? The children's sensitivity scores are shown in Table 24. There was a decrease in these scores in five of the six cases (highly manifest in one case and moderately manifest in four cases). The mothers' sensitivity scores are shown in Table 25. There was a decrease in these scores in five of six cases (highly manifest in two cases and moderately manifest in three cases).

An example of a decrease in the mother's sensitivity was seen when Alia and her mother read the digital version of *Green Eggs and Ham* as illustrated below:

Alia: I wanna do this again.

Mother: No, not again.

Alia: (Moves away from mom)

Mother: (whispers) You need to go to the bathroom. (Looks at child)

Alia: No, I don't!

Mother: I am really tired. (Pushes center button to close out of the story app)

Table 24

*Child's Sensitivity Scores*

	Highly Manifest	Moderately Manifest				Not Manifest
	Alia	Chantel	Ian	Selina	Tyler	Juan
<i>Green Eggs</i>						
Traditional	3.00	2.00	3.00	3.00	0.00	n/a <sup>a</sup>
iPad	2.00	1.00	2.00	2.00	1.00	n/a <sup>a</sup>
Increase/ Decrease	-1.00	-1.00	-1.00	-1.00	+1.00	n/a <sup>a</sup>
<i>Peter Rabbit</i>						
Traditional	3.00	2.00	1.0	2.00	1.00	0.00
iPad	2.00	2.00	2.00	2.00	0.00	1.00
Increase/ Decrease	-1.00	0.00	+1.00	0.00	-1.00	+1.00

*Note:* <sup>a</sup>*Green Eggs and Ham* reading for this dyad was not used.

Table 25

*Mother's Sensitivity Scores*

Reading	Highly Manifest		Moderately Manifest			Not Manifest
	Chantel	Tyler	Alia	Ian	Selina	Juan
<i>Green Eggs</i>						
Traditional	3.00	3.00	3.00	3.00	3.00	n/a <sup>a</sup>
iPad	1.00	2.00	2.00	2.00	3.00	n/a <sup>a</sup>
Increase/ Decrease	-2.00	-1.00	-1.00	-1.00	0.00	n/a <sup>a</sup>
<i>Peter Rabbit</i>						
Traditional	3.00	3.00	2.00	2.00	3.00	1.00
iPad	2.00	2.00	2.00	2.00	2.00	1.00
Increase/ Decrease	-1.00	-1.00	0.00	0.00	-1.00	0.00

Note: <sup>a</sup>Green Eggs and Ham reading for this dyad was not used

Alia: No, I don't!

Mother: I am really tired. (Pushes center button to close out of the story app)

Alia: Noooo!

Mother: What? You want to look at it some more? (Pushes Green Eggs app icon)

Alia: Yeah. (Smiles)

Mother: Here you go. I think I'm going to take a nap while you look at that.

Alia: Read it with me!

Mother: Just have that funny voice read it to you.

Alia: (Chooses the *Read-to-Me* Option)

iPad: (Reads the story)

Alia: (Listens to the story and turns the pages)

Mother: (Puts head down on the back of the couch. Watches as Alia reads the story.)

Alia's sensitivity score lowered because of her lack of compliance and her mother's score lowered because she removed herself from the reading experience.

Another example of lack of sensitivity is illustrated by Tyler's case where both members of the dyad showed a lack of sensitivity toward each other. When Tyler was reading the digital version of *The Tale of Peter Rabbit*, his mother wanted him to read the words on the page before he played with the interactive icons. He appeared to not want to do this and instead ignored her requests as seen in the following example:

Mother: All right, should we read the words?

Tyler: (Pushes on a picture of Peter) (Pushes on a picture of another rabbit) (Turns the page)

Mother: (Turns the page back). Let's read it before we go on.



Tyler: (Looks at mother). I don't want to read it.

Mother: You don't? (Looks at Tyler)

Tyler: No. (Turns the page) (Pushes on picture of a basket) (Pushes on a picture of Peter)

Mother: K. Do you want me to read it?

Tyler: (Pushes on the mother rabbit) (Pushes on the bunnies) (Pushes on a tree) (Pushes Peter)

Mother: K. Am I reading or do you want to?

Tyler: (Pushes on the gooseberries 20 times) (Pushes on Peter) (Pushes on bunnies) (Pushes on gooseberries 14 times)

These type of interactions resulted in a lower sensitivity score for both Tyler and his mother as both members of the dyad showed a lack of sensitivity to the other.

One of the elements used to determine the sensitivity score for each reading was the percentage of the mother's questions that the child responded to either verbally or nonverbally. In several of the digital storybook readings, the child responded to fewer questions asked by the mother than during the traditional storybook readings, as seen in Table 26. The child answered fewer of the mother's questions in 10 of the 11 digital readings. This happened with both the *Green Eggs and Ham* book and *The Tale of Peter Rabbit* book. An example of this is illustrated by Chantel and her mother. As Chantel increased her physical interactions with the icons in the digital version of *The Tale of Peter Rabbit*, her mother began asking more and more meaning-related questions. It was as if she was trying to ensure that Chantel was listening to the story while she was playing. Though her mother asked more questions, Chantel answered fewer of them as seen in the example below:

Table 26

*Percent Decrease in Questions Answered*

Reading	Highly Manifest				Moderately Manifest	
	Chantel	Alia	Ian	Selina	Juan	Tyler
<i>Green Eggs</i>						
Traditional	81%	76%	93%	70%	n/a <sup>a</sup>	35%
iPad	14%	62%	62%	58%	n/a <sup>a</sup>	31%
Increase/ Decrease	-67%	-14%	-31%	-12%	n/a <sup>a</sup>	-4%
<i>Peter Rabbit</i>						
Traditional	66%	75%	79%	81%	62%	36%
iPad	53%	35%	72%	69%	19%	40%
Increase/ Decrease	-13%	-40%	-7%	-12%	-43%	+4%

*Note:* <sup>a</sup>*Green Eggs and Ham* reading for this dyad was not used

Mom: Do you know what implored means? “Implored him to exert himself.” What in the world do you think that means?

Chantel: (Turns page back five times)

Mom: Where are you going? (Pause) Where are you going?

Chantel: (Pushes on a picture that slides) It’s fun to do that. (Smiles)

Mom: (Laughs) Ok, let’s go back. (Turns page four times) (Points at birds) So, the birds were telling him to try harder. That’s what “exert yourself” means.

Chantel: (Pushes birds four times) Oh.

Mom: They were saying, “Try! Try”

Chantel: (Pushes Peter four times)

When I asked Chantel’s mother during her interview why she increased the number of questions she was asking she said:

I found very quickly the first day we did the iPad that I was very frustrated, because she was so distracted by everything that was available on the iPad, with touching everything and then . . . That I felt like that was more . . . I would consider that more an independent activity for her than for it to be both of us, because I felt like I was just kind of in the way, like a side person that . . . Do you know what I mean? So to be a part of the experience, I started asking questions. I like to make it a whole thing with the kids. I like to just ask questions- I like it to be a time for us to kind of communicate and things and, you know, make it more than just the story.

Another example of a mother increasing the number of questions she asked was found as Ian and his mother read the digital version of *The Tale of Peter Rabbit*. Ian’s mother wanted Ian

to retell what happened on each page in order to show that he was listening as shown in the following example:

Mother: What did I read?

Ian: (Pushes pots eight times) He . . . Cool! (Pushes pots three times)

Mother: That is cool, but what did I read? (Looks at child)

Ian: You said um, um, um . . . He chased him.

Mother: So what did Peter do? (Points at Peter)

Ian: (Pushes pots eight times) He jumped. (Looks at mom)

Mother: No . . . (Pushes *sneezed*)

iPad: Sneezed.

Ian: Sneezed.

Mother: (Pushes *kerchoo*)

iPad: Kerchoo!

Mother: (Laughs) So then what happened?

Ian: Mr. Gregor chased him into . . .

Mother: Yep, so Mr. McGregor thought he was in here. (Pushes pot) He thought he was under the pots, so he's looking under each one. And then Peter sneezed, so then he knew where he was. Wanna go to the next one?

During her interview, Ian's mother expressed concern that Ian was so busy playing with the icons that she thought he was missing out on the story.

### **Summary**

The cross-case analysis resulted in five cross-case assertions. Three of the assertions were found in the interpsychological domain. Mother and child engaged in more vocabulary-

related interactions and less text-related interactions during the digital book readings than during the traditional book readings. In addition, the majority of the interactions during the digital book readings were related to the either the operational or functional elements of the digital books.

There were two assertions found in the interrelational domain. The child was more engaged during the digital readings than during the traditional reading. This was evidenced by their engagement score on the affective climate rating scale, as well as by the amount of time the dyad spent reading the books. Despite this increased engagement, both the mother and the child showed less sensitivity to the other as evidenced by their sensitivity scores on the affective rating scale measure.

## **Chapter 5: Discussion**

This chapter begins with a summary and interpretation of the cross-case assertions in each category (meaning, text, technology, and affective climate), followed by a discussion of possible implications. The summary and implications section is followed by a conclusion, recommendations for future research, and the limitations of this study.

### **Summary of Findings and Implications**

The findings from this multiple-case study suggest that the interactions between a mother and child when they are reading a traditional book are different from the interactions they have as they read the same book in a digital format. Some of the interactions around meaning and text change. The dyad interacts in multiple ways about the technological elements of the digital book that they cannot do during a traditional book reading. In addition, the affective climate surrounding the reading experiences are different. The findings from this align with Cultural-Historical Activity Theory (CHAT) (Engestrom, 1999), which states that when the mediating tool in a social interaction is changed, the activity itself changes.

The traditional book readings provided opportunities for more text-related interactions than were found in the digital book readings. In addition, during the traditional book readings, both members of the dyad were more sensitive to the other—wanting to make sure that both were involved in the book-reading experience—than they were during the digital book readings. In contrast, the digital books produced more vocabulary-related interactions than the traditional book readings. They also provided opportunities for the dyads to interact around the digital elements of the book, which were obviously absent from the traditional book readings. The digital books provided opportunities to develop emergent digital literacies related to the operational and functional elements of the digital books as described by McPake et al. (2008). In

several of the cases, the digital books also positively influenced the child's engagement with the reading experience. The children demonstrated more enthusiasm and focus than was evident during the traditional book readings.

This review and implications of the findings is organized around the categories and related assertions found in the study. Following is a discussion of the findings and implications in each of the following categories: (a) the nature of the meaning interactions, (b) the nature of the text interactions, (c) the nature of the technology interactions, and (d) the nature of the affective climate. In each category, the assertions (highly or moderately manifest or in five of the six cases) are reviewed followed by a discussion of the implications.

**The nature of the meaning interactions.** Because of previous research on mother-child book readings, there were several verbal and nonverbal interactions I expected to see in this study (Baker, et al., 2001; Fisch, et al., 2002). These included interactions around vocabulary, summarizing interactions, and inference making. In all of the readings across all six cases, the dyads engaged in these types of meaning-making interactions whether they were reading a traditional book or a digital book. But, as I looked for similarities and differences across book-types (digital versus traditional), one difference was consistent across cases and thus rose to the level of a meaning-related assertion.

The cross-case analysis revealed that in all six of the cases (either highly manifest or moderately manifest) the number of interactions related to vocabulary (labeling, defining, elaborating) increased when the dyad was reading a digital book (assertion one). This finding was similar to Moody et al.'s (2010) findings that child-initiated labeling increased during e-book readings and Korat and Or's (2010) findings that most of the meaning related talk during digital book readings was related to vocabulary activities. This may be because the digital books

provided additional labeling opportunities as the child manipulated the interactive icons. In the case of *Green Eggs and Ham*, the digital book audibly and visually labeled pictures as a member of the dyad pushed on it. This stimulated conversation about the objects that were labeled. Though vocabulary-related interactions increased during the digital book readings, it is important to remember that vocabulary interactions are less complex than other types of meaning-making activities including inference-making and summarizing (De Temple & Snow, 2003; Justice, 2002; Reese & Cox, 1999). Results from previous studies show that vocabulary-related interactions, specifically labeling, are usually found in parent/child storybook interactions when the child is quite young and beginning to develop spoken language (De Temple & Snow, 2003; Justice, 2002; Reese & Cox, 1999).

Though vocabulary interactions are less complex, the child's engagement with the digital books was greater than with the traditional books. Engagement with a book may be just as important for the development of meaning-making skills as the complexity of the meaning interactions. Guthrie and Wigfield (1999) stated that "constructing meaning during reading is a motivated act . . . if a person is not aware of the text, not attending to it, not choosing to make meaning from it . . . little comprehension occurs" (p. 199). If digital books, as this study suggests, are more engaging for children than traditional storybooks, then more meaning-making may be taking place as the mother and child share them together.

**The nature of the text interactions.** Previous research showed that when a mother and child were reading a traditional book, they interacted far less about text (decoding skills) than they did about meaning (Hindman et al., 2008; van Kleeck et al., 2003) unless the child was participating in the reading process (Baker et al., 2001). When children were the readers, mothers supported their reading efforts through text-related interactions including talk about



letter sounds, word parts, and sight words. The results of this study support this finding. The children in this study were beginning readers and participated in the reading process during the traditional and digital book readings. Their mother's offered them text-related support as they read. However, they read more words during the traditional book readings than they did during the digital book readings. This led to assertion two discussed in the following section.

There were more mother/child text-related interactions during the traditional book readings than during the digital book readings (assertion two). Sometimes this was because the children selected the *Read-to-Me* option available on the digital book apps rather than choosing to read the books themselves. It is important to think about the implications the *Read-to-Me* option may have on children's motivation to be the reader. The digital book reading tracts are engaging with expressive and entertaining reading voices, musical tracts, and engaging sound effects. Children may choose this option over the more laborious act of beginning reading.

It is interesting to note that the *Read-to-Me* option was chosen by five of the six dyads for at least one of the digital book readings, usually *The Tale of Peter Rabbit*. So, not only did the child do less of the reading, but so did the mother. The iPad voice became the reading model. Five of the six mothers indicated that, in the future, they most likely would not sit down with their children to read a book on the iPad, so with a digital book, the iPad voice would be the only reading model. This may not be the optimal way to support young readers. The National Association for the Education of Young Children (NAEYC, 2009) position statement states that it is important to "provide positive models . . . [and nurturing] relationships [to] support children's learning and the acquisition of numerous capabilities" (p. 13). At this point, little is known about whether or not a digital device can provide adequate support for young readers; more research is needed.

Though the children in this study often chose to have the iPad read the story to them, some of them did choose to participate in the some digital book readings, specifically in the reading of *Green Eggs and Ham*, the simpler of the two storybooks used in the study. The results showed that when the child was reader of the digital books, the app provided the text-related support. This is in contrast to what happened when the child was reading the traditional books in which the text-related support was provided by the mother. She used a variety of support techniques including pointing to letters, sounding out words, noticing word patterns, and supplying the word as was found by Baker et al. (2001). However, the iPad app only provided one type of support—supplying the word when the child pushed on it. NAEYC (2009) stresses the importance of adjusting learning opportunities to the needs of the individual child. Unlike the mother, the app did not know the child’s reading abilities and what type of support would best lead to literacy growth (Snow, Burns, & Griffin, 1998). During the traditional book readings, the mother was able to offer varied levels and types of support based on the individual child’s needs.

Though digital storybooks may be limited in the ways they can offer support, it is important to note that they do provide a way for a child to be an independent reader. Because most interactive digital storybook apps supply unknown words if the reader pushes on them, young children do not need a parent to help them access the words. Snow et al. (1998) suggested that reading materials for young children should be selected that support the independent reading of texts. One of the mothers in the study stated that the independence her child felt with the digital books increased her child’s confidence in her own reading abilities.

Though children may not receive a variety of text-related support when reading a digital storybook, the results of this study suggest that compared to traditional books, children are more

engaged with digital books and spend more time reading them. Snow et al. (1998) stated that “experiences in early childhood that [foster] motivation and [provide] exposure to literacy in use” (p. 4) are an essential component of a child’s reading instruction. The entertaining *Read-to-Me* option or the built-in word supply found in digital storybook apps may motivate some children to experience *literacy in use* more frequently and for longer periods of time than they would experience with a traditional storybook.

**The nature of the technology interactions.** I also looked at technology-related interactions between the members of the dyad, specifically those related to the operational and functional elements of the digital books (McPake et al., 2008; Moody et al., 2010). The study found that during the digital book readings, mothers and children engaged in medium-specific (technology-related) verbal and nonverbal interactions that were not found in the traditional book readings, which, according to CHAT (Engestrom, 1999), is not surprising. As the mediating tool changed, so did the interactions around the reading experiences. This change is evidenced by the assertion that emerged about the amount of the technology-related interactions experienced by the dyads during the digital book readings.

Assertion three states that the majority of the interactions during the digital book readings were technology-related. This was seen in five of the six cases (highly or moderately manifest). The members of the dyads talked about the icons, music, volume, sound effects, and the voice of the iPad reader. They experimented to determine how to make the iPad read a section of text or what to do when they ran into a technology-related glitch. There were many more of these medium-specific interactions during the digital book readings than during the traditional book readings (e.g., identifying books parts, turning pages). This finding differs from Moody et al.’s (2010) finding that there was no difference in the number of medium-specific talk interactions in

a traditional book reading and a digital book reading. This difference may have been caused by the differences in the technological device used in the studies. Moody et al.'s (2010) study used a CD-ROM story on a desktop computer while this study used a book app on an iPad. Many of the technology-related interactions found in this study surrounded the touch-screen elements only available on an iPad. The change in the digital devices and the way they function is important to consider because, as digital devices change, as they frequently do, so will the operational and functional literacies needed to access these devices.

Baker (2010) stated that “researchers who examine [digital] literacies from a socio-cultural perspective argue that literacy changes as the culture changes” (p.290). Since young children live in a world where digital devices are “rapidly becoming the tools of the culture at home, at school, at work, and in the community” (NAEYC, 2012, p. 2), it is important for children to develop these operational and functional digital literacies so they can access these new cultural tools. Just as parents are an important factor in providing environments that support the development of traditional book literacies, it may be just as important for them to be actively engaged in providing support for the development of digital literacies.

Not surprisingly, the children in this study physically interacted with the technological elements of the digital books more often than the mothers. This was evident in all six cases. The child physically interacted with interactive elements of the books hundreds of times during the readings, while the mother rarely did so. The mother's physical interactions with the digital books were usually limited to accessing the story, problem-solving, or demonstrating how to turn the page.

Wohlwend (2009) explained the children's interactions with the technology when she discovered that they are not only learners of digital literacies but curious, playful explorers.

NAEYC (2012) agreed when they said that “there is a developmental progress in children’s use of tools and materials, typically moving from explorations to mastery and to functional subordination (using the tools to accomplish other tasks)” (p. 6). Though the children in this study had digital devices (e.g., computers, iPads, smart phones) in their homes and interacted with them on a regular basis, their experience with digital storybooks was limited. They may have been in the exploration phase of digital story apps, which caused them to repeatedly explore the interactive elements. It is unknown whether the number of these interactions would decrease after they had read multiple stories on a computer tablet. Each app may be novel enough to promote this exploratory play.

The children’s willingness to playfully explore the digital books led some of the mothers to feel frustrated during the digital book readings. The post-reading interviews confirmed that the mothers were unsure about their role. Some expressed that they did not feel like their child needed them or wanted them to be a part of the experience. The children were not afraid to use this exploratory play to discover the functional and operational elements of the iPad and story apps. While the mothers were easily frustrated when they could not solve a technological problem or figure out how something worked, the children persevered until they found a solution. At times the mother and child switched roles when it came to understanding the way the technology functioned. The child became the mentor and taught the mother how to access the different elements of the books and solve technological problems. The children became the masters and the mothers the apprentices (Lave & Wenger, 2011).

Gee (2010) discussed how digital texts turn children from spectators to full participators with the texts. Children no longer need their mothers to tell them a story in the traditional sense. Because mothers may not understand what their role is during digital book reading, they may

choose not to participate at all. In all six of the cases the mothers indicated that in the future, they would not sit down and read a book on the iPad with their child because the children did not need them to access the digital books. Digital storybook reading may become a solitary activity. Some could view this as concerning because of NAEYC's (2012) recommendation that young children's use of technology be a social experience with "an emphasis on co-viewing and co-participation between adults and children" (p. 7).

In order to align digital storybook reading with the NAEYC's recommendations, a different parental paradigm may be required. Rather than focusing on supporting only traditional literacy skills, parents need to learn how to appropriately support the development of digital literacy skills. Addressing this idea, Gee (2012) stated that "the better the mentoring and the more a child does with this mentoring early on, the better the child fares and the more successful in learning and knowledge acquisition the child becomes" (p. 420). This may be a difficult transition because often the only role model parents have of storybook reading is what they experienced as young children with their parents before digital storybooks were available. Parents also need to be comfortable with the fact that digital books provide support that was traditionally the role of the parent in a read-aloud. This gives the child more autonomy as he makes independent choices about how to interact with the digital books. This doesn't mean that parents should pull away from the digital book reading experiences, but instead they could learn to become co-participants.

**The nature of the affective climate.** Previous researchers who compared the affective climate of mother-child read-alouds on a desktop computer to a traditional book reading found little difference in the affective climate of the two experiences (Moody, et al., 2010). The results of this research study do not confirm these findings. The difference in results may be accounted

for by the difference in the instruments used to measure the affect climates. Moody et al.'s (2010) instrument used three measures (persistence, compliance, and enthusiasm) for both mother and child, whereas this study used seven measures to determine the child's affective climate score (persistence, enthusiasm, focus, reading expression [when applicable], compliance, proximity, and sensitivity) and ten measures to determine the mother's affective climate score (persistence, enthusiasm, focus reading expression [when applicable], proximity, reinforcements, sensitivity, comprehension support, text support, and technology support). The difference in results could also be attributed to differences in the technology and books used in the studies. Moody et al. used a desktop computer with books specifically designed for computers. In contrast, this study used iPads with storybooks originally designed as traditional storybooks and then adapted for digital use. The differences in the affective climates found in this study between traditional and digital storybook readings led to two study assertions and are discussed in the following two sections.

Assertion four states that the child was more engaged with the digital books than with the traditional books. This was seen in all six cases (highly manifest in three and moderately manifest in three). Engagement was determined using four measures: persistence, enthusiasm, focus, and reading expression. During the digital book readings, the child's score almost always increased in the areas of enthusiasm, focus, and persistence, which led to an increase in their total engagement score. Engagement was also seen in the length of time the dyad spent reading the storybooks. In all six cases, the dyads spent more time reading the digital books than they did reading the traditional books. This assertion is consistent with previous findings that digital books are highly motivating for children (Bergin, For, & Hess, 1993) and that the children stay on task for a longer period of time (McCarrick & Li, 2007).

One reason for this increased engagement may be that the child felt more a part of the digital book readings than the traditional book readings, as evidenced by their level of involvement with the physical elements of the iPad apps. Justice and Kaderavek (2002) stated that “the collaborative potential of shared book reading is increased when we are highly sensitive to the child’s level of engagement . . . We must actively involve the children in the activity” (p. 10). Researchers found that books with interactive features (lift-the-flap books, slot books, pop-up books) positively influence a child’s engagement with the book reading experience (Marvin & Mirenda, 1993; Rabidoux & MacDonald, 2000). Though they were studying interactive traditional storybooks, the same principle may explain why the children in this study were more engaged with the interactive digital books than the non-interactive traditional books.

Researchers have shown that engagement is an essential component for the development of traditional literacy skills (Scarborough & Dobrich, 1994; Lonigan, 1994), and engagement in mother-child book readings support this development (Crain-Thoreson & Dale, 1992; Wells, 1985). What has not been studied is how this increased engagement relates to the development of digital literacies or traditional literacies in young children. Further research is needed.

Both members of the dyad were less sensitive to each other during the digital readings than they were during the traditional book readings (assertion five). This assertion was seen in five of the six cases (highly manifest in three and moderately manifest in two). Sensitivity was measured by how often the dyad looked at each, responded to each other’s questions, appeared to engage the other in the storybook experience, and complied with the other’s requests.

The child responded to fewer of the mother’s questions during the digital book readings than during the traditional book readings. This was evident in all six cases. In some instances, the child appeared not to hear the mother’s questions. In other cases, he/she answered with a



one-word response. Two of the mothers increased the number of questions they asked in an attempt to draw their children away from the interactive elements of the digital books and back to a more traditional book reading experience. Their attempts failed as the children continued to disregard the mothers' questions. The mother and child appeared to have two different agendas—the mother wanted the child to interact with her about the meaning of the story while the child wanted to interact with the digital elements of the story.

Some of the mothers expressed concern that technology caused their children to withdraw from a social experience into a solitary experience. They are not alone in their concerns. The American Academy of Pediatrics (2013) issued a statement cautioning parents about the socio-emotional dangers of too much screen time. However, some studies have shown that while adults tended to use computers in isolation, this was not the case for young children (Clements & Sarama, 2003). Learning to use and manipulate technology-based books happened within a child's social world (Muller & Perlmutter, 1985; Heft & Swaminathan, 2002). The results from this study show that, though some of the mothers felt like their children were leaving them out of the digital book reading experience, the mothers also withdrew from the experience (e.g., sat back and watched, did not engage with the digital elements) or attempted to change the digital book reading experience to be more like the traditional book reading experience (increasing the number of meaning-related questions, asking their child to summarize the story, requiring the child to listen before he/she interacted with the digital elements). There was evidence of this in five of the six cases as evidenced by the decrease in their sensitivity scores. This is another indication of a need for a parental paradigm shift about the nature of shared readings with a digital book.

## **Conclusions**

The results of this study indicate that mother-child book readings using a traditional book and those using a digital book are two different experiences. One is not better than the other; rather, one affords more opportunities for interactions around traditional literacy skills and the other more opportunities for interactions around operational and functional digital literacy skills. Mascolo (2005) identified cultural tools as a type of scaffolding known as task/object-scaffolding. He stated that “task/object-scaffolding refers to the ways in which the . . . objects of action structure the construction of novel ways of acting and thinking” (p. 192). According to CHAT (Engestrom, 1999), sometimes changing the tool in a learning experience can create a contradiction, something that comes in conflict with accepted ways of acting and thinking. Contradictions act as a springboard to change. Digital books create opportunities for the construction of these novel ways of thinking and acting. Many parents may not be comfortable with their children interacting with digital books nor understand their supporting role as their children develop these new ways of thinking and acting. Education programs such as dialogic reading (Whitehurst, 2009) have successfully trained parents in effective traditional mother-child book-reading behaviors. Perhaps educating parents about the appropriate ways to help children access digital books could be as effective.

## **Recommendations for Further Research**

The limited number of research studies about mother-child book readings using a digital book along with the illuminating findings of this study, suggest that there is a need for additional research in this area. The results of this multiple-case study provide insight into possible future research topics. There is an extensive research base about mother-child read-alouds using traditional books (Baker et al., 2001; Senechal & LeFevre, 2002; Sonnenshein & Munsterman,

2002). This base, combined with the findings of this study and the few other studies (Fisch et al., 2002; Korat & Or, 2010; Moody et al., 2010) looking at the influence of digital books, can be used to inform future research. For example, how does genre influence the digital book-reading experiences (e.g., nonfiction, ABC books, predictable texts; Stadler & McEvoy, 2003)? How does book type influence a child's ability to retell a story (Kim, Kang, & Pan, 2011)? Does the age of a child change the interactions around digital books (Hindman et al., 2008)?

There are also questions related to parental support of digital literacies during a read-aloud session. Whitehurst and Lonigan (1998) developed a program (dialogic reading) that teaches parents how to promote the development of emergent literacy skills during a traditional mother-child read aloud. Therefore, one would assume that similar programs or strategies could be developed to support the development of digital literacies.

There is some research about how the different types of manipulative features of traditional storybooks (e.g., pop-ups, flaps) affect young children's learning during picture book readings (Tare, Chiong, & DeLoache, 2010), but it may be important, "since all screens are not created equal" (NAEYC, 2012, p. 3) to understand how the different manipulative features (e.g., visual and audio clues, pop-ups, reading options) of a digital books influence learning.

Because this study limited the type of digital books used (e.g., no gaming elements, needed to be available in both the traditional and digital formats), it would be useful to look at how parents and children interact around digital books with a wider range of interactive features such as the ability to choose the direction of the plot or apply the knowledge they gained from a book by playing a related game. It is important to understand what features of a digital book may provide the best opportunities for parents and children to be co-participants in the digital book reading experience. And finally, it may be important to explore further the idea that a

parent's attitudes about children's technology use may influence their interactions during a read-aloud session.

Some scholars believe that the definition of digital literacies should not be limited to the operational and functional skills needed to access the hardware and software of digital devices (Lankshear, & Knobel, 2006; Lankshear & Snyder, 2001). They believe that trying to define digital literacies as a set of tasks, skills, or performances does not adequately represent the complexity of finding meaning in digital texts. They stated that “knowing how to operate bits of hardware and software—are in most cases the least part of what the social practices” (Lankshear & Knobel, 2006, p. 20) of digital literacies involve. “Most of what participants bring to digital literacy practices are cultural and critical ways of doing things rather than operational techniques.” (Lankshear & Knobel, 2006, p. 20). This study defined digital literacies as abilities and competences. A study needs to be conducted that expands the definition of digital literacies to mean understanding how digital texts change the way children think and learn.

Finally, this study compared mother-child interactions during a traditional and digital storybook reading. Kucirkova (2014) stated that because the two reading experiences are so different, they might not be comparable. She suggests conducting studies using a “dynamic evaluative framework rather than a comparative design” (p. 2). Lieberman, Bates, and So (2009) agree. They said that, “instead of comparing . . . the amount of knowledge or skill gained from each [text] format, it might be fairer to compare different kinds of learning that depend on the kinds of learning each [text] format tends to encourage and support best” (p. 277–278). Because of this possibility, a study should be conducted that focuses on the different affordances and intents of digital storybooks rather comparing them to traditional books.

## **Limitations**

The participants for this study were selected from a group of kindergarten students enrolled in a university laboratory school, which limited the diversity of the case studies. However, after screening for previous experience with hand-held computer devices and previous mother-child book-reading experience, efforts were made to use dyads from both genders, and multiple socioeconomic and ethnic backgrounds. Three ethnicities and two socioeconomic backgrounds were represented in the study. In addition, the dyads were balanced using equal numbers of female and male children.

It is also possible that by being a participant in this study and knowing that someone is interested in your book-reading sessions, their interactions differed from those that occur naturally between a mother and child. This limitation was addressed by making the reading environment as natural as possible and by having the researcher outside of the reading room.

Despite these efforts, there was clear evidence that one child's behavior during one of the readings differed from a natural reading. During three of the readings, he was noncompliant and angry with his mother. Before he came for the fourth and final reading, his mother told him that he was getting paid to be a part of a study and that if he behaved, he would receive money to buy a toy. The data from this reading was not used in the study results.

The dyads read a book first in one format, either the traditional book or the digital book, then read the same book in other format. Reading a book in one format and then rereading it in another is not how mothers and children typically interact with books. In addition, the interactions surrounding the reading sessions may have been different from the first reading to the next because of familiarity. Both of these limitations were minimized by having the different dyads read the selected books in varying orders.

Because each of the books needed to be available in both the traditional book format and computer tablet book format, the selection was limited. But, based on the books that were available, there were adequate choices that met the criteria for inclusion. In addition, the technology-based books were limited to those that were most similar to the traditional books. Many children's books are being produced for computer tablets only and contain elements different from those selected (e.g., games, mazes, coloring pages, alternative endings). However, the purpose of this study was to understand differences that occurred when the medium is different. In order to make adequate comparisons, the books needed to be similar in content.

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## Appendix A: Selection Survey

(Given to all kindergarten parents to help select the cases)

1. How often do you read to your child?
2. Which of the following do you have in your home?
  - a. Desktop computer
  - b. Smart phone
  - c. CD Rom books
  - d. Laptop computer
  - e. Computer games
  - f. Computer tablet
  - g. Video games
  - h. Computerized children's games (e.g., Leapfrog, VTech)
3. How often do you use a desktop computer?
4. How often do you use a laptop computer?
5. How often do you use a smart phone?
6. How often do you use a computer tablet?
7. How often do you play computer games?
8. How often do you play video games?
9. How often do you play computerized children's games? (e.g., Leapfrog, VTech)
10. How often do you read computerized children's books?
11. How often does your kindergartener use a desktop computer?
12. How often does your kindergartener use a laptop computer?
13. How often does your kindergartener use a smart phone?
14. How often does your kindergartener use a computer tablet?
15. How often does your kindergartener play computer games?
16. How often does your kindergartener play video games?
17. How often does your kindergartener play computerized children's games? (e.g., Leapfrog, VTech)
18. How often does your kindergartener read computerized children's books?

## **Parental Permission for a Minor**

### **Introduction**

My name is Kathryn L. MacKay. I am a doctoral student at Brigham Young University. I am conducting research about mother-child storybook reading experiences. The study is being conducted under the direction of Dr. Kendra Hall-Kenyon, associate professor in the Teacher Education Department at BYU.

### **Purpose**

The purpose of this study is to gain a greater understanding of what happens as a parent and child read books using traditional books as well as e-readers (iPads). You and your child are invited to participate in this research study because your child is enrolled in the BYU Kindergarten program.

### **Procedures**

If you agree to let your child participate in this research study, the following will occur:

1. Your child will participate in two (2) play sessions prior to the study to familiarize him/her with the research environment and materials.

- The play sessions will take place at the BYU Lab School in an observation room.
- The play session will take place during school hours.
- They will last fifteen (15) minutes.
- Total time commitment: thirty (30) minutes

2. Your child will be interviewed to understand his/her traditional book preferences.

- The interview will take place at the BYU Lab School in an observation room during school hours.
- The interview will last for no longer than ten (10) minutes.

3. Your child will be observed on four different occasions reading a book (iPad and traditional) with his mother.

- The observations will take place at the BYU Lab School in an observation room at times convenient for you.
- The observations will last no longer than thirty (30) minutes each.
- The observations will be videotaped to ensure accuracy for data analysis.
- Total time commitment: Two (2) hours

### **Overall Time Commitment**

Mother: 3 ½ hours (1 hour at home, rest at school)

Child: 2 hours and 40 minutes (all at school)



**Risks**

There are minimal risks for participation in this study. If at any time your child indicates in any way that he/she does not want to participate, we will stop immediately. If you or your child feels uncomfortable about answering a particular question on the survey or during the interview, you have the right to decline to answer that question or be excused from the study. You and/or your child may get fatigued during the book reading sessions, however every effort has been made to ensure that the books are engaging and interactive. In the event that your child is sick, tired, or upset, the research sessions will be rescheduled.

**Confidentiality**

The audience for the recordings, survey, and interview data is the research team. Survey and interview data will be stored in a locked file cabinet in the researcher's office. The observation data, including video-tapes, will be stored on a password-secured computer until they are coded and transcribed. They will then be transferred to a DVD and stored in the locked file cabinet. The data will be accessed by the two head researchers as well as hired transcriptionists and coders. All information will remain confidential and will only be reported using nondescript identifiers. The researcher asks for permission to show video clips of your reading sessions for instructional purposes.

**Benefits**

There will be no direct benefits to your child however, he/she may experience cognitive and emotional benefits as he/she reads books with his/her mother.

**Compensation**

**Your child will receive a children's book of their choosing for participating in this study.**

**Questions about the Research**

If you have questions regarding this study, you may contact Kathryn MacKay at 801-221-0573 for further information.

Questions about your child's rights as a study participant or to submit comment or complaints about the study should be directed to the IRB Administrator, Brigham Young University, A-285 ASB, Provo, UT 84602. Call (801) 422-1461 or send emails to [irb@byu.edu](mailto:irb@byu.edu).

You have been given a copy of this consent form to keep.

**Participation**

Participation in this research study is voluntary. You are free to decline to have your child participate in this research study. You may withdraw your child's participation at any point affecting your child's enrollment in the BYU kindergarten program.

Child's Name: \_\_\_\_\_

Parent Name: \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## Appendix B: Parent Survey

Please answer the following questions to the best of your ability. This information will be used to gain a better understanding of the people in our study. All answers that you give will be confidential and only the researcher will have access to the completed questionnaires.

Please fill in or check the appropriate answers.

### **Child Information**

1. Birthdate (month/day/year) \_\_\_\_\_

2. Gender:    Male \_\_\_\_\_    Female \_\_\_\_\_

3. Ethnic Background:    American Indian \_\_\_\_\_  
                                   Asian \_\_\_\_\_  
                                   Hispanic \_\_\_\_\_  
                                   African American \_\_\_\_\_  
                                   White \_\_\_\_\_  
                                   Pacific Islander \_\_\_\_\_  
                                   Other (specify) \_\_\_\_\_

4. Was your child born in the United States?            Yes            No

If no, when did he/she come to the US? (Month/day/year) \_\_\_\_\_

If no, where was your child born? \_\_\_\_\_

5. Which statement best describes your child's living arrangements?

Lives with his/her mother \_\_\_\_\_

Lives with his/her father \_\_\_\_\_

Lives in the same house with both his/her mother and father \_\_\_\_\_

Lives with mother and visits his/her father \_\_\_\_\_

Lives with father and visits his/her mother \_\_\_\_\_

Lives equally with his/her mother and father (joint custody) \_\_\_\_\_

6. Does your child have a disability?

If yes, please explain. \_\_\_\_\_

7. What is the primary language spoken in the child's home \_\_\_\_\_

**Mother Information**

6. Birthdate (month/day/year) \_\_\_\_\_

7. Ethnic Background:      American Indian \_\_\_\_\_  
                                          Asian \_\_\_\_\_  
                                          Hispanic \_\_\_\_\_  
                                          African American \_\_\_\_\_  
                                          White \_\_\_\_\_  
                                          Pacific Islander \_\_\_\_\_  
                                          Other (specify) \_\_\_\_\_

8. Was the mother born in the United States?      Yes      No

If no, when did he/she come to the US? (Month/day/year) \_\_\_\_\_

If no, where was your child born? \_\_\_\_\_

9. Which statement best describes the mother's education level?

Less than 9th grade \_\_\_\_\_  
 Some high school but didn't finish \_\_\_\_\_  
 High school graduate \_\_\_\_\_  
 High school plus some college or trade school \_\_\_\_\_  
 4-year college degree \_\_\_\_\_  
 Some graduate school \_\_\_\_\_  
 Completed graduate school \_\_\_\_\_

10. Is the mother currently a student?

If yes, is she a:

Full-time Student \_\_\_\_\_  
 Part-time Student \_\_\_\_\_  
 What school is she attending?  
 \_\_\_\_\_

11. Is the mother employed?      Yes      No

If yes, check the statement that best describes your work schedule.

Employed full time (35+ hours/week) \_\_\_\_\_  
 Employed half-time (15–35 hours/week) \_\_\_\_\_  
 Employed part-time (5–15 hours/week) \_\_\_\_\_  
 Work from home \_\_\_\_\_

If employed, please describe the type of employment.

---

If employed, who takes care of your child while you are working?

---

12. What is the mother's annual yearly income?

\$60,000 and above \_\_\_\_\_

\$31,000 through \$59,000 \_\_\_\_\_

\$30,000 and below \_\_\_\_\_

### **Father Information**

13. Birthdate (month/day/year) \_\_\_\_\_

14. Ethnic Background: American Indian \_\_\_\_\_

Asian \_\_\_\_\_

Hispanic \_\_\_\_\_

African American \_\_\_\_\_

White \_\_\_\_\_

Pacific Islander \_\_\_\_\_

Other (specify) \_\_\_\_\_

15. Was the father born in the United States?      Yes      No

If no, when did he/she come to the US? (Month/day/year) \_\_\_\_\_

If no, where was your child born? \_\_\_\_\_

16. Which statement best describes the father's education level?

Less than 9th grade \_\_\_\_\_

Some high school but didn't finish \_\_\_\_\_

High school graduate \_\_\_\_\_

High school plus some college or trade school \_\_\_\_\_

4-year college degree \_\_\_\_\_

Some graduate school \_\_\_\_\_

Completed graduate school \_\_\_\_\_

17. Is the father currently a student?

If yes, is he a:

Full-time Student \_\_\_\_\_

Part-time Student \_\_\_\_\_

What school is he attending?

---

18. Is the father employed?                      Yes                      No

If yes, check the statement that best describes your work schedule.

Employed full time (35+ hours/week) \_\_\_\_\_

Employed half-time (15–35 hours/week) \_\_\_\_\_

Employed part-time (5–15 hours/week) \_\_\_\_\_

Work from home \_\_\_\_\_

If employed, please describe the type of employment.

---

If employed, who takes care of your child while you are working?

---

19. What is the father's annual yearly income?

\$60,000 and above \_\_\_\_\_

\$31,000 through \$59,000 \_\_\_\_\_

\$30,000 and below \_\_\_\_\_

20. Please list all the individuals living in the child's household(s):

Primary Household

Relationship	Age

## Secondary Household (if applicable)

Relationship	Age

Listed below are several statements about your attitudes and beliefs. Circle the answer that is closest to your feelings. Please answer each question in response to your kindergarten child. There are not right or wrong answers. Your own opinions are important to us.

1. As a parent, I play an important role in my child's development.
 

Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
  
2. There is little I can do to help my child get ready to do well in school.
 

Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
  
3. My child learns many important things from me.
 

Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
  
4. I would like to help my child learn, but I don't know how.
 

Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
  
5. I am my child's most important teacher.
 

Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
  
6. Schools are responsible for teaching children, not parents.
 

Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
  
7. Parents need to be involved in their children's education.
 

Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
  
8. When my child goes to school, the teacher will teach my child everything my child needs to know so I don't need to worry.
 

Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4

9. Children do better in school when their parents also teach them things at home.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
10. I find it boring or difficult to read to my child.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
11. I enjoy reading with my child.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
12. I have good memories of being read to when I was a child.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
13. Reading with my child is a special time that we love to share.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
14. My child does not like to be read to.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
15. I feel warm and close to my child when we read.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
16. I have to scold or discipline my child when we try to read.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |



17. I want my child to love books.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
18. I don't read to my child because he or she won't sit still.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
19. I read to my child whenever he or she wants.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
20. When we read, I try to sound excited so my child stays interested.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
21. Children learn new words, colors, names, etc. from books.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
22. Reading helps children be better talkers and better listeners.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
23. My child knows the names of many things he or she has seen in books.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
24. When we read, I want my child to help me tell the story.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
25. I ask my child a lot of questions when we read.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |

26. When we read, I want my child to ask questions about the book.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
27. When we read, we talk about the pictures as much as we read the story.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
28. I try to make the story more real to my child by relating the story to his or her life.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
29. Stories help build my child's imagination.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
30. My child learns lessons and morals from the stories we read.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
31. Reading helps children learn about things they never see in real life (like Eskimos and polar bears).
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
32. My child learns important life skills from books (like how to follow a cooking recipe or how to protect themselves from danger).
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
33. Even if I would like to, I'm just too busy and too tired to read to my child.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |

34. I don't read to my child because we have nothing to read.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
35. I don't read to my child because there is no room and no quiet place in the house.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |
36. I don't read to my child because I have other, more important things to do as a parent.
- |                   |          |       |                |
|-------------------|----------|-------|----------------|
| Strongly Disagree | Disagree | Agree | Strongly Agree |
| 1                 | 2        | 3     | 4              |

1. What parent reads most often to your child?      Mother      Father
  
2. How many times has it occurred during the past month that . . .
  - a. You took your child to the library?
  - b. You were reading a book, textbook, or report in the child's presence?
  - c. You, together with the child, read the instructions or brand name on food packages?
  - d. You read a children's book to the child at bedtime?
  - e. You were reading a magazine or newspaper in the child's presence?
  - f. You and the child were going jointly through a magazine?
  - g. Your child was playing with books or magazines, pretending to read?
  - h. You were writing a postcard, letter, or email in the child's presence?
  - i. You were making note to plan an activity in the child's presence?
  - j. You were writing a shopping list in the child's presence?
  - k. You read a children's book to the child in the daytime?
  - l. You were looking through free advertising papers in the child's presence?
  - m. Your child was scribbling, attempting to write, or pretending to write?

3. How many different people read to your child in a week?
- a. 1
  - b. 2
  - c. 3
  - d. 4
  - e. 5
4. Approximately how many children's books does your child have at home?
- a. 0
  - b. 1–5
  - c. 6–10
  - d. 11–20
  - e. 20+
5. Approximately how many books for adults are in your home?
- a. 0
  - b. 1–5
  - c. 6–10
  - d. 11–20
  - e. 20+
6. Do you have a designated time for reading books to your child?
7. How many books do you typically read at one sitting?
8. What are some of your child's favorite books?

9. When you read books to your child, approximately how long does a “typical” reading session take?

- a. less than a minute
- b. 3–5 minutes
- c. 6–10 minutes
- d. 11–15 minutes
- e. 15+ minutes



6. Did your child spend time playing games video games like Xbox, PlayStation , Wii, or Nintendo DS?														
7. Did your child spend any time playing games on a desktop or laptop computer on that day?														
8. Did your child spend any time playing on a smart phone or computer tablet such as an iPad on that day?														
9. Did your child spend any time reading a book on a computer tablet such as and iPad or Kindle on that day?														



How often, if ever, does your child do each of the following:

	Every Day	Several Times a Week	Several Times a Month	Less Often	Never	Don't Know
10. How often does your child watch television?						
11. How often does your child "read" or look at a book by him/herself?						
12. How often does your child play video games or computer games?						
13. How often does your child watch videos or DVDs?						
14. How often does your child use a smart phone or computer tablet (iPad, Kindle)?						
15. How often does your child read a book on a computer tablet (iPad/Kindle)?						

16. Do you have a computer in your home?            Yes            No

17. Do you have a smart phone?                      Yes            No

18. Do you have a computer tablet?                Yes            No

If yes, what type is it (iPad, Kindle, etc.)? \_\_\_\_\_

19. In general, do you think playing with computer devices mostly helps or mostly hurts children's learning, or doesn't have much affect either way?

Mostly helps \_\_\_\_\_

Mostly hurts \_\_\_\_\_

Not much effect \_\_\_\_\_

20. Do you think reading a book on a computer table mostly helps or mostly hurts children's learning or doesn't have much affect either way?

Mostly helps \_\_\_\_\_

Mostly hurts \_\_\_\_\_

Not much effect \_\_\_\_\_

### **Appendix C: An Example of a Kindergarten Literacy Assessment – Juan**

Student:           

Teacher:                           

Date: 8/21/12

- |                                       |       |
|---------------------------------------|-------|
| 1. Student can write his first name   | 1/1   |
| 2. Student can blend phonemes         | 1/1   |
| 3. Student can segment phonemes       | 1/1   |
| 4. Student can match rhymes           | 2/3   |
| 5. Student can match beginning sounds | 3/3   |
| 6. Student can match ending sounds    | 3/3   |
| 7. Student can distinguish a word     | 1/1   |
| 8. Student can distinguish a letter   | 1/1   |
| 9. Student can distinguish uppercase  | 0/1   |
| 10. Student can distinguish lowercase | 0/1   |
| 11. Student can identify uppercase    | 26/26 |
| 12. Student can identify lowercase    | 26/26 |
| 13. Student can identify sounds       | 26/26 |

14. Student knows concepts of print	3/3
15. Student can identify the character	1/1
16. Student can identify the setting	0/1
17. Student can identify the problem	1/1
18. Student can identify the solution	1/1
19. Student can read sight words	47/5

**Reading Level: J**

## Appendix D: Mother Interview

### Semi-Structured Protocol

1. How typical were the readings of the traditional books to the parent/child book reading experiences you have at home?

Probes: What were the similarities? What are the differences? Why do you think the experiences were different?

2. When you read a book at home with your child, do you read through without stopping?

Probes: Do you talk about the book as you are reading? What do you say? Do you ask questions? Do you talk about letters and words? Do you stop and point to things?

3. Does your child want to talk about the book during the reading?

Probes: Does your child ask questions? Talk about what is happening next?  
Acknowledge letters or words?

4. Have you ever read a book to your child on an electronic device before this experience?

5. How typical were the readings of the books on the iPad to the parent/child book reading experiences you've had previously?

Probes: Tell me about your previous experiences? What were the similarities?  
What are the differences? Why do you think the experiences were different?

6. How interested is your child in technology?

7. Tell me how you felt about the overall book reading experiences? Was it what you expected?

Probes: Did you discover something that you found surprising?

8. Would you use an iPad again as a way to read stories with your child? Why or why not?

10. During the readings I noticed that . . . tell me what you were thinking.

11. During the readings I noticed that your child . . . why do you think he/she did that?

12. Watch this portion of the reading and give me your impression of what was happening.

Additional questions related to the following:

1. Survey information that needed clarification or expansion.
2. Discrepancies between the survey answers and the child interview.

## Appendix E: Child Play Session and Interview

### Semi-Structured Protocol

A. Introduce the child to the iPad and ask:

1. Have you ever used an iPad before?

Probes: When?

How often?

What do you do on the iPad?

Have you ever read a book on an iPad?

2. Do you use a computer at home?

Probes: When?

How often?

What do you do on the computer?

Have you ever read a book on a computer?

3. Do you use an iPhone?

Probes: When?

How often?

What do you do on the iPhone?

Today we are going to read some books on the iPad. Show the child how to locate the book apps on the screen, how to select a reading option, how to turn the pages, and interact with the words and icons. Read two books together.

B. I have some regular books here for you to look at. This one is about . . . , etc. Look carefully at all these books and then decide which one you would like to have as your own. You can only pick one of these books to keep, so take your time to choose your favorite.

1. Did you pick one book to keep? Show me which one is your favorite?
2. What do you think this book is about? (genre and topic focus)
3. Is it a storybook or a book about real things? (genre focus)
4. Why did you pick this book to keep? Why is this one your favorite? (personal connection focus)
5. What makes this book so special? What do you like about this book? (feature focus)
6. What are you going to do with this book? (purpose and intent focus)
7. Is there anything else you would like to tell me about this book?

## **Appendix F: Post-Observation Questionnaire**

### Final Survey

1. Write a paragraph describing your kindergartener's personality. Include both strengths and challenges.

2. Write a paragraph describing your relationship with your kindergartener.



## **Appendix G: Example of Background Summary**

### **Background Summary**

Juan

#### **Demographics:**

Juan is five-years-and-nine-months-old. His mother is Hispanic and his father is White. English is his primary language, though he does understand Spanish because his mother often speaks it in the home. Juan lives with both of his parents. His mother reported that she thinks Juan has ADHD and is going to be taking him to the doctor for a diagnosis. He also has a 3-year-old brother who lives in the home.

Juan's mother is 41-years-old. She was not born in the United States but has lived here for 12 years. She is not sure if she went to college. She indicates that she may have gone for one year. Her primary language is Spanish. She is a stay-at-home mother.

Juan's father is 53-years-old. He is White and was born in the United States. He graduated from college with a B.S. degree and is a business manager. He makes between \$60,000 and \$90,000 a year.

#### **Reading attitudes and behaviors:**

Juan's maternal grandmother was illiterate, so Juan's mother was never read to as a child. Her father was literate, but he never read to his children. Juan's mother misunderstood the directions for this portion of the survey, so she did not indicate how many times in the last month she participated in the activities but rather just marked she did or did not. She answered positively to all of the literacy behaviors. On the attitude portion of the survey, she reported that she values home literacy learning and behaviors such as reading together. She views her mother-child reading experiences with Juan as warm with little discipline needed.

**Technology Use:**

Juan watches television for one-half hour each day. He plays on a smartphone for 15 minutes per day. He plays computer and video games several times a month and watches DVDs several times a month. He also uses an iPad several times a month.

**Juan's mother's feelings about technology:**

I believe technology is wonderful however I believe that for very young kids (infants, toddlers and probably up to 8-9 years old) it must be closely monitored in terms on quantity and content. Having seen my two boy's behavior after being exposed to TV, DVDs, hand held game system (Leapster Explorer), smart phones, computer, kindle, iPad makes me very worry because they just "won't listen" or seems like they lose the connection with mom or dad or friends. I am annoyed at the fact that when my kids are watching or playing they are so interested in "listening" to a character that is in a box with no concern whatsoever for my kid. My kid's hyper focus and it's just hard to bring them back to the real world. I DO let my kids watch TV and play their Leapster Explorer or play computer (most of the time are in segments of 15 minutes or 30 minutes) and I procure all their shows, games, etc., have reading, science, math, or moral content. I do let them watch popular shows once in a while (twice a month maybe) because I also believe that extreme control can backfire in some form. In my heart I believe there is no substitution (even when the kids can't recognize it) for one on one interaction for learning and for fun. I can't always have that interaction because "there is life" but I can keep trying.

**Possible interview questions:**

1. What type of literacy activities do they do in the home?
2. Are these activities done in Spanish or English?
3. Do they read stories in both languages?
4. How much Spanish does Juan know?

5. How well does Juan's mom read in English?
6. Where did she immigrate from?
7. Why is she confused about her college attendance?
8. What exactly does Juan's father do for a living?
9. What was his degree in?
10. What is Juan doing when he uses the iPad and the iPhone?

### **Literacy Assessment Summary**

Juan came to kindergarten with the ability to identify all of the upper- and lower-case letters. He knew all of his letter sounds with the exception of /u/, /y/, and /w/. He was reading on a first-grade level. His last literacy assessment indicates that he now knows all of his letter sounds and is reading on a beginning second-grade level.

### **Post-Observation Questionnaire Summary**

Juan is a wonderful kid. He is full of energy and loves to learn. He has an inquisitive mind and sometimes wants answers immediately. Juan has a wonderful imagination, he liked to pretend ever since he was able to speak, loves technology, nature, sports, and being outdoors. He is tireless! Because he is always in the go he can be "a little "reckless at times, forgetful and it's difficult for him to comply and follow rules. Juan a very soft side to him and loves to show and express his love by helping in the house (he wants to mop floors, cook food!) So mom and dad are always watching him to make sure he is safe. He likes to show and receive affection by hugging, kissing, tickles and wrestling. Since Juan is, during the day always on the go, he can get easily frustrated if he does not get his way when it comes to having his lunch, TV show, etc. on his frame time. It seems to me he is already thinking what's he is going to do next in terms of having fun or just a particular interest. So he can be a little moody and aggressive if we try to persuade him to change his mind. At the end of the day when he relaxes he Is very receptive and

loves for his parents to be with him ( particularly mom) read to him or by himself, answer questions, play quiet games (checkers, bingo, or made up games) He loves to pretend and refuses to fall asleep even if he is extremely tired.

I think we have a great relationship. He loves when I attend his need s and it's usually at the end of the day that he is more vocal about his love for his family, his actions and the things that concerns him. I show love for Juan constantly, with words and actions and I know he knows he is deeply loved even when at times he can complain and demand for more attention.

**Play Session and Interview Summary:**

**Technology Use.** Juan reported that he played games on the iPad “all the time.” I asked him if he played on it every day, and he answered yes. He said that sometimes his mom gets mad but he usually “gets to do it.” I asked him if he had ever read a book on the iPad and he said that he just “likes to play the games or watch shows.” His perception was a bit different from his mother’s perceptions. She said that she hides the iPad so that Juan can’t use it. He probably is unaware that she is hiding it to keep him from using it.

Juan’s mother reported that he did not play games on the computer, computer tablets, or smart phones, but during the child play session, Juan reported that his favorite thing to do on these devices was to play games. He described one game that he “played 999 times.” Both Juan and his mother reported that they did not read books on any of these devices.

**Book Preference:** Juan looked at each of the books very quickly and then chose the book *There’s No Such Thing as a Dragon*. He said that he chose this book because it looked funny and he liked the pictures. I asked him if he liked any of the other books and he said that he didn’t. During the mother interview, his mother indicated that he likes to read nonfiction but he did not choose any of the nonfiction books to take home.

**Additional mother interview questions:**

1. Juan indicated in his play sessions that he loves to play computer games. Does he get to do that very often? How much time do you think he spends doing this?
2. What types of games does he/she play?

**Appendix H: Dyad Book-Reading Order**

Dyads (Cases)	<i>The Tale of Peter Rabbit</i> Traditional Text	<i>The Tale of Peter Rabbit</i> iPad Text	<i>Green Eggs and Ham</i> Traditional Text	<i>Green Eggs and Ham</i> iPad Text
Chantel	4	1	2	3
Alia	3	4	1	2
Ian	4	3	1	2
Juan	3	2	4	1
Selina	2	3	4	1
Tyler	4	3	2	1

## Appendix I: Within-Case Reports

### Chantel's Case

The nature of the parent/child verbal and nonverbal interactions for this case is described by three of the study themes. Table I1 lists the specific themes most evident in the case – those with high manifestations (M) – along with one theme with interesting medium manifestations (m). It also includes the books where the themes were present and the member of the dyad manifesting the theme. Noticeably absent are any manifestations of the themes related to text interactions. This absence is addressed in the case findings.

The following sections detail the results of the within-case analysis. It is organized by the themes that were present in this case. It discusses the lack of text-related interactions, the meaning-related and technology-related interactions, and concludes with a discussion of the affective climate during the book readings.

**Text interactions.** Chantel and her mother had very few text-related interactions during any of the readings (see Appendix J). This may be because Chantel's mother did most of the reading, even in the simpler *Green Eggs and Ham* text, which Chantel could read. The absence of text talk was also evident in the iPad versions of the stories when, once again, Chantel's mother read most of the text.

**Meaning interactions.** Evidence for two of the meaning-related themes were seen in Chantel's case. There was an increase in the number of interactions related to vocabulary development during the digital reading of *The Tale of Peter Rabbit* as compared to the traditional readings (theme one). In addition, Chantel's mother initiated more overall meaning-related interactions (vocabulary, organizing and summarizing, and inference-making) during the digital reading than during the traditional reading.

Table II

*Themes with High or Moderate Manifestations – Chantel*

Category	Theme #	Theme Name	Text(s)	Dyad Member
Meaning	1 <sup>m</sup>	Increase in vocabulary	PRI <sup>b</sup>	Mother
Meaning	2 <sup>m</sup>	Increase in mother-initiated meaning	PRI <sup>b</sup>	Mother
Technology	4 <sup>M</sup>	iPad interactions about technology	GEI <sup>a</sup> /PRI <sup>b</sup>	Both
Affective Climate	5 <sup>M</sup>	Decrease in mother affect	GEI <sup>a</sup> /PRI <sup>b</sup>	Mother
Affective Climate	8 <sup>M</sup>	Decrease in sensitivity	GEI <sup>a</sup> /PRI <sup>b</sup>	Both/Mother
Affective Climate	9 <sup>m</sup>	Increase in child ownership	PRI <sup>b</sup>	Child

Notes: <sup>a</sup>GEI = *Green Eggs and Ham* - iPad Text

<sup>b</sup>PRI - *The Tale of Peter Rabbit* - iPad text.

M=High Manifestation

m=Medium Manifestation

**Theme one.** There was not much difference in the way that Chantel and her mother interacted regarding meaning during the traditional and digital readings of *Green Eggs and Ham* (see Appendix K). The mother's reading style was to read the book to Chantel from beginning to end without many verbal or non-verbal interactions. There was a difference in the way Chantel and her mother interacted regarding meaning during the traditional and digital readings of *The Tale of Peter Rabbit*. The interactive icons available during digital reading induced Chantel and her mother to engage in vocabulary-related talk (Theme 1). For example, large gooseberries dropped down the page, providing an opportunity for Chantel and her mother to not only discuss



gooseberries but also the gooseberry net where Peter became trapped as seen in the following exchange:

Mom: Do you know what? I don't think I've ever seen a gooseberry. Do you think those are gooseberries?

Chantel: Yeah! (Pushes gooseberries three times)

Mom: Huh. (Pushes gooseberry) They look like they have little paper wrappers. Do you think there's a berry underneath that paper wrapper?

Chantel: Yeah.

Mom: (Points at net) Well, I wonder if the net is to hold the gooseberries so they don't fall on the ground or something? (Points at Peter) And his button got caught in one of the little holes of the net, so that's why he couldn't move.

Chantel: (Pushes Peter) (Pushes gooseberries twice) Yeah. (Pushes bush up and down three times) (Pushes Peter) (Pushes gooseberries four times)

Chantel and her mother experienced 25 vocabulary interactions, similar to this one, while reading the digital version of *The Tale of Peter Rabbit* compared to three during the traditional reading.

**Theme two.** As Chantel and her mother read the iPad versions of the stories, there was evidence that they had different objectives—Chantel wanted to play with the icons and her mother wanted her to focus on the story. This was most evident as Chantel and her mother read *The Tale of Peter Rabbit* as illustrated by the following example (italicized words indicate that the text is being read by the iPad):

Mom: Do you know what implored means? “Implored him to exert himself.” What in the world do you think that means?

Chantel: (Turns page back 5 times)

Mom: Where are you going? (Pause) Where are you going?

Chantel: (Pushes on a picture that slides) It's fun to do that. (Smiles)

Mom: (Laughs) Ok, let's go back. (Turns page 4 times) (Points at birds) So, the birds were telling him to try harder. That's what "exert yourself" means.

Chantel: (Pushes birds 4 times) Oh.

Mom: They were saying, "Try! Try!"

Chantel: (Pushes Peter 4 times)

Chantel's mother attempted to draw Chantel away from the interactive icons and into the story by increasing the number of questions she asked (theme two). It is interesting to note that the number of questions asked by Chantel's mother more than doubled from 35 during the traditional reading of *The Tale of Peter Rabbit* to 75 during iPad version of *The Tale of Peter Rabbit* (see Appendix P) and most of these questions were meaning-related (see Appendix K). Though her mother asked more questions, Chantel answered fewer of them, choosing to interact with the icons on the page rather than respond to her mother. Though Chantel offered little indication that she heard her mother's questions and/or comments about the story, there was some evidence that she did. During the traditional reading, which followed the iPad reading, the following exchange occurred, illustrating that Chantel had listened to her mother when she had defined *exert* during the iPad reading:

Mom: "and implored him to exert himself." What does that mean? What were they trying to get him to do?

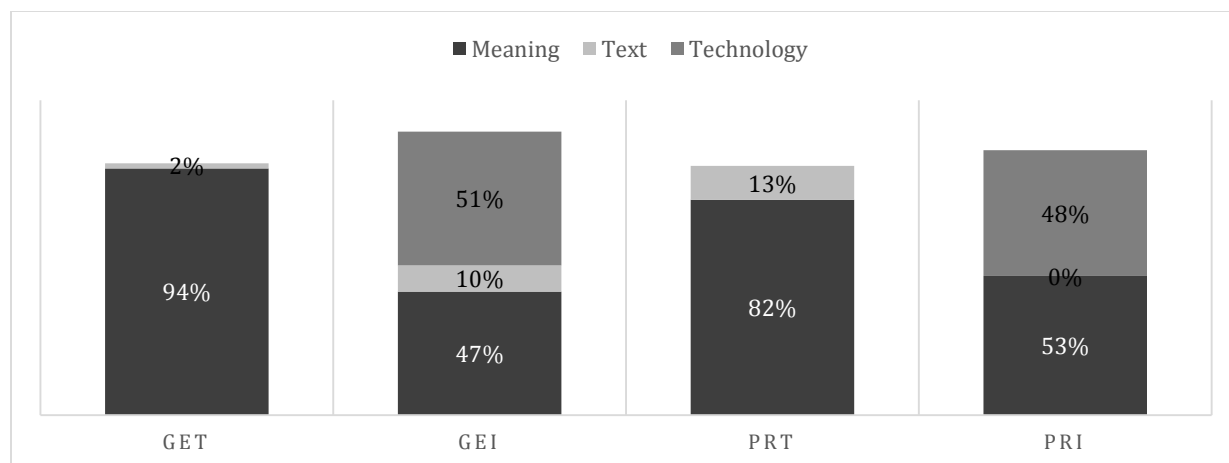
Chantel: (Looks at mom) Try harder.

Mom: To try harder! That's what to "exert yourself" means, to try harder. Ok.

**Technology interactions.** During the digital readings of both books, Chantel and her mother engaged in interactions about the technological elements of the books (see Appendix L). During these readings, the majority of their talk was technology-related (theme four). The following sections reviews these interactions.

**Theme four.** Chantel and her mother did talk about meaning as they read both the traditional and digital texts. However, as they read the digital texts, the percentage of the talk that was about meaning decreased, as seen in Figure 11. Their meaning-talk was replaced by technology-related talk both operational and functional. For example, when Chantel pushed on a picture of Peter Rabbit, his leg moved up and down. She turned to her mother and said, “Oh, it’s like Peter Rabbit’s thumping on a tree!” They had technology-related interactions similar to these on 27 occasions (compared to 15 meaning-related) during the digital reading of *Green Eggs and Ham* and 58 occasions (compared to 49 meaning-related) during the digital reading of *The Tale of Peter Rabbit*.

Chantel’s mother was uncertain about her role during the digital readings. Though the interview data does not address the study’s questions directly, it does provide insight into what was happening during the readings. For example, during her interview, Chantel’s mother acknowledged that Chantel was more equipped to play the mentor role than she was when she said that “kids are a lot better at figuring stuff out because they’ll think to try things, whereas adults . . . I wouldn’t have even known that if you did that [push the beginning of a sentence] it would read.” She struggled providing Chantel with the support she needed to access the technology.



PRT = *The Tale of Peter Rabbit* – Traditional Text

PRI = *The Tale of Peter Rabbit* - iPad text.

GET = *Green Eggs and Ham* – Traditional Text

GEI = *Green Eggs and Ham* - iPad Text

Total talk for each reading may be more than 100% because talk can fall into more than one category.

*Figure II.* Majority of talk during digital readings was technology-related.

Though her mother struggled, Chantel did not. She nonverbally mentored her mother in digital text navigation. She didn't need her mother to access the text. She pushed icons, words, or sentence blocks a total of 504 times compared to her mother's 15 times. While Chantel was not bothered when she didn't know how to make things work right away, her mother became frustrated as illustrated by the following interaction:

Mom: Three times? Try it three times next time.

Chantel: (Pushes beginning of sentence three times)

iPad: *Not. Not. Not in a house. Not in a box. Not with a mouse. Not with a fox. I will not eat them here or there. I do not like them anywhere!*

Chantel: (Turns page)

Mom: K, I'm frustrated now.

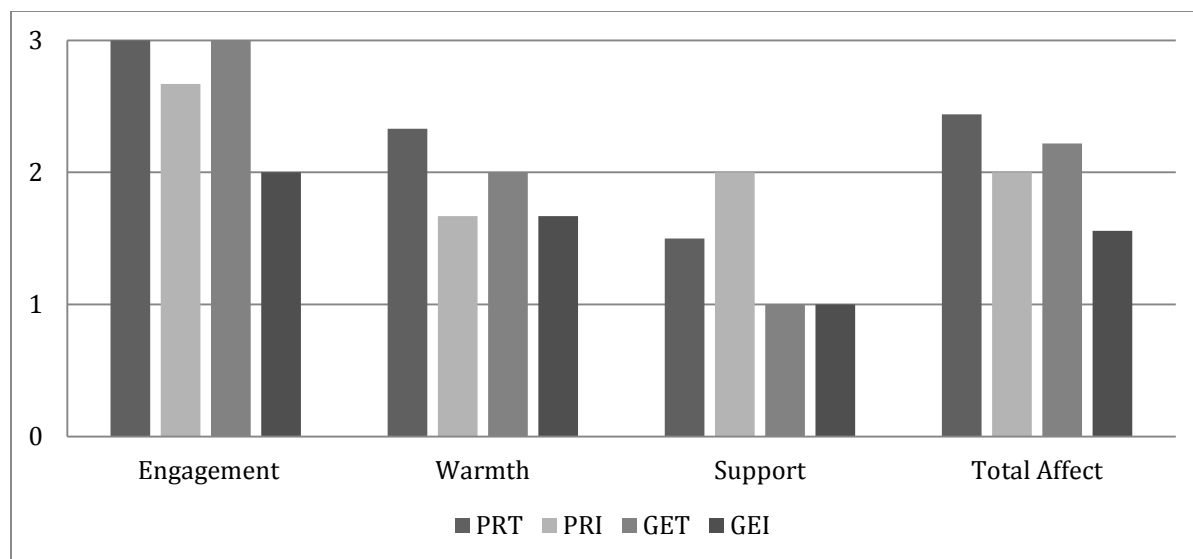
Chantel: (Pushes beginning of sentence twice)

iPad: *Ham. Ham. You do not like green eggs and ham?*

During her interview, Chantel's mother confirmed her frustration when she said, "I found very quickly the first day we did the iPad that I was very frustrated." It took too long to figure out how to make the iPad read and what worked on one page did not seem to work on another. When asked if she would consider purchasing children's books iPad apps, she stated that "I should probably get a couple of books on the iPad just for her to have to goof around with . . . or if she didn't know a word, she could touch the word and it would say it . . . I think it would be valuable on an independent reading level only."

**Affective climate.** As Chantel and her mother read both the traditional and digital books together, three themes related to the affective climate were evident. First, Chantel's mother's total affective climate score was lower when they were reading the digital books than when they were reading the traditional book (theme five). Second, one of the reasons for this decrease in total affect was because her sensitivity score (a subcategory) was lower for those readings (theme eight). Third, Chantel had more ownership during the digital book readings than she had during the traditional readings. Each of these themes are discussed in the following sections.

**Theme five.** Chantel's mother's struggle with her role as mentor contributed to an overall decrease in her affective climate score, as seen in Figure I2. She smiled less often, read with less expression, and seemed frustrated when Chantel preferred the iPad do the reading. During her interview, Chantel's mother explained her feelings when she said, "I just thought, if it was going to read to us, then what was I sitting there doing? That wouldn't be entertaining to me. Maybe to her it would. But not to me." Though Chantel's mother's affect decreased, the dyad spent more time with the digital texts than with the traditional texts. While they spent 12 (PRT) and 9 (GET) minutes reading the traditional texts, they spent 22 (PRI) and 16 (GEI) reading the digital texts.



*Engagement = Enthusiasm, Focus, and Reading Expression' Warmth = Proximity, Reinforcements, and Sensitivity to Other, Support = Comprehension Support, Text Support, Technology Support*  
 PRT = *The Tale of Peter Rabbit* – Traditional Text  
 PRI = *The Tale of Peter Rabbit* - iPad text.  
 GET = *Green Eggs and Ham* – Traditional Text  
 GEI = *Green Eggs and Ham* - iPad Text

*Figure 12.* Mother's affective climate scores in Chantel's case.

Chantel's mother went on to express concern about the role technology plays in the lives of her children. Though the interview data doesn't speak directly to the study results, it may explain why her affective climate decreased during the digital readings (Theme 11: Negative feelings about technology). She stated:

[We] have the attitude in our house that we don't want to use technology just because everybody else is. We want to make sure that it's useful to our family, that we don't become a slave to it. So their time with technology is probably more limited than their peers' . . . We're a little bit more conservative that way.

Chantel confirmed her mother's feelings when, during her play session, she summed up her mother's feelings about children's use of iPads when she said that her mom "usually says no when I ask to play on the iPad."

**Theme eight.** When looking at the subcategories of the affective climate, Chantel's mother's sensitivity scores were lower for the digital book readings than for the traditional book readings (see Appendix N) for both *The Tale of Peter Rabbit* and *Green Eggs and Ham*. Chantel's sensitivity scores decreased for the one of the books –*Green Eggs and Ham*.

As Chantel and her mother read the iPad version of the story, there was evidence that they had different objectives—Chantel wanted to play with the icons and her mother wanted her to focus on the meaning of the story as illustrated by the following example (italicized words indicate that the text is being read by the iPad):

Mom: Do you know what implored means? “Implored him to exert himself.” What in the world do you think that means?

Chantel: (Turns page back 5 times)

Mom: Where are you going? (pause) Where are you going?

Chantel: (Pushes on a picture that slides) It's fun to do that. (Smiles)

Mom: (Laughs) Ok, let's go back. (Turns page 4 times) (Points at birds) So, the birds were telling him to try harder. That's what “exert yourself” means.

Chantel: (Pushes birds 4 times) Oh.

Mom: They were saying, “Try! Try”

Chantel: (Pushes Peter 4 times)

Chantel's mother attempted to draw Chantel away from the interactive icons and into the story by increasing the number of questions she asked. When Chantel's mother reads to her children she likes to ask meaning-related questions. She said, “I like it to be a time for us . . . to communicate and . . . make it more than just the story.” It is interesting to note that the number of questions asked by Chantel's mother more than doubled from 35 during the traditional reading

of *The Tale of Peter Rabbit* to 75 during iPad version of *The Tale of Peter Rabbit* (see Appendix P) and most of these questions were meaning-related. Though her mother asked more questions, Chantel answered fewer of them choosing to interact with the icons on the page rather than respond to her mother. Though Chantel offered little indication that she heard her mother's questions and/or comments about the story, there was some evidence that she did. During the traditional reading, which followed the iPad reading, the following exchange occurred illustrating that Chantel had listened to her mother when she had defined *exert* during the iPad reading:

Mom: "and implored him to exert himself." What does that mean? What were they trying to get him to do?

Chantel: (Looks at mom) Try harder.

Mom: To try harder! That's what to "exert yourself" means, to try harder. Ok.

**Theme nine.** When Chantel and her mother read the traditional version of *The Tale of Peter Rabbit*, her mother held the book, did the reading, and turned all of the pages as illustrated by the photograph in Figure I3. When they read the digital version of the same book, Chantel had more ownership. The book was placed between Chantel and her mother, Chantel turned over half of the pages, and she physically interacted with the touch-screen icons as seen in Figure I4.





*Figure 13.* Chantel has little ownership of the reading experience as they read the traditional *Tale of Peter Rabbit* book.



*Figure 14.* Chantel has more ownership of the reading experience as they read the digital *Tale of Peter Rabbit* book.

## Alia' Case

The nature of the mother-child verbal and nonverbal interactions for this case is described by seven of the study themes. Table 2 lists the specific themes most evident in the case – those with high manifestations (M) – along with one theme with interesting medium manifestations (m). It also includes the books where the themes were present and the member of the dyad manifesting the theme. The following sections detail the results of the within-case analysis. It is organized by the themes that were present in this case. It discusses the text-related interactions, the meaning-related and technology-related interactions, and concludes with a discussion of the affective climate during the book readings.

Table I2

### *Themes with High or Moderate Manifestations – Alia*

Category	Theme #	Theme Name	Text(s)	Dyad Member
Meaning	1 <sup>m</sup>	Increase in vocabulary	GEI <sup>a</sup>	Child
Text	3 <sup>M</sup>	Decrease in text interactions	Both	Mother
Technology	4 <sup>M</sup>	Interactions about technology	Both	Both
Affect	5 <sup>M</sup>	Decrease in mother affect	Both	Mother
Affect	7 <sup>M</sup>	Increase in child engagement	Both	Child
Affect	8 <sup>M</sup>	Decrease in sensitivity	Both	Child
Affect	9 <sup>M</sup>	Child's power/control increases	Both	Child

Notes: <sup>a</sup>GEI = *Green Eggs and Ham* - iPad Text

<sup>b</sup>PRI - *The Tale of Peter Rabbit* - iPad text.

M=High Manifestation

m=Medium Manifestation

**Meaning interactions.** As Alia and her mother read the books, both digital and traditional, they engaged in meaning-related interactions. The within-case analysis found one theme related to meaning as they read. This meaning-related theme is discussed in the following section.

*Theme one.* As Alia and her mother read the digital version of *Green Eggs and Ham*, they had more vocabulary-related interactions than they had when they read the traditional book (theme one). During the traditional reading, they engaged in five vocabulary-related interactions but when they read the digital text, they engaged in twelve. While reading the traditional *Green Eggs and Ham* text, Alia did not initiate any of the vocabulary interactions, but when they read the digital book, she initiated more than half of them (see Appendix K). The digital text provided opportunities to expand the vocabulary beyond what appeared in the written text. When Alia pushed a picture on the screen, a labeling word appeared. In addition to the showing the written word, the iPad voice then said the word. This element provided opportunities for Alia to learn new vocabulary as illustrated below:

iPad: *Would you, could you on a boat?*

Alia: (Pushes mast)

iPad: *Mast.*

Alia: Mast?

Mother: (Points at mast) That's this tall part right here. It holds up the sail.

**Text Interactions.** As Alia and her mother read the books, both digital and traditional, they also engaged in text-related interactions. The within-case analysis found one theme related to text as they read. This text-related theme is discussed in the following section.

**Theme three.** Alia and her mother had fewer text-related interactions as they read the digital books than they did as they read the traditional books (theme four). During both the traditional and digital readings of *Green Eggs and Ham*, Alia wanted to be the reader. She read the traditional text first, and it was difficult for her. Her mother offered extensive text support including supplying words, talking about letters and sounds, pointing out rhyming patterns, and tracking print. Toward the end of the book, when the reading passages became longer, Alia began to tire. Rather than turning the reading entirely over to her mother, she negotiated the reading saying, “You read this page, and then I’ll read that page.”

When they read the book on the iPad, her mother’s text support diminished (see Appendices K). Alia and her mother discovered that the iPad would supply a word if you pushed on it. So, rather than offering support using a variety of strategies, Alia’s mother encouraged her to push on the words she didn’t know. When Alia came to a word she didn’t know, she didn’t attempt to sound it out or look for rhyming patterns, she quickly pushed the screen and moved on. She was able to read the entire book without tiring. Pushing on the word did not require as much mental energy as sounding out unknown words, which is what her mother asked her to do when she turned to her for support. During her interview, Alia’s mother provided insight into why Alia chose to use the iPad for reading support rather than her. She felt like Alia wanted to be in control of the reading. She didn’t need her mother to help her. Because of this, Alia seemed to gain a greater sense of confidence in her own reading abilities (Theme 10: Child’s power/control increases). She stated that Alia’s “confidence rose after that [reading] . . . [Since then] she has read some other books all by herself . . . and [is] feeling better about reading now.”

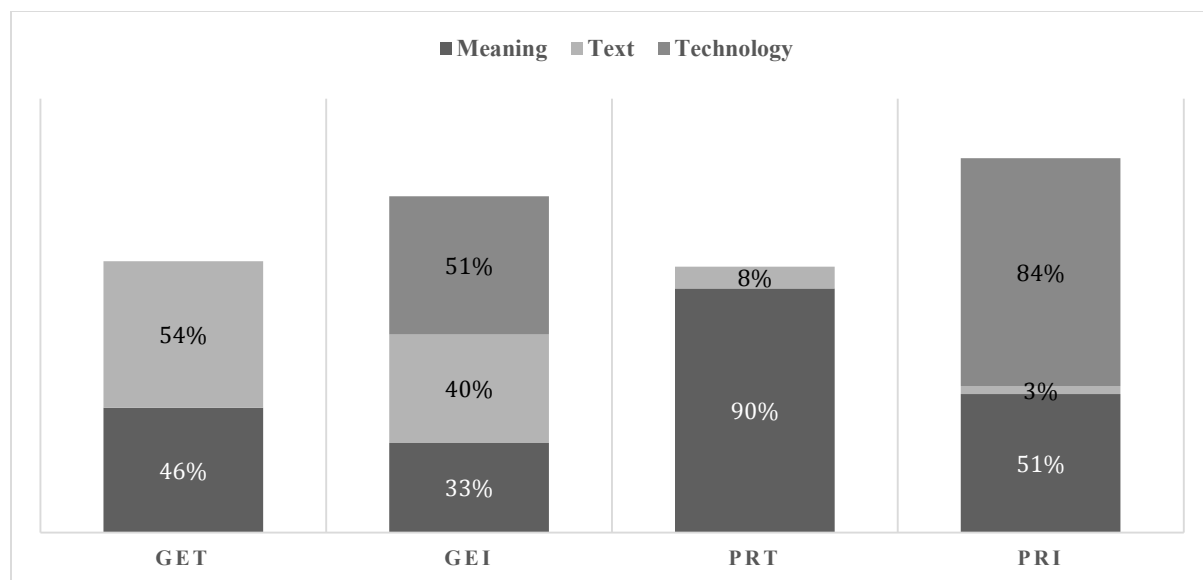
This same phenomena did not happen with *The Tale of Peter Rabbit*, which is above Alia’s reading level. Her mother read the traditional text and the iPad voice read the digital text.

During the digital reading, they did have fewer text-related interactions than they had during the traditional reading because, during the traditional reading, Alia's mother tracked print as she read. She did not do this when they were reading the digital book.

**Technology interactions.** As Alia and her mother read the books together, they had technology-related interactions. The within-case analysis found one theme related to technology. This technology-related theme is discussed in the following section.

**Theme four.** During the digital readings, most of the interactions between Alia and her mother were related to technology (theme four) as seen in Figure I5. Some of these interactions centered on the operational aspects of the iPad including accessing the stories and problem solving. Others were related to the specific digital text such as responding to audio or visual clues and discussing how to turn pages or click on words (see Appendix M). Both child and mother were involved in these interactions. Alia initiated more of these interactions than her mother during the *Green Eggs and Ham* reading, but her mother initiated more during *The Tale of Peter Rabbit* reading.

Though they were both involved in the verbal interactions about technology, Alia was much more involved in the nonverbal interactions as seen in Table I3. She pushed on the pictures over and over again, delighting in the interactive elements. She did this most often in *The Tale of Peter Rabbit* in which her touch did not label the pictures but, rather, caused them to move and make sounds (e.g., gate would open and make a creaking noise). Though her mother didn't push the screen often, she responded when Alia did, usually with a smile or a laugh (see Appendix O). Alia wanted her mother to interact with the digital text more often and encouraged her to do so on several occasions saying, "Mom, now you do it," and her mother complied.



PRT = *The Tale of Peter Rabbit* – Traditional Text

PRI = *The Tale of Peter Rabbit* - iPad text.

GET = *Green Eggs and Ham* – Traditional Text

GEI = *Green Eggs and Ham* - iPad Text

Total talk for each reading may be more than 100% because talk fall into more than one category.

*Figure I5.* Most of the words spoken during the digital readings were about technology.

Table I3

*Nonverbal Technology Interactions – Alia*

Nonverbal interaction	<i>Green Eggs and Ham</i>		<i>The Tale of Peter Rabbit</i>	
	Mother	Child	Mother	Child
Pushes icon/picture	3	149	22	403
Pushes word	25	41	6	11
Pushes to read page	0	0	0	0

**Affective climate.** The within-case analysis revealed four themes related to the affective climate of Alia and her mother’s book readings. Alia appeared to be more engaged with the digital storybooks than with the traditional storybooks. The opposite appeared to be true for her mother. The following sections discuss each the affective climate themes found in the case in detail.

**Theme five.** Alia’s mother’s total affective climate score decreased when they read the digital storybooks (theme five), as seen in Figure I6. She seemed to struggle with understanding her role in the digital readings. She sat further away from Alia as she watched her interact with the text. At times she tried to hurry her along by suggesting that it was time to turn the page or “quit playing.” When Alia finished reading the iPad version of *Green Eggs and Ham*, she wanted to read it again with the iPad doing the reading. Her mother said, “If you are going to do that, I think I’ll just take a nap.” She didn’t, but she withdrew even further from the reading experience. The difference in Alia’s mother’s affective climate scores during each reading can be seen in Figure I7.

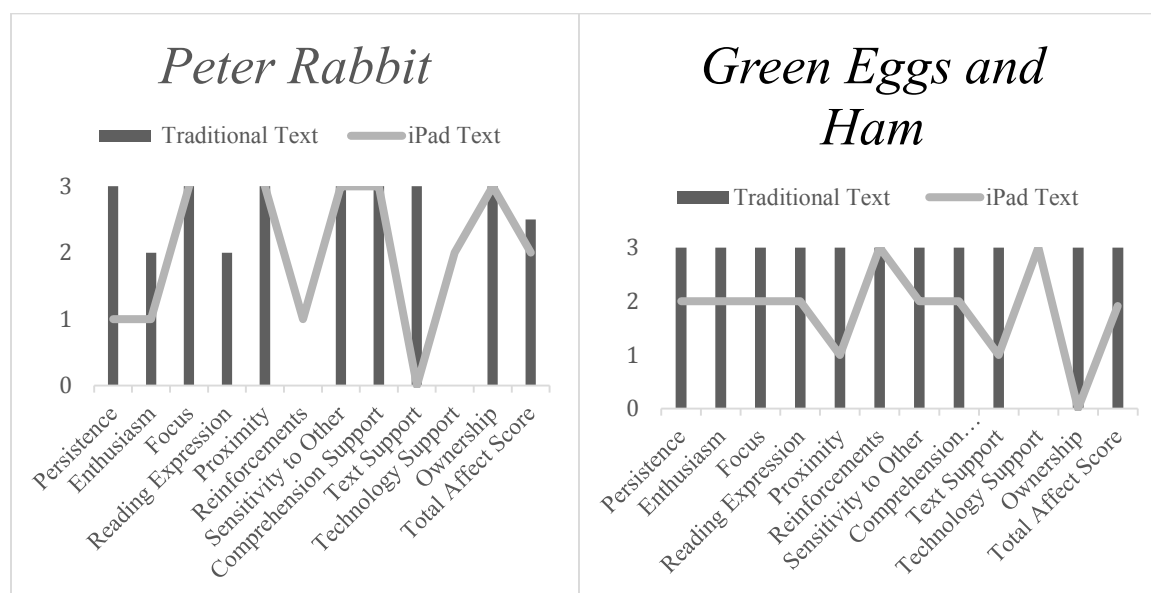


Figure I6. Mother’s affective climate scores decreased during the digital readings in Alia’s case.

During the post-reading interview, Alia’s mother expressed concern about the impact of technology on her children. She doesn’t see value in extended exposure to technology, which may have contributed to her lack of interest in the iPad readings of the texts. She explained, “[I feel] like there is a lot of wasted time on iPad and TV . . . I try to limit their time and I certainly limit what they are viewing to educational games or PBS.” Despite these concerns, her mother also reported that Alia watches TV or videos for about an hour-and-a-half each day and used an iPad regularly to watch shows and read books. Alia’s mother said, “I admit I let my kids get on the iPad more often than I believe I should.”



*Figure 17.* Illustrates the difference in mother’s affect in Alia’s case.

**Theme seven.** Alia’s engagement was greater when they read the digital books than when they read the traditional books. Alia showed pure delight as she and her mother read the stories together. She enjoyed both the traditional texts and the iPad texts. However, her delight was especially evident as she interacted with the interactive elements of the digital storybooks.



Her engagement scores increased because of her level of enthusiasm. For example, she imitated the iPad voices, laughed heartily when icons made sounds, and wanted her mother to share in her joy.

Another indicator of engagement is the time the dyad spent reading each book. Alia and her mother spent more time reading the digital texts than they spent reading the traditional texts. It took about 13 minutes to read the traditional version of *The Tale of Peter Rabbit*, but about 16.5 minutes to read the digital version. The time almost doubled for *Green Eggs and Ham* in which they spent 21 minutes with the traditional book and almost 40 minutes the iPad text.

**Theme eight.** Though Alia's engagement with the digital texts was high, her overall affective climate scores remained the same for both readings of *The Tale of Peter Rabbit* (2.71), and lowered for her digital reading of *Green Eggs and Ham* (GET – 2.88; GEI – 2.63). This is explained by her lower scores in the warmth category of the affective climate scores (see Table R1). She was not as compliant, sat further away from her mother, and answered fewer of her mother's questions lowering her sensitivity scores (Theme 8: Decrease in sensitivity; Theme 17: Questions answered decreases).

**Theme nine.** Alia had more ownership during the digital book readings than during the traditional readings (theme nine). Alia's mother appeared to distance herself from the iPad readings. She would laugh and smile at the visual and auditory elements of the text, offer occasional technological support, and respond to Alia's comments, but she did not engage with Alia in the same way she did when they read the traditional texts. She appeared to be more of a spectator than a participant. Though the interviews do not speak directly to the nature of the mother-child interactions, they offer additional insight into what happened during the readings. During her mother interview, Alia's mother explained why she thought the meaning talk

decreased. She said that “you can’t have those conversations about what she understands and doesn’t understand, and you can’t pause and talk about the pictures while, you know, you’re just . . . It’s almost like you’re watching TV again, just listening . . . It’s just slow-motion TV, where you just are staring at a picture while they’re reading.” She couldn’t see her role in the reading.

### Ian’s Case

Several themes were found to be highly manifested in this case, as seen in Table I4. The case manifested several of the themes about meaning and text well as the themes surrounding the affective climate. Noticeably absent are themes related to technology, though both the meaning- and text-related themes were influenced by technology.

Table I4

#### *Themes with High or Moderate Manifestations – Ian*

Category	Theme #	Theme Name	Text(s)	Dyad Member
Meaning	1 <sup>M</sup>	Increase in vocabulary	Both	Both
Meaning	2 <sup>m</sup>	Increase in mother-initiated meaning	<sup>b</sup> PRI	Mother
Text	3 <sup>m</sup>	Decrease in text interactions	<sup>a</sup> GEI	Mother
Affect	6 <sup>M</sup>	Increase in child affect	Both	Child
Affect	7 <sup>M</sup>	Increase in child engagement	Both	Child
Affect	8 <sup>m</sup>	Decreases in sensitivity	<sup>a</sup> GEI	Both
Affect	9 <sup>m</sup>	Increase in child ownership	Both	Child

Notes: <sup>a</sup>GEI = *Green Eggs and Ham* - iPad Text

<sup>b</sup>PRI - *The Tale of Peter Rabbit* - iPad text.

**Meaning interactions.** The within-case analysis revealed two meaning-related themes. One dealt with the number of vocabulary-related interactions and the other with the amount of meaning-related interactions initiated by Ian’s mother. Both themes, though meaning-related,

were tied to what was happening with the interactive elements of the digital books and are discussed in the following two sections.

**Theme one.** Ian and his mother engaged in more vocabulary-related interactions as they read the digital storybooks than they did as they read the traditional storybooks (see Appendix L; theme one). Though the increase was not great (two to five for Green Eggs and Ham and seven to thirteen for The Tale of Peter Rabbit), they both initiated more labeling and defining interactions during the digital readings. These interactions were usually a reaction to an interactive element of the digital text as seen in the following example of a defining interaction:

Ian: (reading) and don't get into m...

Ian: Pushes on the word *mischief*.

iPad: *Mischief*.

Mother: Oh, it said it for you. (Looks at child)

Ian: Mischief?

Mother: Mischief. It's like trouble.

**Theme two.** Ian's mother increased the amount of meaning-related talk when they read the digital version of The Tale of Peter Rabbit (theme two). During this reading, Ian did not appear interested in the storyline. He did not initiate as many meaning-related interactions (see Appendix L). He appeared to be so delighted with the sounds and movements of the icons that he played with them over and over again throughout the reading (549 times). His mother, concerned he wasn't listening to the story, either summarized the content or asked him to summarize what they just read. Based on some of his responses, it was evident that she had a right to be concerned as illustrated below:

Mother: What did I read?

Ian: (Pushes pots 8 times) He . . . Cool! (Pushes pots 3 times)

Mother: That is cool, but what did I read? (Looks at child)

Ian: You said um, um, um . . . He chased him.

Mother: So what did Peter do? (Points at Peter)

Ian: (Pushes pots 8 times) He jumped. (Looks at mom)

Mother: No . . . \_ (Pushes *sneezed*)

iPad: Sneezed.

Ian: Sneezed.

Mother: (Pushes *kerchoo*)

iPad: Kerchoo!

Mother: (Laughs) So then what happened?

Ian: Mr. Gregor chased him into . . .

Mother: Yep, so Mr. McGregor thought he was in here. (Pushes pot) He thought he was under the pots, so he's looking under each one. And then Peter sneezed, so then he knew where he was. Wanna go to the next one?

**Text interactions.** As Ian and his mother read the traditional and digital storybooks, they engaged in text-related interactions. The within-case analysis found one theme related to text as they read. This text-related theme is discussed in the following section.

**Theme three.** Ian and his mother had fewer text-related interactions when they were reading the digital version of Green Eggs and Ham than when they were reading the traditional book (see Appendix K; theme three). As they read the traditional version of Green Eggs and Ham, they spoke 196 words about text (26% of the total spoken words) in 45 interactions. For example, on three occasions, they stopped to talk about word patterns as illustrated below:

Ian: (Points to the first word in each sentence on the page) Now it says, “I, I, I, I, I, I, I, I, I.”

Mom: Then what? (Points to the second word in each sentence)

Ian: (Continues pointing at the words in each sentence noticing that they are repeated in each sentence on the page.) Do, do, do. Not, not, not, not. Like, like, like, like, like. Them, them, them, them, them.

Mom: And then those are almost all the same. Except that one, huh?

Ian: (Points to words) And these are . . .

Mom: Those are all different, huh? (Points to the words at the end of each sentence) But what do you notice about all these?

Ian: I don’t know.

Mom: Are they . . . similar? All the lines (pointing at each sentence) are similar, right?

These types of interactions did not occur as they read the iPad version of this story.

Though Ian did all of the reading, they only spoke 29 words (.04% of the total spoken words) in four interactions (see Appendix K). This may have been because the traditional reading came first and the iPad reading second. Ian may not have needed as much support the second time through. However, interactions such as the one illustrated above are not necessarily dependent on the need for support. Another explanation for this decrease in text talk is that Ian began to whisper as he read, possibly not wanting his mother to hear his reading. This may have discouraged his mother from initiating text interactions. Ian did not appear to want his mother involved in the reading.

**Affective climate.** The within-case analysis revealed four themes related to the affective climate of Ian and his mother’s book readings. One relates to Ian’s total affective climate score,

one to his engagement score, one to both his and his mother's sensitivity scores and one to Ian's ownership of the reading experiences. Each theme is discussed in detail in the following sections.

**Themes six and seven.** Ian's total affective climate score was higher for the digital readings than for the traditional readings (see Appendix N). The main reason that Ian's total affective score increased was because of the increase in his engagement score. Though Ian's warmth toward his mother decreased during the iPad reading, his engagement increased (see Appendix N). During the traditional reading, Ian became distracted at times. He wanted a drink, took off his shoes, and slid down on the couch. This did not happen during the iPad reading where he remained focused and engaged throughout (see Figure I8).



Figure I8. Illustrates the difference in the child's engagement in Ian's case.

**Theme eight.** When Ian and his mother were reading the digital *Green Eggs and Ham* book, there was a decrease in sensitivity for both of them (theme eight). Ian took the lead in all of the readings. He initiated text, meaning, and technology interactions. He liked being in control, which his mother allowed him to be until he began to be distracted from the story during the *Green Eggs and Ham* iPad reading. Ian attempted to shut his mother out of the reading experience by whispering the words so his mother couldn't hear what he was reading. He interacted with icons and sounds in the story but did not want his mother involved. This sense of independence influenced the affective climate of the *Green Eggs and Ham* iPad reading. Ian was less compliant and his sensitivity to his mother decreased as he ignored her requests for him to read so she could hear him. He answered fewer of her questions (see Appendix P). This, in turn, frustrated his mother and did not allow her to offer much text or comprehension support, which lowered her total affective climate score.

These challenges did not occur in the same way during *The Tale of Peter Rabbit* readings. The affective climate scores for Ian's mother decreased for the traditional rather than the digital reading. The affective climate for the traditional reading of *The Tale of Peter Rabbit* was negatively influenced by three things: (a) the order of the readings, (b) a power struggle, and (c) mother's desire to have Ian do the reading.

Ian and his mother read the iPad version first, and Ian was enamored with the interactive elements of the story. When they read the traditional version, Ian pushed on the pictures on the page and imitated the noises they made on the iPad. He continued doing this even when his mother asked him to stop. It developed into a power struggle. Though his mother never lost her temper, she did ask him to stop being silly. When he refused, she made him do jumping jacks to "get the sillies out." This approach backfired and Ian became more out of control as he did his

jumping jacks. It took Ian several minutes to settle back down to reading. In the post-reading interview, Ian's mother indicated that she often has Ian do physical activity at home when he becomes "silly and wild." She said that usually he just needs to get some energy out or "kind of calm down again . . . We make him run laps through the house sometimes. We get creative with him."

Though Ian is a good reader, *The Tale of Peter Rabbit* was still a difficult text for him to read. During the iPad reading, he didn't mind doing most of the reading. He used the iPad and his mother for support when he didn't know a word; he would push on the word to have the iPad supply it or his mother would supply it. But during the traditional reading, he grew tired easily. He wanted his mother to do more of the reading, but she pushed him to continue, which negatively influenced the affective climate by lowering the mother's sensitivity and warmth scores (see Appendix N).

**Theme nine.** Though he had control in all of the readings, Ian had more ownership of the book-reading experience when they were reading the digital book than he had when they read the traditional book (theme nine). Ian physically interacted with the technological elements of the digital book more than his mother. During the iPad reading of *The Tale of Peter Rabbit*, Ian pushed on pictures and words a total of 551 times compared to his mother's 8 times. During the digital reading of *Green Eggs and Ham*, Ian interacted with technology 120 times while his mother interacted with it on only 4 occasions. They did have some meaningful joint interactions about the functional aspects of the iPad texts as illustrated below (see Appendix M):

Ian: (Trying to access the story) I want to push.

Mother: K, can you find which one it is?

Ian: (Swipes the *Green Eggs and Ham* icon) Oh. (Pushes on Green Eggs and Ham icon)



Mother: Good job.

Ian: (reads) OMBook.

iPad: *Green Eggs and Ham, by Dr. Seuss.*

Mother: (Looks at child) It's talking to us! Ok.

Ian: (reads) Read to me. (Pushes Read to me)

Mother: (Pushes Read it myself)

iPad: *Read to me. Read it myself.*

Mother: Let's read it, k?

Ian: (Pushes Auto play)

iPad: *Auto play.*

Ian: What's auto play?

Mother: I don't know.

Ian: I want to try it.

Mother: No, let's . . . maybe after. Why don't we go ahead and read it, ok?

Ian: (Pushes Read Myself)

At the end of the reading, Ian went back to discover how auto play functions. It didn't take him long to figure it out.

### **Juan's Case**

For three of the readings (GEI, PRT, PRI), Juan and his mother's interactions were minimal, but, during the *Green Eggs and Ham* traditional reading, their meaning and text interactions were high. Before entering this reading, Juan's mother told him that they were being video-taped and would receive a gift-card to spend at the toy store if he behaved, which he did. During her mother interview she said, "So, maybe that was a mistake, right? But, he was very

adamant to get money.” Because of this, it is difficult to determine if Juan and his mother would have interacted in the same ways had he not been motivated to earn the gift card. Because of this, the within-case analysis focused only on *The Tale of Peter Rabbit* readings. Consequently, the themes were only evaluated as being moderately manifest in this case. In order to be considered highly manifest, a theme had to be present with both storybooks (*Green Eggs and Ham* and *The Tale of Peter Rabbit*).

The within-case analysis found five themes present in the two readings of *The Tale of Peter Rabbit* as seen in Table I5. One theme was meaning-related, one technology-related, and two were related to the affective climate of the book readings. It is interesting to note that there were no themes related to text interactions for this case.

**Meaning interactions.** As Juan and his mother read the books, both digital and traditional, they engaged in meaning-related interactions. The within-case analysis found one theme related to meaning as they read. This meaning-related theme is discussed in the following section.

Table I5

*Themes with Moderate Manifestations – Juan*

Category	Theme #	Theme Name	Text(s)	Dyad Member
Meaning	1 <sup>m</sup>	Increase in vocabulary	PRI <sup>b</sup>	Mother
Meaning	2 <sup>m</sup>	Increase in mother-initiated meaning	PRI <sup>b</sup>	Mother
Technology	3 <sup>m</sup>	Interactions about technology	PRI <sup>b</sup>	Child
Affect	6 <sup>m</sup>	Increase in child’s affect	PRI <sup>b</sup>	Child
Affect	7 <sup>m</sup>	Increase in child’s engagement	PRI <sup>b</sup>	Child

Notes: <sup>b</sup>PRI - *The Tale of Peter Rabbit* - iPad text. *Green Eggs and Ham* readings were not reliable so themes are not included for this text.

**Theme one.** During the digital book reading, Juan and his mother engaged in more meaning-related talk than they did during the traditional book reading. The increase came in the area of vocabulary-related talk as they labeled and defined words, pictures, and the interactive elements of the icons (see Appendix L). Six out of the seven verbal vocabulary interactions were initiated by Juan's mother, as illustrated below, as they read about Peter being caught in a gooseberry net:

Juan: (Pushes pop-up button seven times, which results in tears falling from Peter's eyes and an audio crying sound)

Mother: Is he crying?

Juan: Yeah.

Mom: Oh, no.

Juan: (Pushes the pop-up button two more times)

Juan's mother engaged in a labeling activity as she identified that Peter was crying. Though Juan responded to her, his answer was short, which was typical of all of his meaning-related responses during this reading.

**Technology interactions.** As Juan and his mother read the books together, they had technology-related interactions. The within-case analysis found one theme related to technology. This technology-related theme is discussed in the following section.

**Theme three.** When Juan and his mother were reading the digital storybook, the majority of their interactions were about technology (theme three). During the iPad reading of *The Tale of Peter Rabbit*, Juan physically interacted with the technological elements at total of 326 times as he repeatedly pushed on the pictures and pop-up elements of the digital text. He also pushed on the printed words to have the iPad voice read them. In contrast, his mother did not physically

interact with the technological elements of the story other than to help Juan with accessing the story and operational problem solving (see Appendix M).

Juan did not talk much about text or meaning but he did talk about technology. Sixty-two percent of his words were technology related as illustrated in the example below where Juan is pushing on the rabbits as they eat their dinner:

Juan: (Pushes pop-up button 12 times) Look how fast it goes. (Smiles) (Pushes pop-up button 7 times) Look how fast they're doing. (Pushes pop-up button 8 times)

Mom: They're fast eaters, eh? (Looks at child)

Juan: (Pushes pop-up button twice)

Juan's mother did not often respond to Juan's comments about the interactive elements of the digital story. During her post-reading interview, she shared concern about her children's use of technological devices. She said that her children "just want to click somewhere else and see what happened and go to the next thing. Even if they didn't finish, they just jump to somewhere else. I think the electronics are so dangerous for the children . . . You know how their brains are – they just change . . . They get mad at you because they have to finish the game, and they don't understand that it's been half an hour." She stated that she feels better about Juan reading digital books than she does about games, but she would not choose to sit down with Juan and read a book together on the iPad. Rather, she believes that Juan prefers "to have the lady read to him on the iPad than mama." Juan's mother appeared unsure of her role during the iPad readings. When Juan chose the *Read to Me* option (against her will) for the digital reading of *The Tale of Peter Rabbit*, she did not know what to do. At first, she tried to turn down the volume, which upset Juan as it did in the *Green Eggs and Ham* reading. Next, she tried to read along with the iPad voice but found that difficult. She said, "Oh, this is going too fast for me." She stopped for

a couple of pages and then tried to do it again, this time reading with a louder voice to cover up the iPad voice. Eventually, she stopped trying to read altogether (Theme 9: Mother uncomfortable as mentor).

**Affective climate.** Juan and his mother appeared to engage in a power struggle during all of the readings. This struggle did not allow for many other types of interactions to occur. For instance, during the traditional reading of *The Tale of Peter Rabbit*, Juan and his mother spoke a total of 373 words to each other but only 42 of these words were about the story or text. The rest were about behavior and control.

There were several instances in which it was evident that Juan has a strong and sometimes defiant personality and that his mother was unsure how to guide him. This struggle is illustrated in the following example as they negotiate the reading of the digital version of *The Tale of Peter Rabbit*:

Juan: (Pushes screen twice to access the story)

Mother: No, honey, don't. If you do that, it . . . Remember? The icons on the separate screen. You have to . . . (Pushes screen)

Juan: (Pushes his mother's hand away and pushes the screen) If I pressed it too many times. That's what happens. Cool. Right?

Mother: Yeah. Ok. (Pushes the screen to select the text.)

Juan: Hey, I was going to tap it! Hey. (Pushes the *Read to Me* option).

Mother: Actually, I want to read the book to you. (Pushes the *Read to Myself* option)

Juan: (Pushes the *Read to Me* option)

Mother: All right.

Juan: (Laughs) Wait.

Mother: Where do we start?

Juan: (Pushes the button to turn the volume up)

Mother: Where do we . . . (Tries to turn down the volume)

Juan: (Pushes her hand away) No. (Looks at mom. Smiles) It's going to read us.

iPad: *The Tale of Peter Rabbit*

Because these power struggles were not limited to the iPad readings, the technology did not seem to be the source of the conflict. Rather, Juan and his mother struggled regardless of the text type. For example, Figure I9 is a picture taken during the traditional reading of *The Tale of Peter Rabbit* where Juan's unhappiness is easily seen on his face, as is his mother's struggle to stay a part of the reading experience. Juan did not want his mother to be a part of the reading experience so he kept moving around on the couch to avoid sitting by her. He finally settled and allowed his mother to sit on the edge of the couch while he stretched back. This reading was so difficult that during this session, Juan and his mother only smiled a total of 4 times compared to the 20 times they smiled during the iPad reading. Despite these challenges, two themes related to the affect climate did emerge.

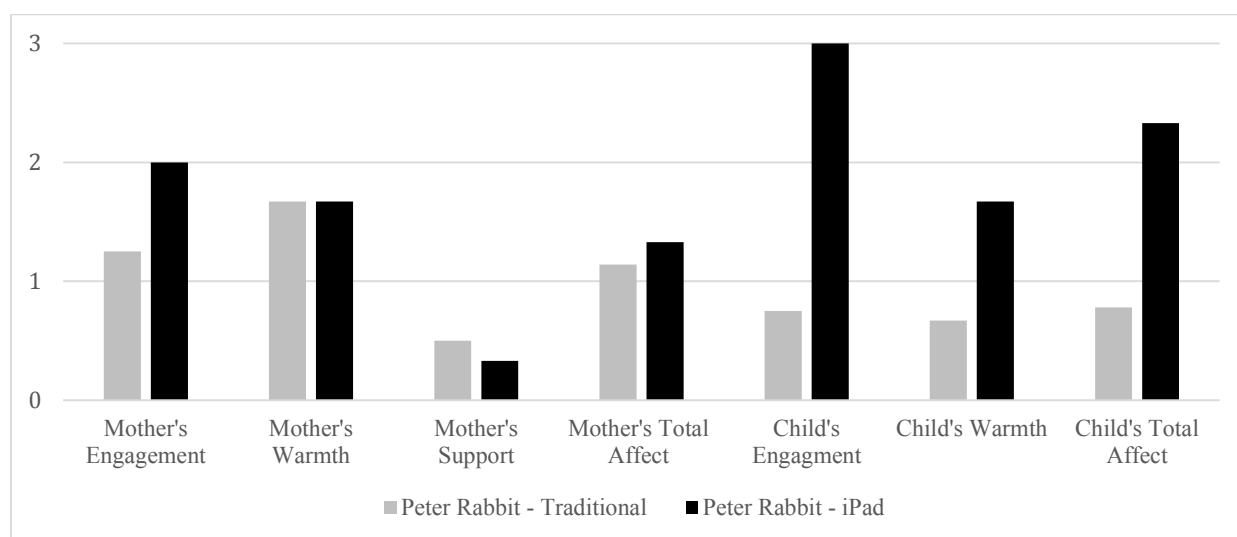
**Theme six.** When Juan and his mother were reading the digital story, Juan's affective climate score was higher than it was during the traditional book reading (theme six). During the traditional book reading, Juan's total affective climate score was .78, but during the traditional reading, it was 2.33 (see Appendix N).

**Theme seven.** One of the reasons for Juan's increased affective climate score was his increased engagement with the digital story (theme seven). During the traditional reading, his engagement score was .75, but during the digital reading, it was 3.0 (the highest possible). This increase was due to the delight he exhibited while playing with the interactive elements of the

digital book. His mother's engagement also increased, but not to the level of Juan's as seen in Figure I10.



*Figure I9.* Illustrates the affective climate during a reading in Juan's case.



*Figure I10.* Mother-child affective climate scores for three readings in Juan's case.

## Selina's Case

The nature of the verbal and nonverbal interactions is represented in several of the study themes as seen in Table I6. Theme one represents the nature of the meaning interactions as the digital and traditional text readings were compared. Theme three represent the text-related interactions and theme four the technology-related interactions. The affect climate is represented by themes five and nine.

Table I6

### *Themes with High or Moderate Manifestations – Selina*

Category	Theme #	Theme Name	Text(s)	Dyad Member
Meaning	1 <sup>m</sup>	Increase in vocabulary	GEI	Child
Text	3 <sup>M</sup>	Decrease in text interaction	Both	Both
Technology	4 <sup>M</sup>	Interactions about technology	Both	Both
Affect	5 <sup>M</sup>	Decrease in mother affect	Both	Mother
Affect	9 <sup>M</sup>	Increase in child ownership	Both	Child

*Notes:* <sup>a</sup>GEI = *Green Eggs and Ham* - iPad Text

<sup>b</sup>PRI = *The Tale of Peter Rabbit* - iPad text.

M = high manifestations

m = interesting moderate manifestations

**Meaning interactions.** As Selina and her mother read the books, both digital and traditional, they engaged in meaning-related interactions. The within-case analysis found one theme related to meaning as they read. This meaning-related theme is discussed in the following section.

**Theme one.** During the digital reading of *Green Eggs and Ham*, Selina and her mother engaged in more vocabulary-related interactions than they did during the traditional reading



(theme one). The number of meaning interactions in the *Green Eggs and Ham* text did not change much from the traditional reading (24 interactions) to the digital reading (19 interactions), but the nature of these interactions, who initiated them, and the length of these interactions did change (see Appendix L). During the traditional reading, the majority of the meaning interactions involved inference making. Only six of the interactions involved vocabulary activities. Seventeen of the 24 interactions were initiated by Selina's mother, as illustrated in the following example:

Mother: That's a crazy train track they're on, huh?

Selina: Yeah. How does it hold up? (Points at picture)

Mother: It's just tied.

In contrast, during the digital reading of *Green Eggs and Ham*, most of the meaning-related interactions were about vocabulary (13) rather than inference-making (2), and most were initiated by Selina rather than her mother as illustrated below:

Selina: (Pushes on a picture of a cliff twice)

iPad: *Cliff. Cliff.*

Selina: Ok. That's a cliff. (Pushes a picture of a tree twice)

iPad: *Tree. Tree.*

Selina: And that's a tree. (Smiles)

**Text interactions.** As Selina and her mother read the traditional and digital storybooks, they engaged in text-related interactions. The within-case analysis found one theme related to text as they read. This text-related theme is discussed in the following section.

**Theme three.** When Selina and her mother read the digital storybooks, they engaged in less text-related interactions than they did when they read the traditional books (theme three).

During the *Green Eggs and Ham* readings, the number of text interactions dropped from 21 (traditional reading) to 5 (digital reading). The decrease in text interactions during the digital reading happened for two reasons: (a) the iPad voice did more of the reading than either Selina or her mother, and (b) Selina used the text support options built into the digital text when she needed help. During the traditional reading, Selina and her mother took turns reading the text. Selina read a total of 554 words and her mother read 319 words. During the digital reading, Selina read just 63 words and her mother 142 words (Theme 14: Dyad reads less). The rest of the words (468) were read by the *Read to Me* option available on each page. When Selina did read and needed support, she pushed on an individual word, which caused the iPad voice to supply the word. She did this 20 times during the reading as her mother watched.

The amount of text support offered by Selina's mother also decreased when they read the digital version of *The Tale of Peter Rabbit*. During the traditional reading, in which Selina and her mother shared the reading responsibilities, Selina's mother provided reading support to Selina a total of 71 times compared to 0 times during the digital reading. This low number was due to the fact that Selina chose the *Read to Me* option at the beginning of the story and did not attempt to read any of the words on her own. Rather, Selina and her mother listened as the text was read to them.

**Technology interactions.** As Selina and her mother read the books together, they had technology-related interactions. The within-case analysis found one theme related to technology. This technology-related theme is discussed in the following section.

**Theme four.** As Selina and her mother read the digital versions of both storybooks, they engaged in more interactions related to technology than those related to meaning or text, as seen in Figure I11. The nature of these verbal interactions was both operational and functional. They

interacted as they accessed the story and problem-solved computer glitches. They also interacted as they selected the reading options, responded to audio and visual clues and encouraged each other to push on the interactive elements of the texts. The following is an example of a functional interaction the dyad had about a technological element of the text:

Mother: (Responding to the iPad reading voice) I like her accent.

Selina: (Smiles)

iPad: *They lived with their mother in a sandbank underneath the root of a very big fir tree.*

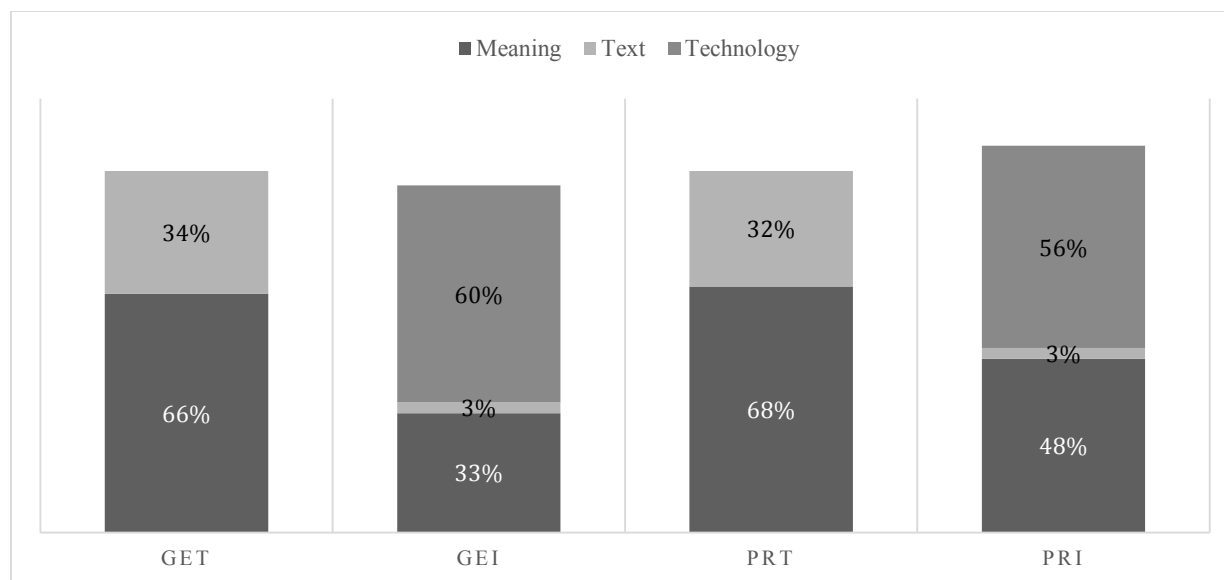
Mother: You know why I like her voice?

Selina: Why?

Mother: Because it kind of sounds like the woman who . . . Beatrix Potter.

Though both Selina and her mother initiated verbal dialogue about the technology, Selina physically interacted with the technology much more than her mother. During the *Green Eggs and Ham* reading, Selina pushed icons and words a total of 305 times, but her mother never physically interacted with the technology in these ways. During the iPad reading of *The Tale of Peter Rabbit*, Selina pushed icons and words 289 times compared to her mother's 39 times.

**Affective climate.** The within-case analysis revealed two themes related to the affective climate of Selina and her mother's book readings. One relates to Selina's mother's total affective climate score and one to Selina's ownership of the reading experiences. Each theme is discussed in detail in the following sections.



PRT = *The Tale of Peter Rabbit* – Traditional Text

PRI = *The Tale of Peter Rabbit* - iPad text.

GET = *Green Eggs and Ham* – Traditional Text

GEI = *Green Eggs and Ham* - iPad Text

Total talk for each reading may be more than 100% because talk can fall into more than one category.

*Figure III.* Decrease in meaning-related talk during digital readings for Selina’s case.

**Theme five.** Selina’s mother’s total affective climate score was lower as they read the digital books compared to the traditional books as seen in Figure 12 (theme five) (see Appendix N for more detail). The lower total scores were the result of lower engagement and warmth scores. Though Selina’s mother expressed concerns about her children’s use of technology, she appeared consistently comfortable with the digital texts as evidenced by her higher than average total affective climate scores, as illustrated in Figure I11. She was the only mother in the study to have all her total affective climate scores above 2.0. She was content to allow Selina freedom to explore the technological elements as much as she wished. She didn’t try to hurry her along or control the reading experience. Despite this, her overall affective scores dropped some as they read the digital texts together, as seen in Figure I11. For the *Green Eggs and Ham* readings, her score fell from 2.89 for the traditional reading to 2.38 for the digital reading. For *The Tale of Peter Rabbit* readings, her score decreased from 3.0 for the traditional reading to 2.22 for the

digital reading. Though all four scores are high, there was a difference in the readings. The drop in affective climate scores was caused by a decrease in her overall warmth (due to a decrease in reinforce and sensitivity scores) and engagement scores (due to a decrease in enthusiasm scores) (see Appendix N).

The warmth score was affected by the amount of positive reinforcement given to Selina by her mother during the readings. For example, when they read the traditional version of *Green Eggs and Ham*, Selina's mother offered positive reinforcement to Selina a total of nine times including exchanges like the following:

Mother: Holy cow. (Looks at child)

Selina: What? (Looks at mom)

Mother: You read that whole page.

Selina: Wait, I read 22 pages almost? (Points at page numbers) (Looks at mom)

Mother: (Looks at child) Yeah!

Selina: Ohhh.

Mother: You're amazing.

As they read the digital version of *Green Eggs and Ham*, positive reinforcements happened four times, but these were not as rich and were not about Selina's reading abilities. All of them consisted of Selina's mother saying, "Good job," as Selina correctly interacted with technology in some way as illustrated below:

Selina: I wanna see if it says *house*. (Pushes on the picture of a house)

iPad: *House*.

Mother: Good job.

**Theme nine.** Selina had more ownership of the reading experience with the digital books than she did with the traditional books (theme nine). Because Selina relied on the technological elements of the digital texts to provide the reading and reading support she needed, her mother was not as involved in the reading experience as she was during the traditional readings. Selina's mother was not bothered by this fact, but she did disengage somewhat from the experience by pulling back and watching as Selina navigated the texts. During the mother interview, she confirmed this when she said, that she "just wanted to sit back and let Selina enjoy the book."

### **Tyler's Case**

The four book readings illustrated the difficult relationship that exists between Tyler and his mother. This relationship influenced the nature of the meaning, text, and the technology interactions in important ways. None of the four readings were shared experiences. Tyler wanted to be in control of what occurred, which his mother allowed him to do. She seemed hesitant to become a part of the experience or make suggestions because it seemed to upset Tyler. During two of the readings, she attempted to be an active participant, but this usually resulted in her being ignored by Tyler. He only responded to between 30% and 40% of her questions during any of the readings.

As was found in Juan's case, the negative nature of the mother/child relationship did not allow for many of the types of interactions seen in the other cases. However, several themes did emerge as illustrated in Table I7 illustrates the themes that were evident in this case. Noticeably absent are any themes related the text. This dyad did not have many interactions during any reading about text. The following sections describe the themes in detail.

Table I7

*Themes with High and Moderate Manifestations – Tyler*

Category	Theme #	Theme Name	Text(s)	Dyad Member
Meaning	1 <sup>m</sup>	Increase in vocabulary	<sup>a</sup> GEI	Child
Technology	3 <sup>M</sup>	Interactions about Technology	Both	Both
Affect	6 <sup>M</sup>	Increase in child affect	Both	Child
	7 <sup>M</sup>	Increase in child engagement	Both	Child

**Meaning interactions.** As Tyler and his mother read the books, both digital and traditional, they engaged in meaning-related interactions. The within-case analysis found one theme related to meaning as they read. This meaning-related theme is discussed in the following section.

**Theme one.** When Tyler and his mother read the digital version of Green Eggs and Ham, they engaged in more vocabulary-related interactions than when they read the traditional version (theme one). The number of vocabulary-related interactions increased because Tyler pushed on the interactive pictures in the digital storybooks. When he did this, the iPad would audibly say the name of the object (label it), and have the written word pop up in big letters on the screen. The following is an example of this type of interaction. Tyler wonders why the storybook app does not audibly label things as he thinks it should:

Tyler: (Pushes on the picture of a chimney which is attached to a house)

iPad: House (audibly and visually)

Tyler: (Smiles) Why doesn't it say chimney (Pushes on the chimney again)

iPad: House.

Mother: Why does it what?

Tyler: (Pushes on a picture of a bush)

iPad: Bush.

Tyler: Why. . . (Pushes on a picture of grass)

iPad: Grass.

Tyler: (Pushes on the chimney again)

iPad: House.

Tyler: Why isn't it saying chimney?

Mother: Oh, because it's so small. (Points at house) If it's bigger then it will say the parts  
of the house, but when it's so small it just says...

Tyler: (Turns one page back where the picture of the house is larger) (Pushes on the  
chimney)

iPad: Chimney.

Tyler: I knew it was a chimney

The nature of the vocabulary interactions was dependent on the quality of the affective climate as seen in Table I8. The more positive the affective climate, the more the dyad participated in vocabulary-making activities. It is interesting to note that the affective climate score also influenced who initiated the interactions. During the digital reading of *Green Eggs and Ham*, when the affective climate score was highest for both Tyler and his mother (see Appendix N), Tyler initiated most of the vocabulary interactions. During the other readings, when both of their affective climate scores were low, Tyler's mother usually initiated these interactions.



Table I8

*Meaning Interactions in Relation to Affective Climate Score – Tyler*

Text	Averaged (mother and child) total affective climate score	Number of vocabulary interactions	Who initiated the interactions
GET <sup>a</sup>	1.57	9	4 – Mother
GEI <sup>b</sup>	2.30	14	10 – Tyler
PRT <sup>c</sup>	1.55	5	5 – Mother
PRId	1.40	2	2 – Mother

Notes: Order = Averaged scores are out of 3.0

a = *Green Eggs and Ham* - Traditional Text

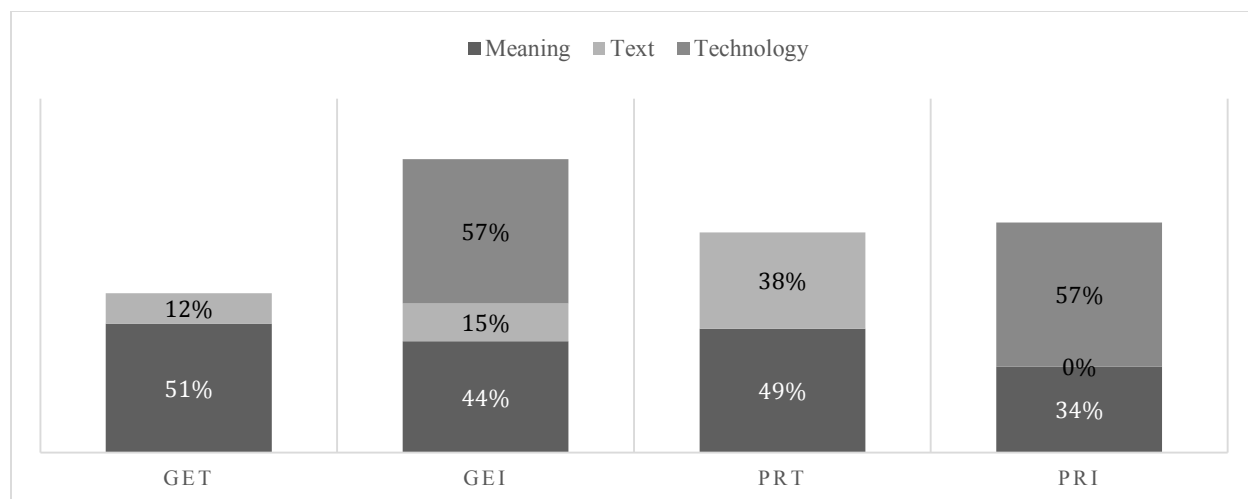
b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

**Technology interactions.** As Tyler and his mother read the books together, they had technology-related interactions. The within-case analysis found one theme related to technology. This technology-related theme is discussed in the following section.

**Theme three.** Most of the interactions that Tyler and his mother had during the digital book readings were about technology (theme three) as illustrated in Figure I12. Tyler physically interacted with the technology far more than his mother. During the iPad reading of *Green Eggs and Ham*, Tyler pushed pictures and words a total of 328 times compared to his mother's fifteen. During the digital *Tale of Peter Rabbit* reading, Tyler physically interacted with the technological elements 286 times and his mother only eight times. Not only did Tyler physically interact with the technology more than his mother, at times he mentored her through his actions. His mother was not uncomfortable in her role, but during her interview she indicated that Tyler taught her a few things such as double clicking to hear the iPad voice read the text.



PRT = *The Tale of Peter Rabbit* – Traditional Text

PRI = *The Tale of Peter Rabbit* - iPad text.

GET = *Green Eggs and Ham* – Traditional Text

GEI = *Green Eggs and Ham* - iPad Text

Total talk for each reading may be more than 100% because talk can fall into more than one category.

*Figure I12.* Most of the talk during digital readings is about technology for Tyler’s.

Though Tyler’s mother didn’t appear to be bothered by Tyler’s demeanor and/or actions during any of the readings, she didn’t see the value in sitting down with Tyler to read a book on a digital device in the future. During her interview, she indicated that she would likely not sit down with Tyler to read a digital book in the future because, “I just don’t see the need to do it. I’m trying so hard to get him away from technology. You know, I want him to play outside or read a book . . . He could spend all day on that I think.” It is interesting to note that, though Tyler’s mother expressed concern about the amount of time Tyler spends with technological devices, her other comments as well as her survey data indicate that he is still allowed to spend several hours a week playing on them.

**Affective climate.** The within-case analysis revealed two themes related to the affective climate of Tyler and his mother’s book readings. One relates to Tyler’s total affective climate score and one his engagements during the reading experiences. Each theme is discussed in detail in the following sections.

**Theme six.** Tyler's affective climate score was higher for the digital readings than for the traditional readings (theme six). Though this was true, the increase was only .17 for *The Tale of Peter Rabbit* readings and .43 for *Green Eggs and Ham* as seen in Table I9. The reason the increase was not larger was because Tyler lacked warmth during the all of the readings. His lower warmth scores decreased the total affective climate score. For example, Tyler had a low affective climate score for digital reading of *The Tale of Peter Rabbit*. This reading, which occurred before the traditional reading, was almost a solitary activity for Tyler. He and his mother did not sit close to each other. Tyler held the iPad on his lap and was in complete control of the reading experience. At the beginning of the reading, his mother offered some technology support as she showed him how to select the *Read to Me* option and how to work the interactive icons. Tyler accepted this help but, aside from these beginning interactions, she did not touch the iPad. About halfway through the reading, she attempted to interact with an icon but Tyler pushed her hand away and she didn't try again. Another time, Tyler's mother tried to wipe his nose with a tissue. He responded by saying, "Don't, I hate you," and threw the tissue on the floor. These types of exchanges along with the low number of interactions between mother and child resulted in low warmth scores for this reading as seen in Table I9.

The nature of the affective climate interactions changed somewhat during the traditional reading of *The Tale of Peter Rabbit*. Tyler's total affective climate score was lower than it was during the digital reading. Tyler's lower score was the result of a variety of factors including low engagement and warmth scores. He wanted to be the reader, but the text was much too difficult for him. Despite this difficulty, he did not want his mother to do the reading. To solve this problem, he imitated the interactive nature of the iPad by pushing on almost every word so his mother could supply it as if she were the iPad voice. About halfway through the story, Tyler

began using hand signals to indicate to his mother what he wanted her to do. For instance, if he tapped once, she was to supply the word; if he tapped twice she was to read the entire passage. If his mother didn't understand his hand signals, he would say "No" and insist she do it until she got it right. At one point Tyler pounded the page when his mother misinterpreted his signals. His mother responded calmly and tried to interpret what he wanted her to do until she got it right. During another exchange, Tyler pushed once on the word *Mrs.* and his mother supplied the word. Tyler responded by adamantly insisting that the word was not *Mrs.* but *Miss* because *Mrs.* should have two *s*'s and this word only had one. Rather than correcting him, Mom agreed that the word was *Miss* and then read it as such for the rest of the story. It appeared that Tyler's mother was agreeing with all of Tyler's requests in order to minimize the possibility of upsetting him.

Table I9

*Mother/Child Composite Affective Climate Scores and Ownership – Tyler*

Text	Order	Engagement		Warmth		Support		Total Score	
		Mom	Child	Mom	Child	Mom	Child	Mom	Child
GET <sup>a</sup>	3	1.75	2.00	1.67	1	1.00	n/a	1.56	1.57
GEI <sup>b</sup>	2	2.75	2.25	2.33	1.67	2.67	n/a	2.6	2.00
PRT <sup>c</sup>	4	2.11	1.33	1.67	0.67	3.0	n/a	2.11	1.0
PRI <sup>d</sup>	1	2.00	2.00	.67	.33	1.33	n/a	1.33	1.17

Notes: Order = order in which the readings occurred, scores are out of 3.0

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

Tyler's affective climate scores were highest for the digital reading of *Green Eggs and Ham* as seen in Table I8. Tyler was in a good mood and did not get as easily upset by his mother's desire to be involved in the story. He was still in control of the reading experience. He held the iPad and did all of the reading, but he allowed his mother to offer support when he needed it. Near the end of the story, as Tyler tired, he told his mother to, "Stop it," when she offered some technology support. At one point, Tyler's mother tried to hold his hands back when he continually pushed on an icon. Tyler responds by grabbing his mother's hands and pushing them away. His mother never reacted negatively to any of Tyler's verbal or nonverbal interactions. She was content to let him do what he wanted to do. During her interview she explained her passive responses to Tyler's behavior. She stated the following:

And all of my kids are so, "Let me do it by myself," . . . with my first one it was so hard because I had these visions of "I'm going to teach you all these things," and he could care less . . . The last thing he wants to do is learn anything from his mother. And so me, learning over the years that it really doesn't matter what you're doing. If you have that book in front of you and you're together, you're reading. So, really trying to keep a balance of moving things along being engaged but not being overbearing.

The affective climate scores for the traditional reading of *Green Eggs and Ham* were not as high as for the iPad reading as seen in Table 15. From the beginning, Tyler did not want his mother to be a part of the reading experience. He read silently and held the book so his mother had a difficult time seeing. On two occasions, Tyler's mother suggested that he read the book aloud so she could hear. Both times Tyler ignored her request. She then tried to point at a word and ask Tyler what the word said. During her interview, she said that she did this to see if Tyler

was “really reading the book or just pretending to get it over with.” Tyler ignored these requests, as well. These types of interactions lowered Tyler’s compliance scores and thus his warmth scores as seen in Table 15.

About halfway through the traditional reading of *Green Eggs and Ham*, Tyler’s mother suggested he treat the traditional book like the iPad version and push on words he didn’t know and she would supply them. Tyler liked this idea and they did this for a couple of pages. Then he started pushing on the pictures and wanted his mom to audibly label them. They did this, but Tyler questioned the labels his mother gave for the pictures. For example, when he touched the picture of a house, his mother responded, “House.” Tyler said, “No, that’s a window!” His mother would agree and they would move on. They seemed to both enjoy this activity as they laughed a bit together. Near the end of the story, Tyler’s mother attempted to reverse their roles. She pushed on a word and asked Tyler to say it. He responded, “No, when you push a word I will not say it but when I push a word, you have to say it.” She complies. These types of interactions lowered Tyler’s sensitivity scores as seen in Table 15.

**Theme seven.** When Tyler was reading the digital version of both storybooks, his engagement scores were higher than when he was reading the traditional versions (theme seven). Engagement scores were based on the sub-categories of enthusiasm, persistence, focus, and when appropriate, reading expression. Though Tyler’s enthusiasm was never high during any reading, his persistence and focus increased during the digital readings (see Appendix N). For example, he spent almost ten more minutes reading the digital version of *Green Eggs and Ham* than he spent reading the traditional version. He spent three and a half more minutes reading *The Tale of Peter Rabbit* on the iPad than he spent with the storybook.

## Appendix J: Text Interactions

### Chantel's Case

Table J1

#### *Text – Concepts of Print Interactions – Chantel*

Text	Tracking		Pointing at print		Identifying Book Parts		Concepts of Print Totals		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	1	0	0	2	0	0	1	2	3
GEI <sup>b</sup>	0	1	4	0	n/a	n/a	4	1	5
PRT <sup>c</sup>	0	0	1	0	2	0	3	0	3
PRI <sup>d</sup>	1	0	1	0	n/a	n/a	2	0	2

*Notes:* Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table J2

*Text – Phonemic and Phonological Awareness Interactions – Chantel*

Text	<u>Identifying Letter Sounds</u>		<u>Sounding Out</u>		<u>Chanting and Rhyming</u>		<u>Repeating Alliteration</u>		<u>Completing Predictable Text</u>		<u>Phonemic Totals</u>		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	0	0	0	0	0	0	0	0	0	1	0	1	1
GEI <sup>b</sup>	0	0	0	0	2	0	0	0	0	0	2	0	2
PRT <sup>c</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0
PRI <sup>d</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table J3

*Text – Alphabetic Knowledge Interactions – Chantel*

Text	<u>Pointing to Letters</u>		<u>Identifying Letters</u>		<u>Looking for Letters</u>		<u>Alphabetic Knowledge Totals</u>		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	1	0	0	2	0	0	1	2	3
GEI <sup>b</sup>	0	1	4	0	n/a	n/a	4	1	5
PRT <sup>c</sup>	0	0	1	0	2	0	3	0	3
PRI <sup>d</sup>	1	0	1	0	n/a	n/a	2	0	2

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text



Table J4

*Text – Word Knowledge Interactions – Chantel*

Text	Identifying Sight Words		Pointing to Picture for Word Support		Identifying Word Parts		Supplying Words		Reading Fluently for Support		Phonemic Totals		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0
GEI <sup>b</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0
PRT <sup>c</sup>	1	0	0	0	0	0	0	0	0	0	1	0	1
PRI <sup>d</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table J5

*Text – Composite Text Interactions – Chantel*

Text	Concepts of Print		Phonemic/Phono Awareness		Alphabetic Knowledge		Word Knowledge		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	1	2	0	1	0	0	0	0	4
GEI <sup>b</sup>	4	1	2	0	n/a	n/a	0	0	7
PRT <sup>c</sup>	0	0	0	0	0	0	1	0	1
PRI <sup>d</sup>	1	0	1	0	n/a	n/a	2	0	2

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

## Alia's Case

Table J6

*Text – Concepts of Print Interactions – Alia*

Text	Tracking		Pointing at Print		Identifying Book Parts		Concepts of Print Totals		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	14	0	11	0	2	0	27	0	27
GEI <sup>b</sup>	0	3	10	0	n/a	n/a	3	10	13
PRT <sup>c</sup>	14	0	0	0	2	2	16	2	18
PRI <sup>d</sup>	0	0	0	0	n/a	n/a	1	0	1

*Notes:* Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table J7

*Text – Phonemic and Phonological Awareness Interactions – Alia*

Text	<u>Identifying Letter Sounds</u>		<u>Sounding Out</u>		<u>Chanting and Rhyming</u>		<u>Repeating Alliteration</u>		<u>Completing Predictable Text</u>		<u>Phonemic Totals</u>		Dyad Total	
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child		
GET <sup>a</sup>	6	1	1	0	0	4	0	0	0	0	0	7	5	12
GEI <sup>b</sup>	0	0	0	0	2	0	0	0	0	0	0	2	0	2
PRT <sup>c</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PRI <sup>d</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table J8

*Text – Alphabetic Knowledge Interactions – Alia*

Text	<u>Pointing to Letters</u>		<u>Identifying Letters</u>		<u>Looking for Letters</u>		<u>Alphabetic Knowledge Totals</u>		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	4	0	4	0	0	0	8	0	8
GEI <sup>b</sup>	0	0	0	0	n/a	n/a	0	0	0
PRT <sup>c</sup>	0	0	0	0	0	0	0	0	0
PRI <sup>d</sup>	0	0	0	0	n/a	n/a	0	0	0

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table J9

*Text – Word Knowledge Interactions – Alia*

Text	Identifying Sight Words		Pointing to Picture for Word Support		Identifying Word Parts		Supplying Words		Reading Fluently for Support		Phonemic Totals		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	0	0	1	0	0	0	4	0	2	0	7	0	7
GEI <sup>b</sup>	2	0	0	0	0	0	1	0	0	0	3	0	3
PRT <sup>c</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0
PRI <sup>d</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table J10

*Text – Composite Text Interactions – Alia*

Text	Concepts of print		Phonemic/Phono Awareness		Alphabetic Knowledge		Word Knowledge		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	27	0	7	5	8	0	7	0	54
GEI <sup>b</sup>	10	3	1	1	0	0	3	0	18
PRT <sup>c</sup>	16	2	0	0	0	0	0	0	18
PRI <sup>d</sup>	1	0	0	0	n/a	n/a	0	0	1

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

## Ian's Case

Table J11

*Text – Concepts of Print Interactions – Ian*

Text	Tracking		Pointing at Print		Identifying Book Parts		Concepts of Print Totals		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	5	2	5	26	0	1	10	29	39
GEI <sup>b</sup>	0	0	4	0	n/a	n/a	4	0	4
PRT <sup>c</sup>	8	1	25	1	1	0	34	1	35
PRI <sup>d</sup>	13	0	26	1	n/a	n/a	39	1	40

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table J12

*Text – Phonemic and Phonological Awareness Interactions – Ian*

Text	<u>Identifying Letter Sounds</u>		<u>Sounding Out</u>		<u>Chanting and Rhyming</u>		<u>Repeating Alliteration</u>		<u>Completing Predictable Text</u>		<u>Phonemic Totals</u>		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0
GEI <sup>b</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0
PRT <sup>c</sup>	0	0	5	1	0	0	0	0	0	0	5	1	6
PRI <sup>d</sup>	0	0	7	0	0	0	0	0	0	0	0	7	0

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table J13

*Text – Alphabetic Knowledge Interactions – Ian*

Text	<u>Pointing to Letters</u>		<u>Identifying Letters</u>		<u>Looking for Letters</u>		<u>Alphabetic Knowledge Totals</u>		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	0	0	0	0	0	0	0	0	0
GEI <sup>b</sup>	0	0	0	0	n/a	n/a	0	0	0
PRT <sup>c</sup>	0	0	0	0	0	0	0	0	0
PRI <sup>d</sup>	0	0	0	0	n/a	n/a	0	0	0

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table J14

*Text – Word Knowledge Interactions – Ian*

Text	Identifying Sight Words		Pointing to Picture for Word Support		Identifying Word Parts		Supplying Words		Reading Fluently for Support		Phonemic Totals		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	0	3	0	0	0	0	0	0	0	0	0	3	3
GEI <sup>b</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0
PRT <sup>c</sup>	0	0	0	0	0	0	16	0	0	0	16	0	16
PRI <sup>d</sup>	0	0	0	0	0	0	18	0	0	0	0	18	18

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table J15

*Text – Composite Text Interactions – Ian*

Text	Concepts of Print		Phonemic/Phono Awareness		Alphabetic Knowledge		Word Knowledge		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	10	29	0	0	0	0	0	3	42
GEI <sup>b</sup>	4	0	0	0	0	0	0	0	4
PRT <sup>c</sup>	34	1	5	1	0	0	16	0	57
PRI <sup>d</sup>	39	1	7	0	n/a	n/a	18	0	65

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

## Juan's Case

Table J16

*Text – Concepts of Print Interactions – Juan*

Text	Tracking		Pointing at Print		Identifying Book Parts		Concepts of Print Totals		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	5	0	9	12	2	1	11	18	29
GEI <sup>b</sup>	0	0	0	1	n/a	n/a	0	1	1
PRT <sup>c</sup>	0	14	0	0	0	0	0	14	14
PRI <sup>d</sup>	0	0	0	6	n/a	n/a	0	6	6

*Notes:* Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text



Table J17

*Text – Phonemic and Phonological Awareness Interactions – Juan*

Text	<u>Identifying Letter Sounds</u>		<u>Sounding Out</u>		<u>Chanting and Rhyming</u>		<u>Repeating Alliteration</u>		<u>Completing Predictable Text</u>		<u>Phonemic Totals</u>		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	0	0	0	0	1	1	0	0	0	1	1	2	3
GEI <sup>b</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0
PRT <sup>c</sup>	0	0	0	1	0	0	0	0	0	0	0	1	1
PRI <sup>d</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table J18

*Text – Alphabetic Knowledge Interactions – Juan*

Text	<u>Pointing to Letters</u>		<u>Identifying Letters</u>		<u>Looking for Letters</u>		<u>Alphabetic Knowledge Totals</u>		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	0	0	0	0	0	0	0	0	0
GEI <sup>b</sup>	0	0	0	0	n/a	n/a	0	0	0
PRT <sup>c</sup>	0	0	0	0	0	0	0	0	0
PRI <sup>d</sup>	0	0	0	0	n/a	n/a	0	0	0

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table J19

*Text – Word Knowledge Interactions – Juan*

Text	Identifying Sight Words		Pointing to Picture for Word Support		Identifying Word Parts		Supplying Words		Reading Fluently for Support		Phonemic Totals		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	0	1	0	0	1	1	1	0	0	0	2	2	4
GEI <sup>b</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0
PRT <sup>c</sup>	0	0	0	0	0	0	2	0	0	0	2	0	2
PRI <sup>d</sup>	0	0	0	0	0	0	2	0	0	0	0	2	2

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table J20

*Text – Composite Text Interactions – Juan*

Text	Concepts of Print		Phonemic/Phono Awareness		Alphabetic Knowledge		Word Knowledge		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	11	18	1	2	0	0	2	2	36
GEI <sup>b</sup>	0	1	0	0	0	0	0	0	1
PRT <sup>c</sup>	0	14	0	1	0	0	2	0	17
PRI <sup>d</sup>	0	6	0	0	0	0	2	0	2

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

## Selina's Case

Table J21

### *Text – Concepts of Print Interactions – Selina*

Text	Tracking		Pointing at Print		Identifying Book Parts		Concepts of Print Totals		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	0	1	3	3	3	0	6	4	10
GEI <sup>b</sup>	0	0	0	1	n/a	n/a	0	1	1
PRT <sup>c</sup>	1	25	9	0	0	0	10	25	35
PRI <sup>d</sup>	0	0	0	0	n/a	n/a	0	0	0

*Notes:* Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table J22

*Text – Phonemic and Phonological Awareness Interactions – Selina*

Text	<u>Identifying Letter Sounds</u>		<u>Sounding Out</u>		<u>Chanting and Rhyming</u>		<u>Repeating Alliteration</u>		<u>Completing Predictable Text</u>		<u>Phonemic Totals</u>		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	0	0	0	0	0	1	0	0	0	8	0	9	9
GEI <sup>b</sup>	0	0	0	0	0	0	0	0	0	1	0	1	1
PRT <sup>c</sup>	1	0	0	0	0	0	0	0	0	0	1	0	1
PRI <sup>d</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table J23

*Text – Alphabetic Knowledge Interactions – Selina*

Text	<u>Pointing to Letters</u>		<u>Identifying Letters</u>		<u>Looking for Letters</u>		<u>Alphabetic Knowledge Totals</u>		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	0	0	0	0	0	0	0	0	0
GEI <sup>b</sup>	0	0	0	0	n/a	n/a	0	0	0
PRT <sup>c</sup>	0	0	0	0	0	0	0	0	0
PRI <sup>d</sup>	0	0	0	0	n/a	n/a	0	0	0

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table J24

*Text – Word Knowledge Interactions – Selina*

Text	Identifying Sight Words		Pointing to Picture for Word Support		Identifying Word Parts		Supplying Words		Reading Fluently for Support		Phonemic Totals		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	0	0	0	0	0	0	2	0	0	0	2	0	2
GEI <sup>b</sup>	3	0	0	0	0	0	0	0	0	0	3	0	3
PRT <sup>c</sup>	0	0	0	1	0	0	33	0	1	0	34	0	35
PRI <sup>d</sup>	0	1	0	0	0	0	0	0	0	0	0	1	1

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table J25

*Text – Composite Text Interactions – Selina*

Text	Concepts of Print		Phonemic/Phono Awareness		Alphabetic Knowledge		Word Knowledge		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	6	4	0	9	0	0	2	0	21
GEI <sup>b</sup>	0	1	0	1	0	0	3	0	5
PRT <sup>c</sup>	10	25	1	0	0	0	35	0	71
PRI <sup>d</sup>	0	0	0	0	0	0	0	1	1

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

## Tyler's Case

Table J26

### *Text – Concepts of Print Interactions – Tyler*

Text	Tracking		Pointing at Print		Identifying Book Parts		Concepts of Print Totals		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	2	1	6	6	1	0	9	7	16
GEI <sup>b</sup>	0	1	13	2	n/a	n/a	13	3	16
PRT <sup>c</sup>	0	14	6	144	1	0	7	158	165
PRI <sup>d</sup>	0	0	0	0	n/a	n/a	0	0	0

*Notes:* Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table J27

*Text – Phonemic and Phonological Awareness Interactions – Tyler*

Text	<u>Identifying Letter sounds</u>		<u>Sounding Out</u>		<u>Chanting and Rhyming</u>		<u>Repeating Alliteration</u>		<u>Completing Predictable Text</u>		<u>Phonemic Totals</u>		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	0	0	0	0	1	0	0	0	0	1	1	1	2
GEI <sup>b</sup>	0	0	0	0	1	0	0	0	0	0	1	0	1
PRT <sup>c</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0
PRI <sup>d</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table J28

*Text – Alphabetic Knowledge Interactions – Tyler*

Text	<u>Pointing to Letters</u>		<u>Identifying Letters</u>		<u>Looking for Letters</u>		<u>Alphabetic Knowledge Totals</u>		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	0	0	0	0	0	0	0	0	0
GEI <sup>b</sup>	0	0	0	0	n/a	n/a	0	0	0
PRT <sup>c</sup>	0	0	0	0	0	0	0	0	0
PRI <sup>d</sup>	0	0	0	0	n/a	n/a	0	0	0

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table J29

*Text – Word Knowledge Interactions – Tyler*

Text	Identifying Sight Words		Pointing to Picture for Word Support		Identifying Word Parts		Supplying Words		Reading Fluently for Support		Phonemic Totals		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	0	0	0	0	0	0	2	3	1	0	3	3	6
GEI <sup>b</sup>	4	1	0	0	4	0	4	0	0	0	12	1	13
PRT <sup>c</sup>	0	0	0	0	2	0	122	0	1	0	125	0	125
PRI <sup>d</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table J30

*Text – Composite Text Interactions – Tyler*

Text	Concepts of Print		Phonemic/Phono Awareness		Alphabetic Knowledge		Word Knowledge		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	9	7	1	1	0	0	3	3	24
GEI <sup>b</sup>	13	3	1	0	0	0	12	1	30
PRT <sup>c</sup>	7	158	0	0	0	0	125	0	290
PRI <sup>d</sup>	0	0	0	0	0	0	0	1	1

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text



## Appendix K: Meaning Interactions

### Chantel's Case

Table K1

#### *Meaning – Vocabulary Interactions - Chantel*

Text	Describing				Elaborating		Vocabulary Totals		Dyad Total
	Labeling		Defining		Mom	Child	Mom	Child	
	Mom	Child	Mom	Child					
GET <sup>a</sup>	2	1	0	0	0	0	2	1	3
GEI <sup>b</sup>	1	2	0	0	0	0	1	2	3
PRT <sup>c</sup>	5	1	3	0	0	0	8	2	10
PRI <sup>d</sup>	16	2	5	0	2	0	23	2	25

*Notes:* Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Not included - tables where all the data = 0 : Organizing and Summarizing—Chantel

Table K2

*Meaning – Inference Making Interactions – Chantel*

Text	Clarifying		Connecting		Predicting		Inference-Making Totals		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	7	3	4	0	1	0	12	3	15
GEI <sup>b</sup>	7	2	3	0	0	0	10	2	12
PRT <sup>c</sup>	8	1	3	0	2	0	13	1	14
PRId	16	2	2	0	1	0	19	2	21

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table K3

*Composite Meaning Interactions – Chantel*

Text	Order	Vocabulary		Organizing and Summarizing		Inference Making		Meaning Totals		Dyad Total
		Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	2	2	1	0	0	12	3	14	4	18
GEI <sup>b</sup>	3	1	2	0	0	10	2	11	4	15
PRT <sup>c</sup>	4	8	1	0	0	13	1	21	2	23
PRId	1	23	2	3	0	19	2	45	4	49

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

## Alia's Case

Table K4

### *Meaning – Vocabulary Interactions – Alia*

Text	Describing				Elaborating		Vocabulary Totals		Dyad Total
	Labeling		Defining		Mom	Child	Mom	Child	
	Mom	Child	Mom	Child					
GET <sup>a</sup>	5	0	0	0	0	0	5	0	5
GET <sup>b</sup>	3	6	2	1	0	0	5	7	12
PRT <sup>c</sup>	5	0	2	0	1	1	8	1	9
PRF <sup>d</sup>	8	1	1	0	0	0	9	1	10

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table K5

*Meaning – Organizing and Summarizing – Alia*

Text	Recalling/retelling		Confirming		Organizing/Summarizing Totals		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	0	0	0	0	0	0	0
GEI <sup>b</sup>	0	0	0	0	0	0	0
PRT <sup>c</sup>	0	0	5	0	5	0	5
PRI <sup>d</sup>	1	3	0	0	1	3	4

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table K6

*Meaning – Inference Making Interactions – Alia*

Text	Clarifying		Connecting		Predicting		Inference-Making Totals		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	8	2	3	0	0	1	11	2	13
GEI <sup>b</sup>	2	5	1	0	0	1	3	6	9
PRT <sup>c</sup>	11	3	12	3	4	0	27	6	33
PRI <sup>d</sup>	3	1	3	1	0	0	6	2	8

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table K7

*Composite Meaning Interactions – Alia*

Text	Order	Vocabulary		Organizing and Summarizing		Inference Making		Meaning Totals		Dyad Total
		Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	1	5	0	0	0	11	2	16	2	18
GEI <sup>b</sup>	2	5	7	0	0	3	6	8	13	21
PRT <sup>c</sup>	3	8	1	5	0	27	6	40	7	47
PRI <sup>d</sup>	4	9	1	1	3	6	2	16	6	22

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

## Ian's Case

Table K8

### *Meaning – Vocabulary Interactions – Ian*

Text	Describing				Elaborating		Vocabulary Totals		Dyad Total
	Labeling		Defining		Mom	Child	Mom	Child	
	Mom	Child	Mom	Child					
GET <sup>a</sup>	1	0	0	0	0	0	1	0	1
GEI <sup>b</sup>	1	2	2	0	0	0	3	2	5
PRT <sup>c</sup>	1	1	1	2	0	2	2	5	7
PRI <sup>d</sup>	4	3	1	5	0	0	5	8	13

*Notes:* Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table K9

*Meaning – Organizing and Summarizing – Ian*

Text	Recalling/retelling		Confirming		Organizing/Summarizing Totals		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	0	0	0	0	0	0	0
GEI <sup>b</sup>	0	0	0	0	0	0	0
PRT <sup>c</sup>	0	1	0	1	0	2	2
PRI <sup>d</sup>	10	3	1	0	11	3	14

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table K10

*Meaning – Inference Making Interactions – Ian*

Text	Clarifying		Connecting		Predicting		Inference-Making Totals		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	1	4	4	4	1	4	6	12	18
GEI <sup>b</sup>	0	5	1	2	0	1	1	8	9
PRT <sup>c</sup>	1	9	1	4	0	1	2	14	16
PRI <sup>d</sup>	6	7	5	3	1	0	12	10	22

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table K11

*Composite Meaning Interactions – Ian*

Text	Order	Vocabulary		Organizing and Summarizing		Inference Making		Meaning Totals		Dyad Total
		Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	1	1	0	0	0	6	12	7	12	19
GEI <sup>b</sup>	2	3	2	0	0	1	8	4	10	14
PRT <sup>c</sup>	4	2	5	0	2	2	14	4	21	25
PRI <sup>d</sup>	3	5	8	11	3	12	10	28	21	49

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text



## Juan's Case

Table K12

### *Meaning- Vocabulary Interactions – Juan*

Text	Describing				Elaborating		Vocabulary Totals		Dyad Total
	Labeling		Defining		Mom	Child	Mom	Child	
	Mom	Child	Mom	Child					
GET <sup>a</sup>	8	7	0	0	1	1	9	8	17
GEI <sup>b</sup>	0	0	0	0	0	0	0	0	0
PRT <sup>c</sup>	1	0	0	0	1	0	2	0	2
PRI <sup>d</sup>	2	0	4	1	1	0	7	1	8

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table K13

*Meaning – Organizing and Summarizing – Juan*

Text	Recalling/retelling		Confirming		Organizing/Summarizing Totals		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	0	0	0	0	0	0	0
GEI <sup>b</sup>	0	0	1	0	1	0	1
PRT <sup>c</sup>	0	0	0	0	0	0	0
PRId	1	0	0	0	1	0	1

*Note.* Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

Table K14

*Meaning – Inference Making Interactions – Juan*

Text	Clarifying		Connecting		Predicting		Inference-Making Totals		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	11	9	1	1	3	4	15	14	29
GEI <sup>b</sup>	0	1	1	0	0	0	1	1	2
PRT <sup>c</sup>	1	0	2	0	0	0	3	0	3
PRId	1	0	1	0	0	0	2	0	2

*Notes:* Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table K15

*Composite Meaning Interactions – Juan*

Text	Order	Vocabulary		Organizing and Summarizing		Inference Making		Meaning Totals		Dyad Total
		Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	4	9	8	0	0	15	14	24	22	46
GET <sup>b</sup>	1	1	0	1	0	1	1	2	1	3
PRT <sup>c</sup>	3	2	0	0	0	3	0	5	0	5
PRT <sup>d</sup>	2	7	1	1	0	2	1	10	2	12

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

## Selina's Case

Table K16

### *Meaning – Vocabulary Interactions – Selina*

Text	Describing				Elaborating		Vocabulary Totals		Dyad Total
	Labeling		Defining		Mom	Child	Mom	Child	
	Mom	Child	Mom	Child					
GET <sup>a</sup>	4	2	0	0	0	0	4	2	6
GEI <sup>b</sup>	2	11	2	0	0	0	4	11	15
PRT <sup>c</sup>	0	2	2	4	0	0	2	6	8
PRI <sup>d</sup>	3	0	3	1	0	0	6	1	7

*Notes:* Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table K17

*Meaning – Organizing and Summarizing – Selina*

Text	Recalling/retelling		Confirming		Organizing/Summarizing Totals		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	0	0	0	0	0	0	0
GEI <sup>b</sup>	0	0	0	0	0	0	0
PRT <sup>c</sup>	0	0	0	1	0	1	1
PRId	0	0	0	0	0	0	0

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table K18

*Meaning – Inference Making Interactions – Selina*

Text	Clarifying		Connecting		Predicting		Inference-Making Totals		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	7	2	3	1	3	2	13	5	18
GEI <sup>b</sup>	0	2	0	2	0	0	0	4	4
PRT <sup>c</sup>	1	2	3	0	0	0	4	2	6
PRId	4	0	1	0	1	0	6	0	6

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table K19

*Composite Meaning Interactions – Selina*

Text	Order	Vocabulary		Organizing and Summarizing		Inference Making		Meaning Totals		Dyad Total
		Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	4	4	2	0	0	13	15	17	7	24
GEI <sup>b</sup>	1	4	11	0	0	0	4	4	15	19
PRT <sup>c</sup>	3	2	6	0	1	4	2	6	9	15
PRI <sup>d</sup>	2	6	1	0	0	6	0	12	1	13

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

## Tyler's Case

Table K20

### *Meaning – Vocabulary Interactions – Tyler*

Text	Describing				Elaborating		Vocabulary Totals		Dyad Total
	Labeling		Defining		Mom	Child	Mom	Child	
	Mom	Child	Mom	Child					
GET <sup>a</sup>	4	5	0	0	0	0	4	5	9
GEI <sup>b</sup>	3	8	0	2	1	0	4	10	14
PRT <sup>c</sup>	0	0	5	0	0	0	5	0	5
PRI <sup>d</sup>	0	0	1	0	1	0	2	1	3

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table K21

*Meaning – Organizing and Summarizing – Tyler*

Text	Recalling/Retelling		Confirming		Organizing/Summarizing Totals		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	0	0	1	0	1	0	1
GEI <sup>b</sup>	0	0	0	0	0	0	0
PRT <sup>c</sup>	1	0	0	0	1	0	1
PRId	0	0	0	0	0	0	0

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text

Table K22

*Meaning – Inference Making Interactions – Tyler*

Text	Clarifying		Connecting		Predicting		Inference-Making Totals		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	2	0	1	0	0	0	3	0	3
GEI <sup>b</sup>	2	5	0	0	0	0	2	5	7
PRT <sup>c</sup>	1	2	3	0	0	0	4	2	6
PRId	5	0	1	0	0	0	6	0	6

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text



Table K23

*Composite Meaning Interactions – Tyler*

Text	Order	Vocabulary		Organizing and Summarizing		Inference Making		Meaning Totals		Dyad Total
		Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	2	4	5	1	0	3	0	8	5	13
GEI <sup>b</sup>	1	4	10	0	0	2	5	6	15	21
PRT <sup>c</sup>	4	5	0	1	0	8	0	14	0	14
PRI <sup>d</sup>	3	2	0	0	0	6	0	8	0	8

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – Traditional Text

b = *Green Eggs and Ham* – iPad Text

c = *The Tale of Peter Rabbit* – Traditional Text

d = *The Tale of Peter Rabbit* – iPad text.

## Appendix L: Technology Interactions

### Chantel's Case

Table L1

#### *Technology – Functional Interactions – Chantel*

Text	<u>Selecting Reading</u>		<u>Responding to Audio Clues</u>		<u>Responding to Visual Clues</u>		<u>Pushing Words</u>		<u>Pushing Icons</u>		<u>Turning Pages</u>		<u>Pushing to Have the iPad Read</u>		<u>Functional Totals</u>		Dyad Total
	M	C	M	C	M	C	M	C	M	C	M	C	M	C	M	C	
GEI <sup>a</sup>	1	1	2	1	0	0	0	0	5	1	3	1	9	2	20	6	26
PRI <sup>b</sup>	1	0	5	3	4	0	0	0	13	10	12	0	4	3	39	16	55

Notes: M = mother; C = child; Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – iPad text

b = *The Tale of Peter Rabbit* – iPad text

Table L2

#### *Technology – Operational Interactions – Chantel*

Text	<u>Accessing Story</u>		<u>Problem Solving</u>		<u>Operational Totals</u>		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	
GEI <sup>b</sup>	0	1	0	0	0	1	1
PRI <sup>d</sup>	2	0	1	0	3	0	3

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

Table L3

*Composite Technology Interactions – Chantel*

Text	Order	Operational		Functional		Technology Totals		Dyad Total
		Mom	Child	Mom	Child	Mom	Child	
GEI <sup>b</sup>	3	0	1	20	6	20	7	27
PRI <sup>d</sup>	1	3	0	39	16	42	16	58

*Notes:* Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

## Alia's Case

Table L4

### *Technology – Functional Interactions – Alia*

Text	<u>Selecting Reading</u>		<u>Responding to Audio Clues</u>		<u>Responding to Visual Clues</u>		<u>Pushing Words</u>		<u>Pushing Icons</u>		<u>Turning Pages</u>		<u>Pushing to Have the iPad Read</u>		<u>Functional Totals</u>		Dyad Total
	M	C	M	C	M	C	M	C	M	C	M	C	M	C	M	C	
GEI <sup>a</sup>	1	2	10	7	0	2	13	6	3	19	2	3	1	1	30	40	70
PRId	0	0	11	6	8	7	2	0	5	3	5	0	0	0	31	16	47

Notes: M = mother; C = child; Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – iPad text

b = *The Tale of Peter Rabbit* – iPad text

Table L5

### *Technology – Operational Interactions – Alia*

Text	<u>Accessing Story</u>		<u>Problem Solving</u>		<u>Operational Totals</u>		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	
GEI <sup>b</sup>	0	2	1	1	1	3	4
PRId	1	0	2	0	3	0	3

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

Table L6

*Composite Technology Interactions – Alia*

Text	Order	Operational		Functional		Technology Totals		Dyad Total
		Mom	Child	Mom	Child	Mom	Child	
GEI <sup>b</sup>	2	1	3	30	40	31	43	74
PRI <sup>d</sup>	4	3	0	31	16	34	16	50

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

## Ian's Case

Table L7

### *Technology – Functional Interactions – Ian*

Text	<u>Selecting Reading</u>		<u>Responding to Audio Clues</u>		<u>Responding to Visual Clues</u>		<u>Pushing Words</u>		<u>Pushing Icons</u>		<u>Turning Pages</u>		<u>Pushing to Have the iPad Read</u>		<u>Functional Totals</u>		Dyad Total
	M	C	M	C	M	C	M	C	M	C	M	C	M	C	M	C	
GEI <sup>a</sup>	0	2	3	10	1	1	0	0	2	4	2	1	0	1	8	19	27
PR1 <sup>b</sup>	0	0	2	3	5	22	3	3	2	2	13	1	0	0	25	31	56

Notes: M = mother; C = child; Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – iPad text

b = *The Tale of Peter Rabbit* – iPad text

Table L8

### *Technology – Operational Interactions – Ian*

Text	<u>Accessing Story</u>		<u>Problem Solving</u>		<u>Operational Totals</u>		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	
GEI <sup>b</sup>	1	2	1	1	2	3	5
PR1 <sup>d</sup>	0	3	2	0	2	3	5

Note. Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

Table L9

*Composite Technology Interactions – Ian*

Text	Order	Operational		Functional		Technology Totals		Dyad Total
		Mom	Child	Mom	Child	Mom	Child	
GEP <sup>b</sup>	2	2	3	8	19	10	22	32
PR <sup>d</sup>	3	2	3	25	31	27	34	61

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

## Juan's Case

Table L10

### *Technology – Functional Interactions – Juan*

Text	<u>Selecting Reading</u>		<u>Responding to Audio Clues</u>		<u>Responding to Visual Clues</u>		<u>Pushing Words</u>		<u>Pushing Icons</u>		<u>Turning Pages</u>		<u>Pushing to Have the iPad Read</u>		<u>Functional Totals</u>		Dyad Total
	M	C	M	C	M	C	M	C	M	C	M	C	M	C	M	C	
GEI <sup>a</sup>	0	2	2	4	1	0	0	0	0	0	0	0	0	0	3	6	9
PR1 <sup>b</sup>	1	1	2	0	1	5	0	0	0	0	0	0	0	0	4	6	10

Notes: M = mother; C = child; Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – iPad text

b = *The Tale of Peter Rabbit* – iPad text

Table L11

### *Technology – Operational Interactions – Juan*

Text	<u>Accessing Story</u>		<u>Problem Solving</u>		<u>Operational Totals</u>		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	
GEI <sup>b</sup>	0	1	0	0	0	1	1
PR1 <sup>d</sup>	1	2	2	0	2	2	4

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text



Table L12

*Composite Technology Interactions – Juan*

Text	Order	Operational		Functional		Technology Totals		Dyad Total
		Mom	Child	Mom	Child	Mom	Child	
GEI <sup>b</sup>	1	0	1	3	6	3	7	10
PRI <sup>d</sup>	2	4	6	2	2	6	8	14

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

## Selina's Case

Table L13

### *Technology – Functional Interactions – Selina*

Text	<u>Selecting Reading</u>		<u>Responding to Audio Clues</u>		<u>Responding to Visual Clues</u>		<u>Pushing Words</u>		<u>Pushing Icons</u>		<u>Turning Pages</u>		<u>Pushing to Have the iPad Read</u>		<u>Functional Totals</u>		Dyad Total
	M	C	M	C	M	C	M	C	M	C	M	C	M	C	M	C	
GEI <sup>a</sup>	0	0	2	1	1	0	0	0	0	0	0	0	0	0	3	6	9
PRId	1	1	3	2	5	2	1	3	2	1	4	0	0	2	16	11	27

Notes: M = mother; C = child; Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – iPad text

b = *The Tale of Peter Rabbit* – iPad text

Table L14

### *Technology – Operational Interactions – Selina*

Text	<u>Accessing Story</u>		<u>Problem Solving</u>		<u>Operational Totals</u>		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	
GEI <sup>b</sup>	0	0	2	1	2	1	3
PRId	1	1	0	0	1	1	2

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

Table L15

*Composite Technology Interactions – Selina*

Text	Order	Operational		Functional		Technology Totals		Dyad Total
		Mom	Child	Mom	Child	Mom	Child	
GEI <sup>b</sup>	1	2	1	18	8	20	9	29
PRI <sup>d</sup>	2	1	1	16	11	17	12	29

*Note.* Mom and Child = who initiated the interaction, Order = order in which the readings occurred, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

<sup>a</sup>GET = *Green Eggs and Ham* - Traditional Text

<sup>b</sup>GEI = *Green Eggs and Ham* - iPad Text

<sup>c</sup>PRT = *The Tale of Peter Rabbit* - Traditional Text

<sup>d</sup>PRI = *The Tale of Peter Rabbit* - iPad Text

## Tyler's Case

Table L16

### *Technology – Functional Interactions – Tyler*

Text	<u>Selecting Reading</u>		<u>Responding to Audio Clues</u>		<u>Responding to Visual Clues</u>		<u>Pushing Words</u>		<u>Pushing Icons</u>		<u>Turning Pages</u>		<u>Pushing to Have the iPad Read</u>		<u>Functional Totals</u>		Dyad Total
	M	C	M	C	M	C	M	C	M	C	M	C	M	C	M	C	
GEI <sup>a</sup>	1	0	8	9	0	1	1	0	6	0	1	0	5	0	22	10	32
PRI <sup>b</sup>	3	0	0	0	0	0	0	0	0	0	0	0	1	0	6	1	7

Notes: M = mother; C = child; Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* – iPad text

b = *The Tale of Peter Rabbit* – iPad text

Table L17

### *Technology – Operational Interactions – Tyler*

Text	<u>Accessing Story</u>		<u>Problem Solving</u>		<u>Operational Totals</u>		Dyad Total
	Mom	Child	Mom	Child	Mom	Child	
GEI <sup>b</sup>	1	1	0	0	1	1	2
PRI <sup>d</sup>	1	1	1	0	2	1	3

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

Table L18

*Composite Technology Interactions – Tyler*

Text	Order	Operational		Functional		Technology Totals		Dyad Total
		Mom	Child	Mom	Child	Mom	Child	
GEP <sup>b</sup>	1	1	1	22	10	23	11	34
PR <sup>d</sup>	3	2	1	4	0	6	1	7

Notes: Mom and Child = who initiated the interaction, Dyad Total = number of text interactions (mother and child initiated/all subcategories) that occurred during the reading.

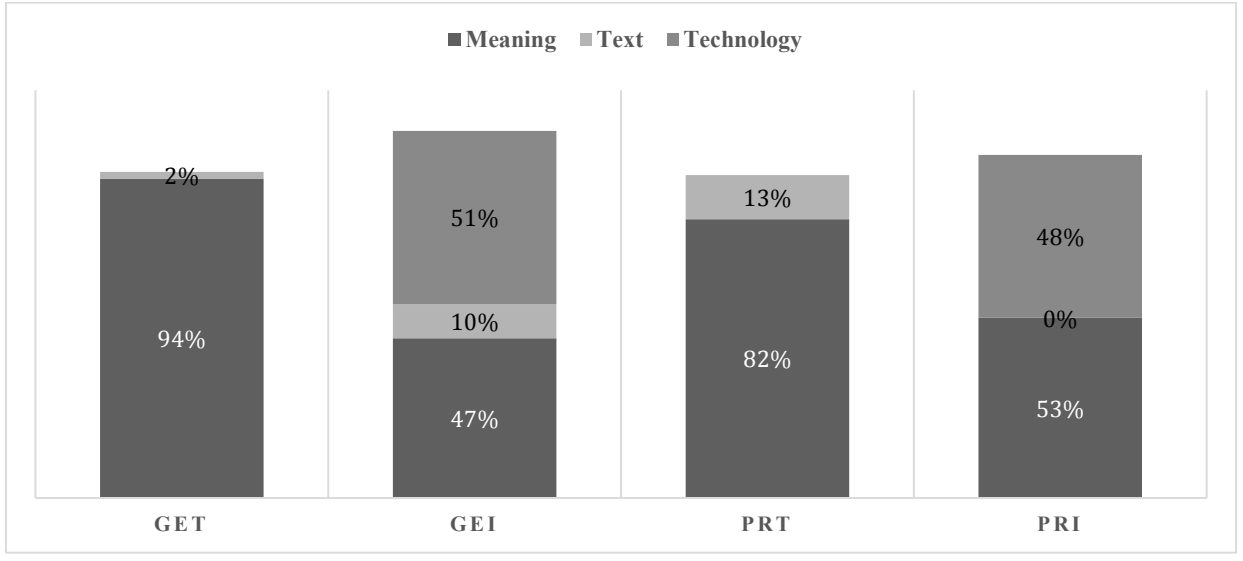
a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

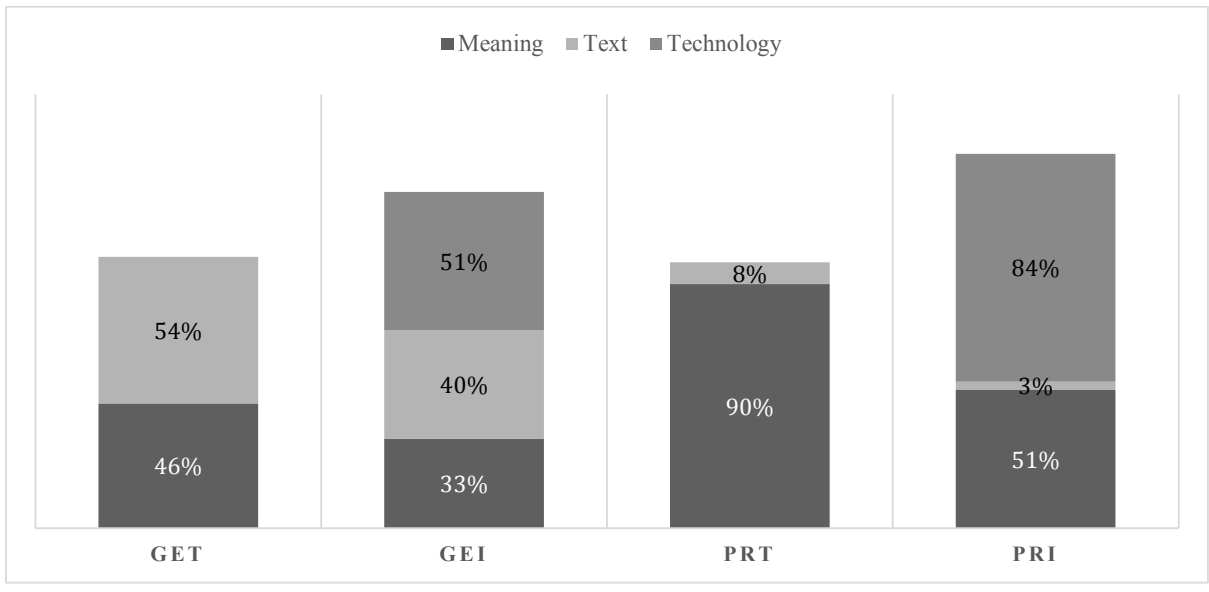
d = *The Tale of Peter Rabbit* - iPad text

### Appendix M: Percentages of words - Text, meaning, Technology



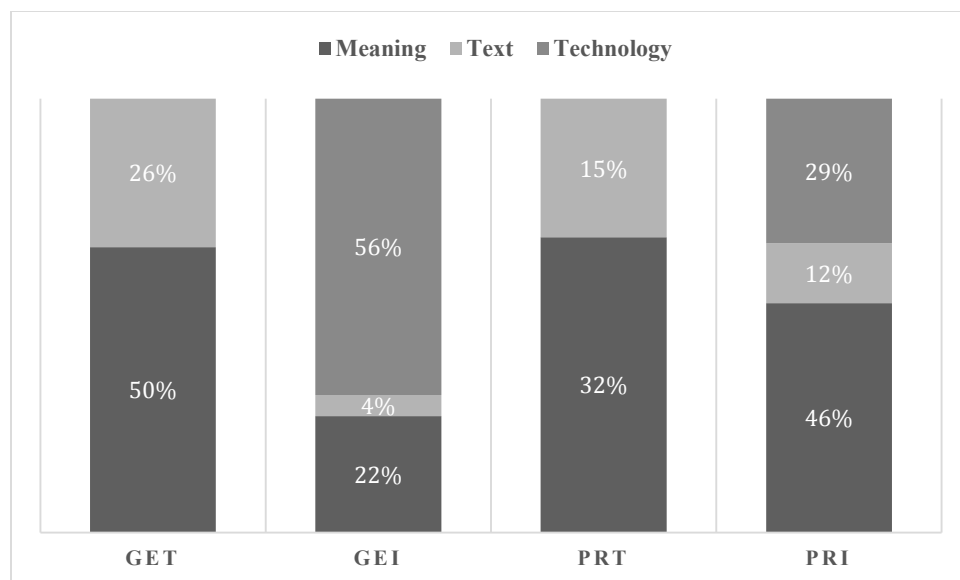
PRT = *The Tale of Peter Rabbit* – Traditional Text  
PRI = *The Tale of Peter Rabbit* - iPad text.  
GET = *Green Eggs and Ham* – Traditional Text  
GEI = *Green Eggs and Ham* - iPad Text  
Total talk for each reading may be more than 100% because talk can fall into more than one category.

Figure M1. Chantel's case.



PRT = *The Tale of Peter Rabbit* – Traditional Text  
PRI = *The Tale of Peter Rabbit* - iPad text.  
GET = *Green Eggs and Ham* – Traditional Text  
GEI = *Green Eggs and Ham* - iPad Text  
Total talk for each reading may be more than 100% because talk fall into more than one category.  
Total talk for each reading may be less than 100% if there was a significant amount of irrelevant talk

Figure M2. Alia's case.



PRT = *The Tale of Peter Rabbit* – Traditional Text

PRI = *The Tale of Peter Rabbit* - iPad text.

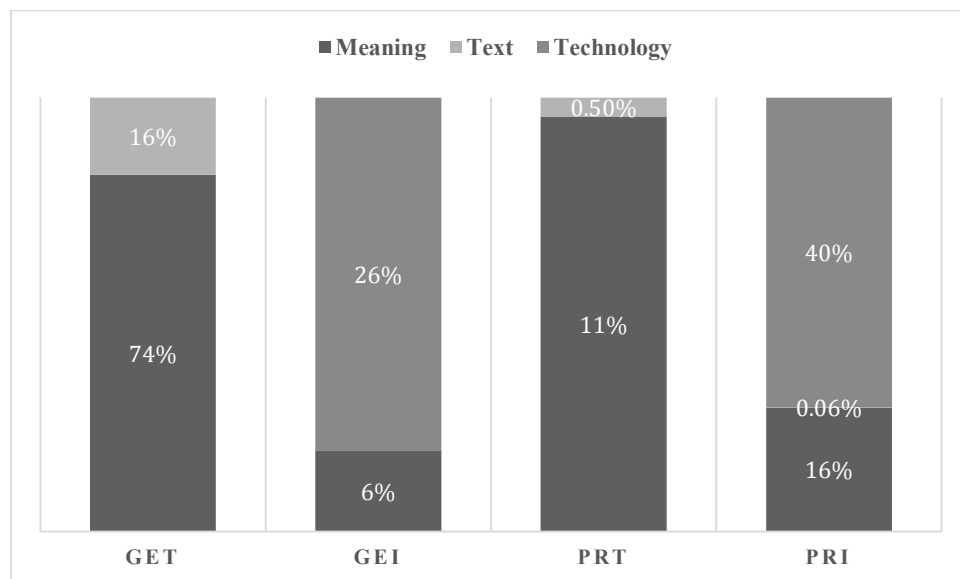
GET = *Green Eggs and Ham* – Traditional Text

GEI = *Green Eggs and Ham* - iPad Text

Total talk for each reading may be more than 100% because talk fall into more than one category.

Total talk for each reading may be less than 100% if there was a significant amount of irrelevant talk.

*Figure M3.* Ian's case.



PRT = *The Tale of Peter Rabbit* – Traditional Text

PRI = *The Tale of Peter Rabbit* - iPad text.

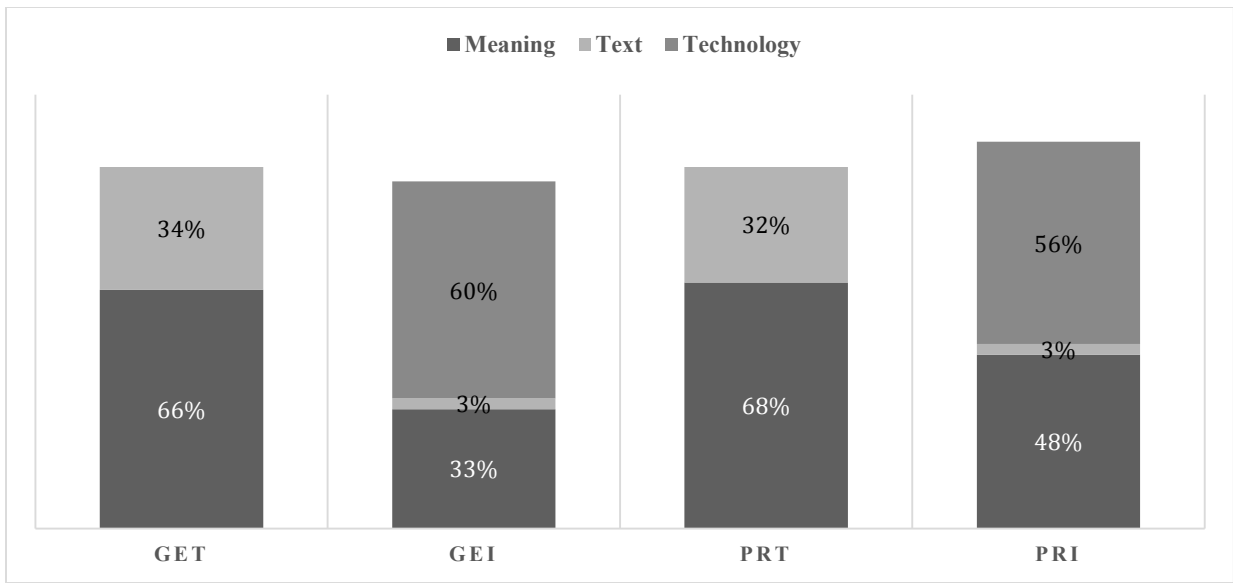
GET = *Green Eggs and Ham* – Traditional Text

GEI = *Green Eggs and Ham* - iPad Text

Total talk for each reading may be more than 100% because talk fall into more than one category.

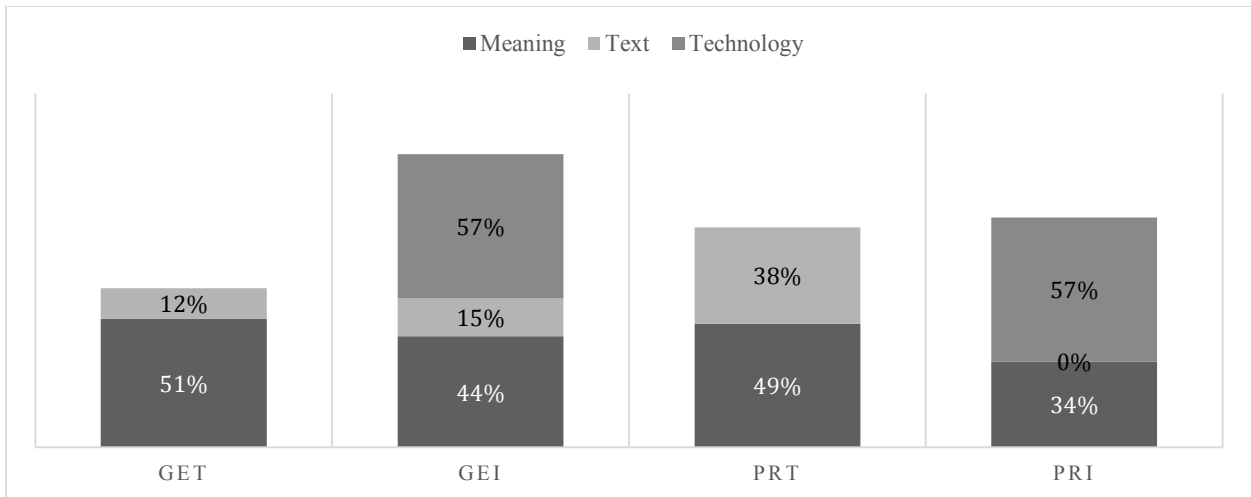
Total talk for each reading may be less than 100% if there was a significant amount of irrelevant talk

*Figure M4.* Juan's case.



PRT = *The Tale of Peter Rabbit* – Traditional Text  
PRI = *The Tale of Peter Rabbit* - iPad text.  
GET = *Green Eggs and Ham* – Traditional Text  
GEI = *Green Eggs and Ham* - iPad Text  
Total talk for each reading may be more than 100% because talk can fall into more than one category.  
Total talk for each reading may be less than 100% if there was a significant amount of irrelevant talk

Figure M5. Selina's case.



PRT = *The Tale of Peter Rabbit* – Traditional Text  
PRI = *The Tale of Peter Rabbit* - iPad text.  
GET = *Green Eggs and Ham* – Traditional Text  
GEI = *Green Eggs and Ham* - iPad Text  
Total talk for each reading may be more than 100% because talk can fall into more than one category.

Figure M6. Tyler's case.



## Appendix N: Affective Climate Scores

### Chantel's Case

Table N1

#### *Mother's Affective Scores – Chantel*

Text	Engagement				Warmth			Support			Total Score
	Persistence	Enthusiasm	Focus	Reading Expression	Proximity	Reinforcement	Sensitivity	Text	Comp <sup>f</sup>	Tech <sup>g</sup>	
GET <sup>a</sup>	3	3	3	3	3	0	3	0	2	n/a	2.22
GEI <sup>b</sup>	2	1	3	2	3	1	1	0	1	1	1.36
PRT <sup>c</sup>	3	3	3	3	3	1	3	0	2	0	2.33
PRI <sup>d</sup>	2	2	3	2	3	0	2	3	0	1	1.80

Notes: Scores are out of 3.0

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

e = Sensitivity shown to the child

f = Comprehension Support

g = Technology Support

Table N2

*Child's Affective Scores – Chantel*

Text	Engagement				Warmth			Total Score
	Persistence	Enthusiasm	Focus	Reading Expression	Proximity	Compliance	Sensitivity	
GET <sup>a</sup>	3	1	3	3	3	3	2	2.57
GEI <sup>b</sup>	3	1	3	1	3	3	1	2.14
PRT <sup>c</sup>	2	1	2	3	3	1	2	2.17
PRI <sup>d</sup>	3	3	3	2	3	3	2	2.43

Notes: Scores are out of 3.0

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

Table N3

*Mother/Child Composite Affective Climate Scores and Ownership – Chantel*

Text	Order	Engagement		Warmth		Support		Total Score		Ownership
		Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	2	3.0	2.5	2.0	2.67	1.0	n/a	2.22	2.57	Mother
GEI <sup>b</sup>	3	2.0	2.0	1.67	2.33	.067	n/a	1.36	2.14	Child
PRT <sup>c</sup>	4	3.0	1.67	2.33	2.67	1.0	n/a	2.33	2.17	Mother
PRI <sup>d</sup>	1	2.25	3.0	1.67	2.67	1.33	n/a	1.80	2.43	Shared

Notes: Scores are out of 3.0

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

## Alia's Case

Table N4

### *Mother's Affective Scores – Alia*

Text	Engagement				Warmth			Support			Total Score
	Persistence	Enthusiasm	Focus	Reading Expression	Proximity	Reinforcement	Sensitivity	Text	Comp <sup>f</sup>	Tech <sup>g</sup>	
GET <sup>a</sup>	3	3	3	3	3	3	3	3	3	n/a	3.0
GEI <sup>b</sup>	2	2	2	2	1	3	2	1	2	3	2.0
PRT <sup>c</sup>	3	2	3	2	3	0	3	3	3	n/a	2.44
PRId	1	1	3	n/a	3	1	3	0	3	2	1.89

Notes: Scores are out of 3.0

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

e = Sensitivity shown to the child

f = Comprehension Support

g = Technology Support

Table N5

*Child's Affective Scores – Alia*

Text	Engagement				Warmth			Total Score
	Persistence	Enthusiasm	Focus	Reading Expression	Proximity	Compliance	Sensitivity	
GET <sup>a</sup>	2	3	3	3	3	3	3	2.86
GEI <sup>b</sup>	3	3	3	3	2	2	2	2.57
PRT <sup>c</sup>	3	1	3	n/a	3	3	3	2.67
PRI <sup>d</sup>	3	2	3	n/a	3	3	2	2.67

Notes: Scores are out of 3.0

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

Table N6

*Mother/Child Composite Affective Climate Scores and Ownership – Alia*

Text	Order	Engagement		Warmth		Support		Total Score		Owner-ship
		Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	1	3.0	2.75	3.0	3.0	3.0	n/a	3.0	2.86	Shared
GEI <sup>b</sup>	2	2.0	3.0	2.33	2.0	2.0	n/a	2.00	2.57	Child
PRT <sup>c</sup>	3	2.5	2.33	3.0	3.0	3.0	n/a	2.44	2.67	Shared
PRI <sup>d</sup>	4	1.67	2.66	2.33	3.0	1.67	n/a	1.89	2.67	Shared

Notes: Scores are out of 3.0

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

## Ian's Case

Table N7

### *Mother's Affective Scores – Ian*

Text	Engagement			Reading Expression	Warmth			Support			Total Score
	Persistence	Enthusiasm	Focus		Proximity	Reinforcement	Sensitivity	Text	Comp <sup>f</sup>	Tech <sup>g</sup>	
GET <sup>a</sup>	3	2	3	1	3	3	3	2	2	n/a	2.50
GEI <sup>b</sup>	3	2	3	n/a	3	3	2	0	1	2	1.90
PRT <sup>c</sup>	3	1	3	2	2	2	2	2	1	n/a	2.00
PRI <sup>d</sup>	3	2	3	2	3	3	2	3	2	3	2.90

Notes: Scores are out of 3.0

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

e = Sensitivity shown to the child

f = Comprehension Support

g = Technology Support

Table N8

*Child's Affective Scores – Ian*

Text	Engagement				Warmth			Total Score
	Persistence	Enthusiasm	Focus	Reading Expression	Proximity	Compliance	Sensitivity	
GET <sup>a</sup>	2	2	2	2	2	2	3	2.0
GEI <sup>b</sup>	3	3	3	2	3	2	2	2.63
PRT <sup>c</sup>	1	1	1	1	2	1	1	1.14
PRI <sup>d</sup>	2	2	2	1	2	3	2	2.43

Notes: Scores are out of 3.0

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

Table N9

*Mother/Child Composite Affective Climate Scores and Ownership – Ian*

Text	Order	Engagement		Warmth		Support		Total Score		Ownership
		Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	1	2.25	2.0	3.0	2.67	2.0	n/a	2.5	2.0	Mother
GEI <sup>b</sup>	2	2.67	2.75	2.67	2.33	1.0	n/a	1.90	2.63	Child
PRT <sup>c</sup>	4	2.5	1.75	1.67	1.33	1.5	n/a	2.0	1.14	Shared
PRI <sup>d</sup>	3	2.5	1.75	2.67	1.5	2.67	n/a	2.90	2.43	Shared

Notes: Scores are out of 3.0

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

## Juan's Case

Table N10

### *Mother's Affective Scores – Juan*

Text	Engagement			Warmth			Support			Total Score	
	Persistence	Enthusiasm	Focus	Reading Expression	Proximity	Reinforcement	Sensitivity	Text	Comp <sup>f</sup>		Tech <sup>g</sup>
GET <sup>a</sup>	3	3	3	n/a	3	3	3	2	3	n/a	2.89
GEI <sup>b</sup>	3	0	3	n/a	1	1	1	0	0	0	1.00
PRT <sup>c</sup>	1	1	3	n/a	1	3	1	0	1	n/a	1.14
PRI <sup>d</sup>	3	1	3	1	3	1	1	0	1	0	1.33

Notes: Scores are out of 3.0

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

e = Sensitivity shown to the child

f = Comprehension Support

g = Technology Support

Table N11

*Child's Affective Scores – Juan*

Text	Engagement				Warmth			Total Score
	Persistence	Enthusiasm	Focus	Reading Expression	Proximity	Compliance	Sensitivity	
GET <sup>a</sup>	3	3	3	2	2	2	2	2.5
GEI <sup>b</sup>	2	2	3	0	1	1	1	1.63
PRT <sup>c</sup>	1	0	2	0	1	1	0	0.81
PRI <sup>d</sup>	3	3	3	n/a	3	1	1	2.83

Notes: Scores are out of 3.0

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

Table N12

*Mother/Child Composite Affective Climate Scores and Ownership – Juan*

Text	Order	Engagement		Warmth		Support		Total Score		Ownership
		Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	4	3.00	2.75	3.0	2.00	2.50	n/a	2.89	2.50	Shared
GEI <sup>b</sup>	1	2.00	1.75	1.00	1.00	.33	n/a	1.00	1.63	Child
PRT <sup>c</sup>	3	1.25	.75	1.67	0.67	0.50	n/a	1.14	0.81	Child
PRI <sup>d</sup>	2	2.00	3.00	1.67	1.67	0.33	n/a	1.33	2.83	Child

Notes: Scores are out of 3.0

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text



## Selina's Case

Table N13

### *Mother's Affective Scores – Selina*

Text	Engagement				Warmth			Support			Total Score
	Persistence	Enthusiasm	Focus	Reading Expression	Proximity	Reinforcement	Sensitivity	Text	Comp <sup>f</sup>	Tech <sup>g</sup>	
GET <sup>a</sup>	3	3	3	3	3	3	3	2	3	n/a	2.86
GEI <sup>b</sup>	3	2	2	n/a	3	2	3	n/a	2	2	2.38
PRT <sup>c</sup>	3	3	3	n/a	3	3	3	3	3	n/a	3.00
PRI <sup>d</sup>	3	2	3	3	3	2	2	0	3	2	2.22

Notes: Scores are out of 3.0

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

e = Sensitivity shown to the child

f = Comprehension Support

g = Technology Support

Table N14

*Child's Affective Scores – Selina*

Text	Engagement				Warmth			Total Score
	Persistence	Enthusiasm	Focus	Reading Expression	Proximity	Compliance	Sensitivity	
GET <sup>a</sup>	3	3	3	2	3	3	3	2.86
GEI <sup>b</sup>	3	3	3	3	3	3	2	2.89
PRT <sup>c</sup>	3	2	3	2	3	3	2	2.83
PRI <sup>d</sup>	3	2	3	n/a	3	3	2	2.67

Notes: Scores are out of 3.0

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

Table N15

*Mother/Child Composite Affective Climate Scores and Ownership – Selina*

Text	Order	Engagement		Warmth		Support		Total Score		Ownership
		Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	4	3.00	2.75	3.0	3.00	2.50	n/a	2.89	2.86	Shared
GEI <sup>b</sup>	3	2.33	3.0	2.67	2.67	2.0	n/a	2.38	2.83	Shared
PRT <sup>c</sup>	1	3.0	2.75	3.0	3.0	3.0	n/a	2.00	2.71	Shared
PRI <sup>d</sup>	2	2.67	2.67	2.33	2.67	1.67	n/a	2.22	2.67	Shared

Notes: Scores are out of 3.0

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

## Tyler's Case

Table N16

### *Mother's Affective Scores – Tyler*

Text	Engagement			Reading Expression	Warmth			Support			Total Score
	Persistence	Enthusiasm	Focus		Proximity	Reinforcement	Sensitivity	Text	Comp <sup>f</sup>	Tech <sup>g</sup>	
GET <sup>a</sup>	2	1	3	1	2	0	3	0	2	n/a	1.57
GEI <sup>b</sup>	3	2	3	3	3	2	2	3	3	2	2.60
PRT <sup>c</sup>	3	0	3	2	2	0	3	3	3	n/a	2.11
PRI <sup>d</sup>	1	2	3	n/a	0	0	2	0	2	2	1.33

*Notes:* Scores are out of 3.0

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

e = Sensitivity shown to the child

f = Comprehension Support

g = Technology Support

Table N17

*Child's Affective Scores – Tyler*

Text	Engagement				Warmth			Total Score
	Persistence	Enthusiasm	Focus	Reading Expression	Proximity	Compliance	Sensitivity	
GET <sup>a</sup>	3	1	3	1	2	1	0	1.57
GEI <sup>b</sup>	3	2	3	1	3	1	1	2.0
PRT <sup>c</sup>	2	0	2	n/a	2	0	0	1.0
PRId	3	0	3	n/a	0	1	0	1.17

Notes: Scores are out of 3.0

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

Table N18

*Mother/Child Composite Affective Climate Scores and Ownership - Tyler*

Text	Order	Engagement		Warmth		Support		Total Score		Ownership
		Mom	Child	Mom	Child	Mom	Child	Mom	Child	
GET <sup>a</sup>	2	1.75	2.00	1.67	1.0	1.0	n/a	1.56	1.57	Tyler
GEI <sup>b</sup>	1	2.75	2.25	2.33	1.67	2.67	n/a	2.60	2.00	Tyler
PRT <sup>c</sup>	4	2.00	1.33	1.67	.67	3.0	n/a	2.11	1.0	Tyler
PRId	3	2.00	2.00	.67	.33	1.33	n/a	1.17	1.33	Tyler

Notes: Scores are out of 3.0

a = *Green Eggs and Ham* - Traditional Text

b = *Green Eggs and Ham* - iPad Text

c = *The Tale of Peter Rabbit* - Traditional Text

d = *The Tale of Peter Rabbit* - iPad text

### **Appendix O: Descriptions of Affective Climate Categories and Subcategories**

The engagement category consisted of four subcategories—persistence, enthusiasm, focus, and reading expression. Persistence referred to the mother and child’s willingness to continue with the experience even though it was uncomfortable, boring, or difficult. Enthusiasm referred to the level the mother and child appeared to be enjoying the experience (e.g., smiling, laughing, asking questions, engaging with the story). Focus referred to whether or not the mother and child’s center of interest was the book reading experience. Were they focused on the book throughout or were they distracted by things in the observation room (e.g., toys, books) or things happening after the reading experience (e.g., going to a fast-food restaurant for lunch, going back to the classroom)? Reading expression referred to the use of multi-tonal inflections and/or character voices as they read the story. This was used as a sub-category only when the mother or child did some or all of the reading.

As I examined the engagement category for each dyad, I noticed that the child physically interacted with the digital texts (e.g., pushed icons, pushed a word for reading support) far more often than the mother. There was such an obvious difference between the traditional readings and the digital readings that I went back and counted how many times the child and the mother physically interacted with the with each of the texts (see Appendix T). This information provided additional insight to the engagement category.

The warmth category included four additional subcategories of the affective climate—compliance (child only), proximity, reinforcements (mother only), and sensitivity to the other member of the dyad. Each of these subcategories were a priori with the exception of compliance. Compliance referred to the child’s willingness to respond positively to the mother’s requests and directions. This category emerged as I was coding using the a priori categories for

the affective climate for case one. In case one, Chantel did not respond as readily to her mother's requests when they were reading the digital storybooks as she did when they were reading the traditional books. Because of difference, I noticed that as the book type changed so did the child's willingness to comply and thus added the compliance subcategory. Proximity dealt with the space and distance between the mother and child. Reinforcements were the amount of positive comments and actions given to the child by the mother. Sensitivity measured how aware each member of the dyad was that the reading was a social activity (e.g., eye contact, adjusting behavior based on the other's comments, responding to the other's questions).

As I was evaluating the warmth of each book reading, I noticed a pattern that was not fully represented in the Affective Climate rating scale. When the dyad was reading the digital storybooks, it appeared that the child did not answer as many of the mother's questions as he or she answered during the traditional storybook readings. This lack of sensitivity was reflected in the composite warmth score, but I felt that the score alone did not tell the whole story and I wanted to explore it further. So, I went back to the transcripts and counted how many questions the mother asked during each book reading and how many of those questions were either answered or acknowledged in some way by the child. A pattern did emerge. In five of the six cases, the child responded to fewer of the mother's questions during the digital reading than during the traditional reading (see Appendix U).

The support category examined the amount of support or help given by the mother in the areas of text, meaning, and technology (digital readings only). Text support included things such as tracking print while the child was reading, assisting the child in decoding words, supplying unknown words. Meaning support included things such as asking questions, making inferences,

or labeling pictures. Technology support included things like helping the child determine how both the hardware and software functioned. This category was only scored for the mother.

I looked at who held the book, who turned the pages, and who did the reading. I also looked at who was physically interacting with the books (e.g., pointing at words and pictures, pushing icons). To help make this determination, I went back to the transcripts and counted the following: (a) how many words read by the mother, child, and iPad voice; (b) how many pages the mother and child each turned; (c) total number of interactions initiated by the mother and child; and (d) number of times the mother and child physically interacted with the books (pointing, pushing, etc.).

## Appendix P: Example of a Mother Interview Questions

### Dyad: Alia and her mother

1. Have you read either of the books before with your child? How often?
2. Are these typical of the types of books you read together?
3. How typical were the readings of the traditional books to the mother-child book-reading experiences you have at home?

Probes: What were the similarities? What are the differences? Why do you think the experiences were different?

4. Have you ever read a book to your child on a technological device before this experience? How typical were the readings of the books on the iPad to the mother-child book-reading experiences you've had previously?

Probes: Tell me about your previous experiences? What were the similarities? What are the differences? Why do you think the experiences were different?

5. What kinds of experiences has your child had with an iPad?
6. Tell me how you felt about the overall book reading experiences? Was it what you expected? Did you discover something that you found surprising?
7. Would you use an iPad again as a way to read stories with your child? Why or why not?
8. Which type of reading do you think Alia liked better?
9. Let's look at a couple of video clips. I want to get your impressions of what is happening
  - a. PRT
    - i. 1:50 – Alia said, “I’m Cottontail.” Is this typical for her to put herself in the story?
    - ii. 2:50-3:20 – There seems to be a lot of talk here – back and forth. Is this typical?
    - iii. You define words – “Do you know what mischief means?” Typical?
    - iv. 7:55 – Alia seems to be looking very intently at the book throughout. Is her attention usually this good?
  - b. PRIP
    - i. :35 - Beginning – book starts in the wrong place – It looks like Alia figures it out. Does she often figure out technological problems?



- ii. 1:02 – You said, “Oh, it is going to read to us?” Is that what you wanted? Did you know how to change it?
  - iii. “We’re kind of in a hurry” Throughout the first part of the book you seemed to be encouraging Alia to turn the pages – but towards the end you didn’t. Tell me about that.
  - iv. 1:59 – Alia seems to be pushing your hand away? Why?
  - v. 5:30 – Alia says, “You try” several times in the story to encourage you to play with the icons. Why do you think she does this?
  - vi. 6:50 - Gooseberry page. What were you thinking here? How about Alia?
- c. GET
- i. 1:22- You are showing her the title. Do you typically talk about the title – book parts?
  - ii. She starts off reading the book. Does she typically do the reading when you are reading books on her level?
  - iii. 4:15 – You are tracking the print and pointing to words she is struggling with. Is this typical? You reread a part to clarify. Is this typical. Alia seems very perseverant – is she always this way?
  - iv. 5:30 – The two of you negotiate the reading – each reading what a different character says. Is this typical?
- d. GEIP
- i. :35 – Alia chooses Read to Me but then goes back quickly and changes. Why do you think she did this?
  - ii. 4:00 – 4:35 – Alia uses the iPad for word support rather than you. What do you think about that? She does this throughout.
  - iii. Several times you suggest that Alia can take a break from doing all the reading. Why did you do this?
  - iv. Why do you think she was able to do more of the reading on the iPad than the traditional book?
  - v. 12:34 – technological break-down. You fix it. Do you think Alia could have figured this out without you?
  - vi. Alia moves around and fidgets when she reads – is this what you meant when you told me that she gets anxious when she reads.
  - vii. 18:18 – you ask if Alia wants you to take over – when she says no were you surprised?
  - viii. 28:20 – When Alia wanted to read it again – what were you thinking? You sat by her – would you have done that at home?
10. I noticed in the survey that you said . . . (refer to technology experience and book reading experience).
- a. You have a college degree – what did you study
  - b. What were your husband’s degrees in?

- c. What does he do for work?
- d. Tell me about your at home reading routines?
- e. I noticed that Alia's grandmother lives in your home? Does she read to Alia?  
How often?

### Appendix Q: Themes and Factors

Themes and Factors	Theme Abbreviations
<p>Theme 1: Vocabulary interactions increase with the iPad.            Factors:</p> <ol style="list-style-type: none"> <li>1. Describing/Labeling interactions</li> <li>2. Describing/Defining interactions</li> </ol>	<p>Increase in vocabulary</p>
<p>Theme 2: Meaning interactions (mother-initiated) increase with the iPad as Mom is checking to see if her child is listening.            Factors:</p> <p>Vocabulary</p> <ol style="list-style-type: none"> <li>1. Describing/Labeling</li> <li>2. Describing/Defining</li> </ol> <p>Organizing and summarizing</p> <ol style="list-style-type: none"> <li>1. Recall/Retell</li> <li>2. Confirming</li> </ol> <p>Inference making</p> <ol style="list-style-type: none"> <li>1. Clarifying</li> <li>2. Connecting</li> <li>3. Predicting</li> </ol> <p>Percentage of the mother's talk that was related to meaning making</p>	<p>Increase in Mother-Initiated Meaning</p>
<p>Theme 3: Text interactions decreases during the iPad readings.            Factors:</p> <ol style="list-style-type: none"> <li>1. Text support scores – affective climate</li> <li>2. Text interaction counts</li> </ol> <p>Number of text-related words spoken</p>	<p>Decrease in Text Interactions</p>
<p>Theme 4: The majority of the talk when using the iPad is technology related.            Factors:</p> <p>Operational</p> <ol style="list-style-type: none"> <li>1. Accessing the story</li> <li>2. Problem solving</li> </ol> <p>Functional</p> <ol style="list-style-type: none"> <li>1. Selecting reading type</li> <li>2. Responding to audio clues</li> <li>3. Responding to visual clues</li> <li>4. Pushing words</li> <li>5. Pushing icons</li> <li>6. Turning pages</li> </ol> <p>Percent of words spoken that are technology related, meaning related, and text related</p>	<p>Interactions about Technology</p>

<p>Theme 5: Mother's affect decreases when using the iPad</p> <p>Factors:</p> <ol style="list-style-type: none"> <li>1. Total affect score</li> </ol>	Decrease in Mother's Affect
<p>Theme 6: Child's affect increases when using the iPad.</p> <p>Factors:</p> <ol style="list-style-type: none"> <li>1. Total affect score</li> </ol>	Increase in Child's Affect
<p>Theme 7: Child's engagement increases with the iPad readings.</p> <p>Factors:</p> <ol style="list-style-type: none"> <li>1. Engagement score on affective scale</li> <li>2. Length of the readings</li> </ol>	Increase in Child's Engagement
<p>Theme 8: Sensitivity to the other decreases during the iPad readings.</p> <p>Factors:</p> <ol style="list-style-type: none"> <li>1. Sensitivity score on the affective scale</li> <li>2. Questions asked and answered.</li> </ol>	Sensitivity decreases
<p>Theme 9: The child has ownership during the iPad readings.</p> <p>Factors:</p> <ol style="list-style-type: none"> <li>1. Who does the reading</li> <li>2. Who of pages turned</li> <li>3. Who holds the book</li> <li>4. Who interacts with the book</li> </ol>	Child's power/control increases

## Appendix R: Analyst Notes

### Example: Chantel

#### *Analyst Notes for Chantel*

<p>Synopsis of case:</p> <p>Chantel and her mother are a high income, English-language dyad with significant literacy as well as technology experience. The mother is a college-educated, first generation Arab-American who has not worked outside the home. She has helped her husband with some in home business ventures. She reads to Chantel every night before bed. She is wary of the effects of technology on her children's development and limits their time with devices.</p>	<p>Case Findings:</p> <p>I. There was a conflict of objectives during the iPad readings. Chantel wanted to play with the icons while listening to the story but her mother wanted her to talk about meaning. She seemed concerned that Chantel was not listening to the story. (Theme 2, Theme 8, Theme 10, Theme 12)</p> <p>II. The mother's affect decreased while reading the iPad texts. She became engaged as evidenced by her enthusiasm levels, reading expressions, and lower sensitivity to Chantel. (Theme 4, Theme 8)</p> <p>III. Technology provided an opportunity for additional meaning talk not found in the traditional reading. (Theme 14)</p> <p>V.</p>
<p>Relevance of case for cross-case Themes:</p> <p>Theme 1 – yes – Mother – Peter Rabbit – m          Theme 2 – yes – Mother – Peter Rabbit – m          Theme 3 –          Theme 4 – yes – M both          Theme 5 – yes – M both          Theme 6 – <i>Peter Rabbit</i> only – m          Theme 7 – <i>Peter Rabbit</i> only - m          Theme 8 – both <i>Green Eggs</i>; Mother – <i>Peter Rabbit</i> – M          Theme 9 – m <i>Green Eggs</i></p>	<p>Factors (optional):</p> <ol style="list-style-type: none"> <li>1. Interaction counts</li> <li>2. Interaction counts and transcript counts</li> <li>3. Interaction counts and word counts/percentages</li> <li>4. Interaction counts and word counts and percentages</li> <li>5. Affective scores</li> <li>6. Affective scores</li> <li>7. Engagement score and length of the readings</li> <li>8. Sensitivity scores/Questions asked and answered</li> <li>9. Ownership scores</li> </ol>

*Evidence of Themes in Chantel*

Theme 1	m <i>Peter Rabbit</i> Mother	<p><i>Peter Rabbit</i> – There is comprehension talk using the icons as support—labeling the bunnies and talking about a sieve. Another good exchange involves the gooseberries and mom talks about how the gooseberries look like they are wrapped in paper—but she spends more time talking about the gooseberry net while Chantel is interested in pushing the gooseberries.</p> <p>Vocabulary interaction counts – Mom’s increase from 8 to 23; child’s increase from 1 to 2; 18 of the 25 interactions are labeling.</p>
Theme 2	m <i>Peter Rabbit</i> Mother	<p><i>Peter Rabbit</i> – The most interesting thing about this reading is mom’s desire to talk about the story and offer comprehension support while Chantel’s desire is to play with the icons. Though the dyad is warm, there is an underlying presence of different objectives. Mom initiates 45 out of the 49 meaning interactions (labeling [23] and inference making [16] are the most common interactions). Chantel answers 53% of her questions but seems disinterested in most of them.</p> <p>Mom speaks 480 meaning-related words during <i>PRT</i> and 682 during <i>PRI</i>.</p>
Theme 3		
Theme 4	M Both Both	<p><i>Peter Rabbit</i> – Out of 109 interactions, 58 of them are tech related (42 mother-initiated; 16 child-initiated). 44% of Mom’s words spoken were tech related and 65% of Chantel’s words were tech related.</p> <p><i>Green Eggs</i> – Out of 47 interactions, 27 of them are tech related. The majority of these (11) are about how to get the iPad to read. Mom initiates 20 of these interactions. However, 51% of Mom’s word were tech related and 48% of Chantel’s.</p>

Theme 5	M Both	<p>Mom's affective scores decrease for both iPad readings (<i>Green Eggs</i> – 2.11 to 1.35; <i>Peter Rabbit</i> – 2.33 to 1.80). This is due to a decrease in total engagement scores (specifically enthusiasm and reading expression).</p> <p><i>Peter Rabbit</i> – Mom's reading expression varies. At the beginning, it is good but when she starts competing with the iPad, it disappears. At the end of the story, Chantel stops pushing to have the iPad read and mom finishes the story with better reading expression. For <i>Peter Rabbit</i>, the warmth score decreases due to lack of sensitivity to the other.</p> <p><i>Green Eggs</i> – At the end of the reading, Chantel wants to read it again, this time selecting the "Read-to-Me" option. Mom quickly tells her that they have to be done and turns off the iPad. Chantel complies.</p>
Theme 6	m <i>Peter Rabbit</i>	<p>Chantel enjoys both readings but especially enjoys the <i>PRI</i> reading. This is the only increase in affective score (1.86 to 2.83 due to an increase in all her engagement scores). Her <i>GEI</i> affective score decreases because she becomes frustrated with her mother trying to ask her questions about the story (sensitivity to the other) and her reading expression decreases (engagement).</p>
Theme 7	m <i>Peter Rabbit</i>	<p><i>Peter Rabbit</i> – Engagement scores increase for <i>Peter Rabbit</i> (1.67 to 3.0) The time spent reading increases from 12:04 minutes (<i>PRT</i>) to 22.01 (<i>PRI</i>). In addition, Chantel increases the number of times she smiles from 9 to 17. During <i>PRT</i> she loses interest a couple of times—looking away (see pictures). This does not happen during <i>PRI</i>. During <i>PRI</i> she wants to read the story again at the conclusion of the reading but at the conclusion of <i>PRT</i> jumps off the couch and heads for the door. (See pictures).</p> <p><i>Green Eggs</i> – Her engagement scores for <i>Green Eggs</i> all increase with the exception of reading expression. She does not seem to be enthused when her Mom has her read; she would rather interact with the iPad. This brings down the total engagement scores. Time increases from 9:37 to 16:39. Chantel is ready to be finished at the end of <i>GET</i> – heads to the door (see pictures). At the conclusions of <i>GEI</i> this is the interaction:</p> <p>C: Read to me.</p>

		<p>C: ((Pushes read to me))  I: [<i>I am Sam.</i>]  M: [I think we have to be done.] Yeah, I think we have to be done.  M: ((Pushes menu icon)) ((Looks at child))</p> <p>PRT – 12:04  PRI – 22:01  GET – 9:37  GEI – 16:39</p>
Theme 8	<p>M  <i>Green Eggs</i>  Both</p>	<p>Mom’s Sensitivity Scores decrease for both iPad readings. However there is an underlying warmth throughout all of the readings.</p> <p><i>Peter Rabbit</i> – There are a couple of times that mom restrains Chantel’s hand from accessing the icons. This is done gently, and Chantel complies. The number of negative comments made increase from 0 to 9.  <i>Green Eggs</i> – Chantel was frustrated with her mom about the story. Her mom thought that Sam’s friend had tried Green Eggs and Ham before and he knew that he didn’t like them. Chantel knew that Sam’s friend had never tried them. She tells her mother in a stern voice that she knows because she has read this story before. At the end, when Chantel proves her point, she turns to her mom and says, “See?”</p>
Theme 9	<p>m  <i>Green Eggs and Ham</i></p>	<p>There isn’t much evidence of a power struggle, but Chantel definitely has more power during the iPad readings.</p> <p><i>Peter Rabbit</i> – Mom does all the reading in <i>PRT</i> (with the exception of 5 words). Mom also turns most of the pages. Mom and the iPad share the reading in <i>PRI</i>. Chantel has more control during this reading. When Chantel discovers how to make the iPad read, the reading changes. At first she wants her mom to read, and then she has the iPad reread the passage. Mom says that she can imitate the English accent and reads one passage that way. They have the iPad reread the passage to see if she</p>



		<p>did a good job with the accent. Near the end, Chantel just wants the iPad to read rather than Mom.</p> <p>During <i>PRT</i>, Mom holds the book but puts it between them so Chantel can easily see. During <i>PRI</i>, Mom holds the iPad, and Chantel interacts with the icons. Near the end of the story, Chantel has possession of the iPad. (see pictures)</p> <p><i>Green Eggs</i> – The <i>Green Eggs</i> experience is almost identical. <i>GET</i> – Mom holds the books and does all the reading. During <i>GEI</i>, Chantel is much more involved with the iPad than the book. She reads 73 of the words as compared to 5. They share the page turning.</p>
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### Appendix S: Merged Themes and Manifestations

Theme	Chantel	Alia	Ian	Juan	Selina	Tyler
1	m	m	M	M	m	m
2	m			M		m
3	m	M	m		M	M
4	M	M	m		M	m
5	M	M	m		M	m
6	m	m	M	M	m	M
7	m	M	M	M		m
8	M	M	m		M	M
9	m	M	m		M	

### Appendix T: Physical Interactions

Table T1

*Chantel's Case*

Action	GET Child	GET Mom	GEI Child	GEI Mom	PRT Child	PRT Mom	PRI Child	PRI Mom
Turns Pages <sup>a</sup>	0	31	26	20	6	24	30	18
Points at Words	3	2	0	4	1	0	0	1
Points at Pictures	0	10	0	3	6	10	4	17
Pushes on Words	n/a	n/a	6	0	n/a	n/a	44	0
Pushes Pictures	n/a	n/a	71	1	n/a	n/a	460	15
Pushes to Read	n/a	n/a	123	20	n/a	n/a	0	0

<sup>a</sup>There are more page turns during the digital readings because many times it took multiple swipes to make the pages turn.

Table T2

*Alia's Case*

Action	GET Child	GET Mom	GEI Child	GEI Mom	PRT Child	PRT Mom	PRI Child	PRI Mom
Turns Pages <sup>a</sup>	27	2	145	67	1	32	88	34
Points at Words	0	19	4	16	0	1	1	0
Points at Pictures	4	7	15	7	2	27	6	11
Pushes on Words	n/a	n/a	41	25	n/a	n/a	11	6
Pushes Pictures	n/a	n/a	149	3	n/a	n/a	403	22
Pushes to Read	n/a	n/a	0	0	n/a	n/a	0	0

<sup>a</sup>There are more page turns during the digital readings because many times it took multiple swipes to make the pages turn.

Table T3

*Ian's Case*

Action	GET Child	GET Mom	GEI Child	GEI Mom	PRT Child	PRT Mom	PRI Child	PRI Mom
Turns Pages <sup>a</sup>	0	29	63	2	32	18	53	9
Points at Words	26	5	0	4	1	25	1	26
Points at Pictures	26	5	0	4	23	5	21	18
Pushes on Words	n/a	n/a	1	0	n/a	n/a	14	6
Pushes Pictures	n/a	n/a	118	4	n/a	n/a	535	2
Pushes to Read	n/a	n/a	1	0	n/a	n/a	2	0

<sup>a</sup>There are more page turns during the digital readings because many times it took multiple swipes to make the pages turn.

Table T4

*Juan's Case*

Action	GET Child	GET Mom	GEI Child	GEI Mom	PRT Child	PRT Mom	PRI Child	PRI Mom
Turns Pages <sup>a</sup>	12	28	62	6	32	2	57	13
Points at Words	12	9	1	0	0	0	6	0
Points at Pictures	45	27	1	1	0	2	0	3
Pushes on Words	n/a	n/a	33	0	n/a	n/a	22	0
Pushes Pictures	n/a	n/a	31	0	n/a	n/a	304	0
Pushes to Read	n/a	n/a	20	0	n/a	n/a	0	0

<sup>a</sup>There are more page turns during the digital readings because many times it took multiple swipes to make the pages turn.

Table T5

*Selina's Case*

Action	GET Child	GET Mom	GEI Child	GEI Mom	PRT Child	PRT Mom	PRI Child	PRI Mom
Turns Pages <sup>a</sup>	0	28	67	28	30	6	40	36
Points at Words	3	3	0	0	0	9	0	0
Points at Pictures	11	6	3	1	2	8	0	0
Pushes on Words	n/a	n/a	20	0	n/a	n/a	13	2
Pushes Pictures	n/a	n/a	285	0	n/a	n/a	287	37
Pushes to Read	n/a	n/a	0	0	n/a	n/a	1	0

<sup>a</sup>There are more page turns during the digital readings because many times it took multiple swipes to make the pages turn.

Table T6

*Tyler's Case*

Action	GET Child	GET Mom	GEI Child	GEI Mom	PRT Child	PRT Mom	PRI Child	PRI Mom
Turns Pages <sup>a</sup>	33	2	63	4	23	9	38	0
Points at Words	6	6	2	13	144	6	0	0
Points at Pictures	134	6	15	7	0	8	0	1
Pushes on Words	n/a	n/a	31	6	n/a	n/a	38	0
Pushes Pictures	n/a	n/a	237	3	n/a	n/a	241	7
Pushes to Read	n/a	n/a	60	6	n/a	n/a	7	2

<sup>a</sup>There are more page turns during the digital readings because many times it took multiple swipes to make the pages turn.



## Appendix U: Questions Asked and Answered

### Chantel's Case

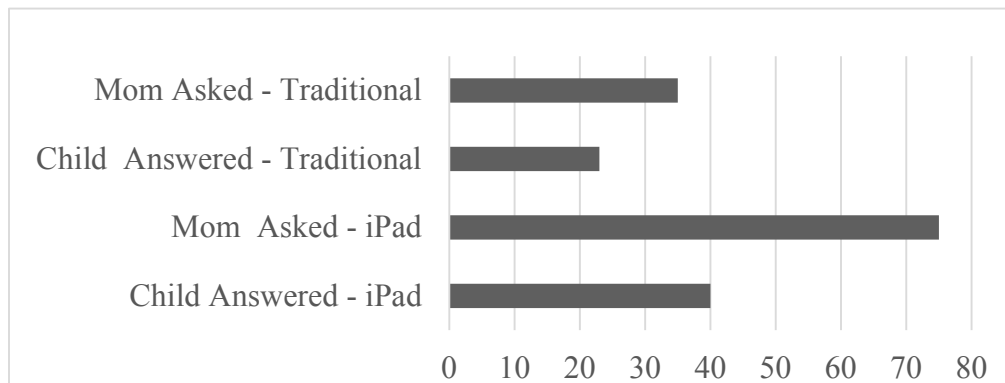


Figure U1. Chantel – *The Tale of Peter Rabbit*.

Traditional – Chantel answered 66% of her mother's questions

iPad – Chantel answered 53% of her mother's questions

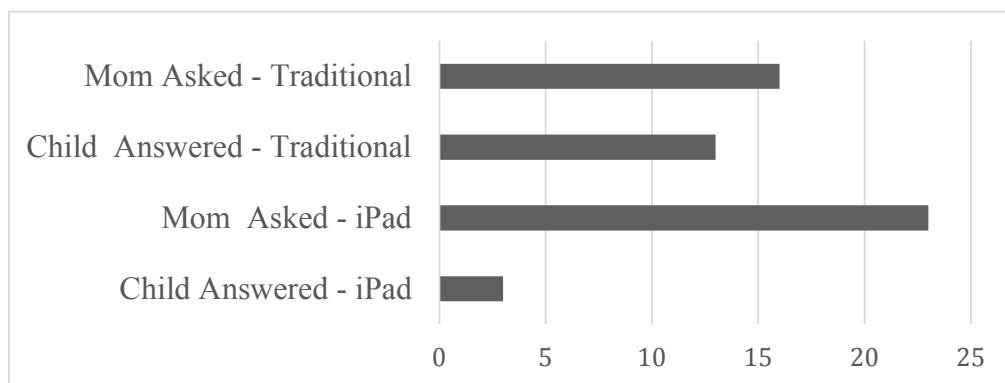


Figure U2. Chantel – *Green Eggs and Ham*.

Traditional – Chantel answered 81% of her mother's questions

iPad – Chantel answered 14% of her mother's questions

### Alia's Case

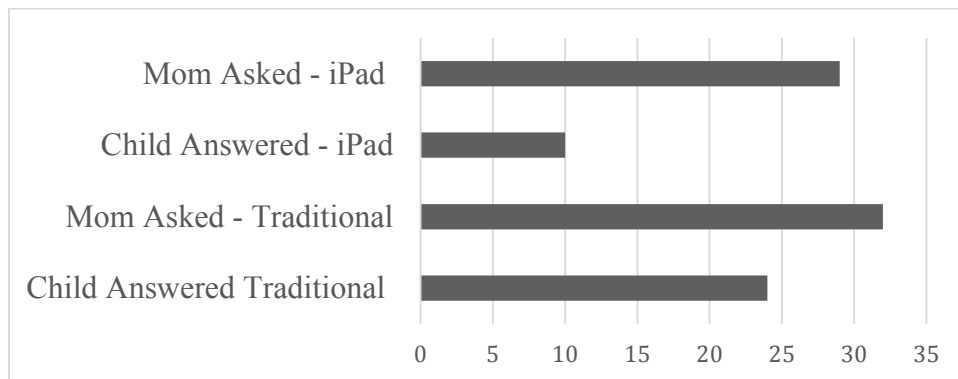


Figure U3. Alia - *The Tale of Peter Rabbit*.

Traditional – Alia answered 75% of her mother's questions

iPad – Alia answered 35% of her mother's questions

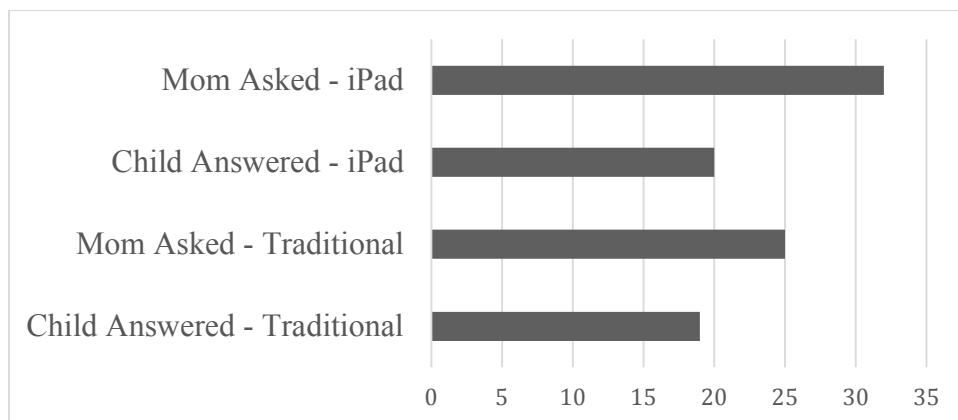


Figure U4. Alia – *Green Eggs and Ham*.

Traditional – Alia answered 76% of her mother's questions

iPad – Alia answered 62% of her mother's questions

### Ian's Case

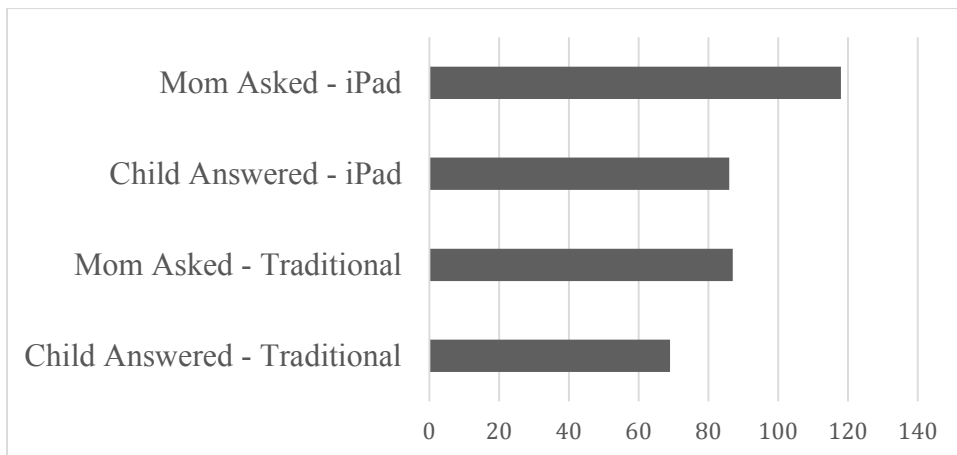


Figure U5. Ian – *The Tale of Peter Rabbit*.

Traditional – Ian answered 79% of his mother's questions.

iPad – Ian answered 72% of his mother's questions.

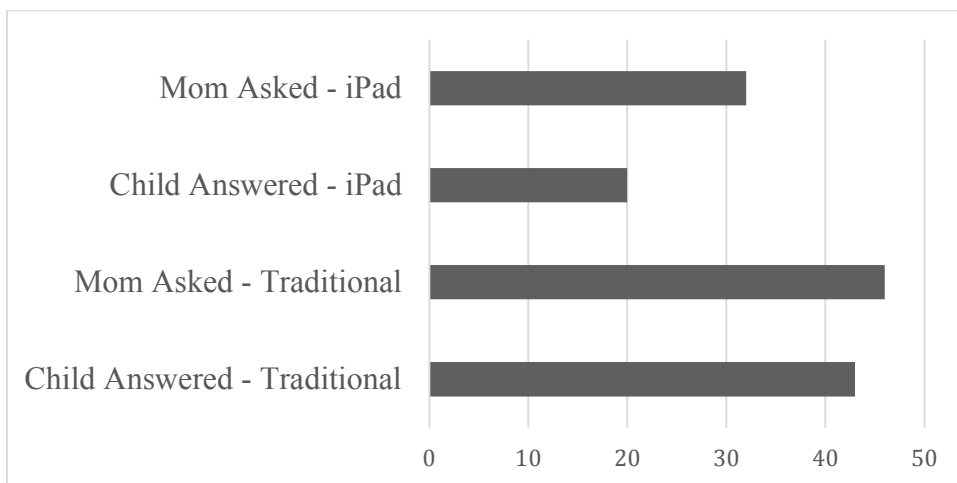


Figure U6. Ian – *Green Eggs and Ham*.

Traditional – Ian answered 93% of his mother's questions

iPad – Ian answered 62% of his mother's questions

### Juan's Case

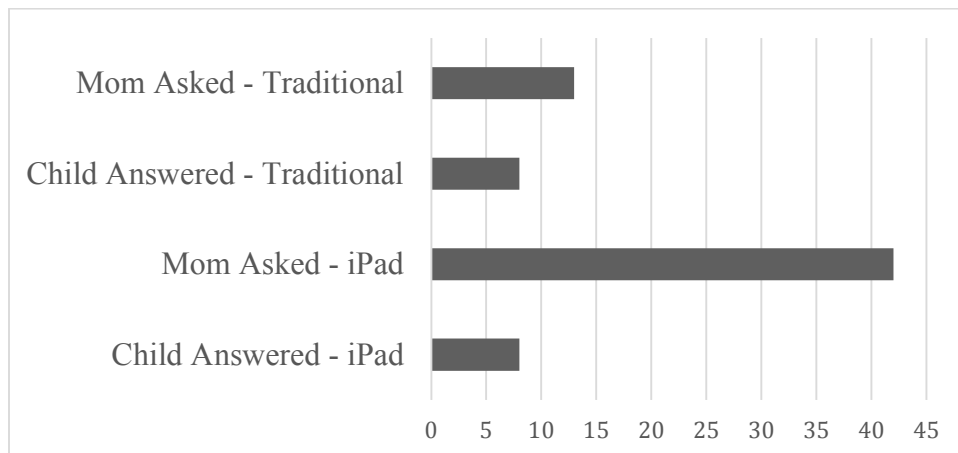


Figure U7. Juan – *The Tale of Peter Rabbit*.

Traditional – Juan answered 62% of his mother's questions

iPad – Juan answered 19% of his mother's questions

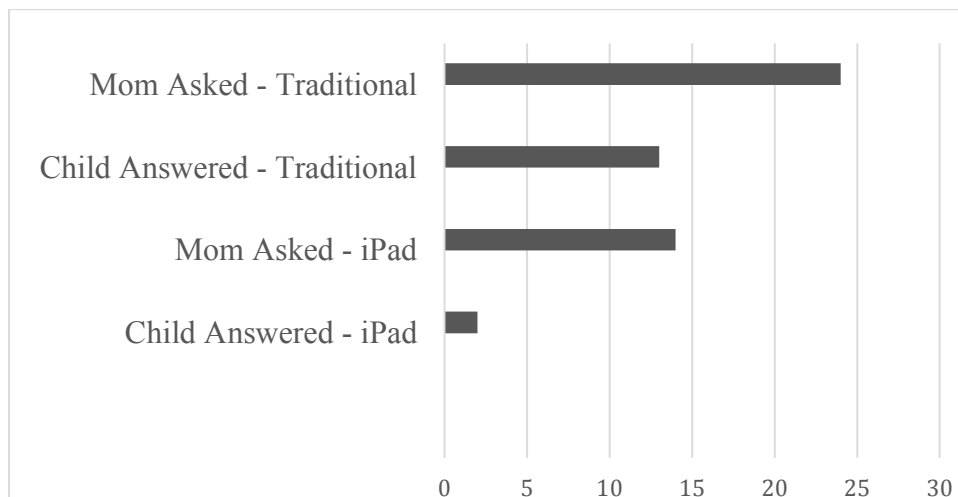


Figure U8. Juan – *Green Eggs and Ham*.

Traditional – Juan answered 54% of his mother's questions

iPad – Juan answered 14% of his mother's questions

### Selina's Case

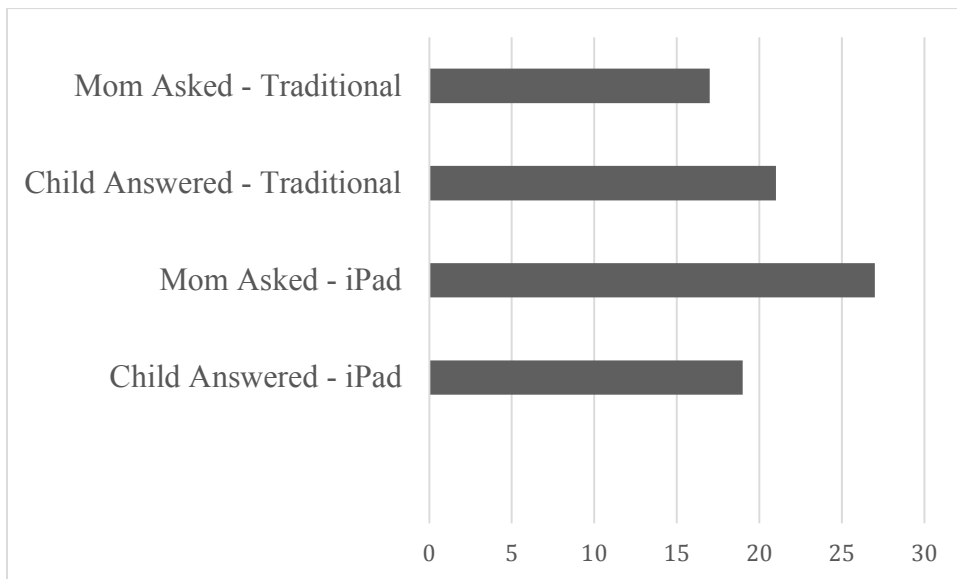


Figure U9. Selina – *The Tale of Peter Rabbit*.

Traditional – Selina answered 81% of her mother's questions

iPad – Selina answered 69% of her mother's questions

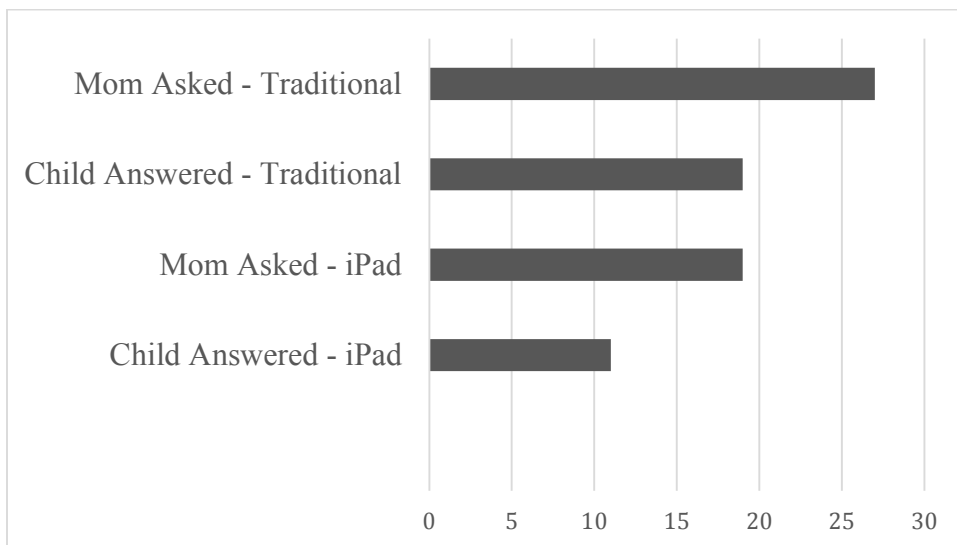


Figure U10. Selina – *Green Eggs and Ham*.

Traditional – Selina answered 70% of her mother's questions

iPad – Selina answered 58% of her mother's questions

## Tyler's Case

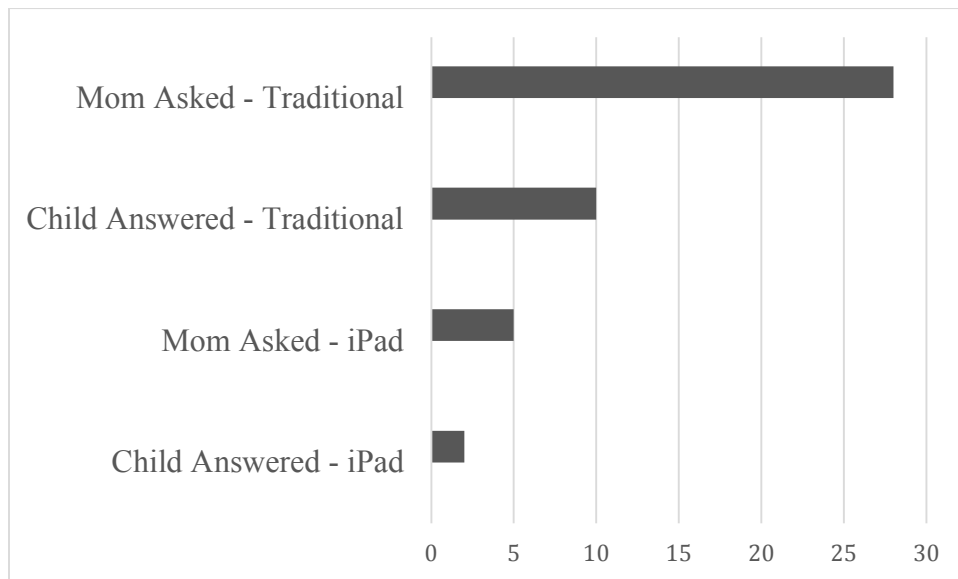


Figure U11. Tyler – *The Tale of Peter Rabbit*.

Traditional – Tyler answered 36% of his mother's questions

iPad – Tyler answered 40% of his mother's questions

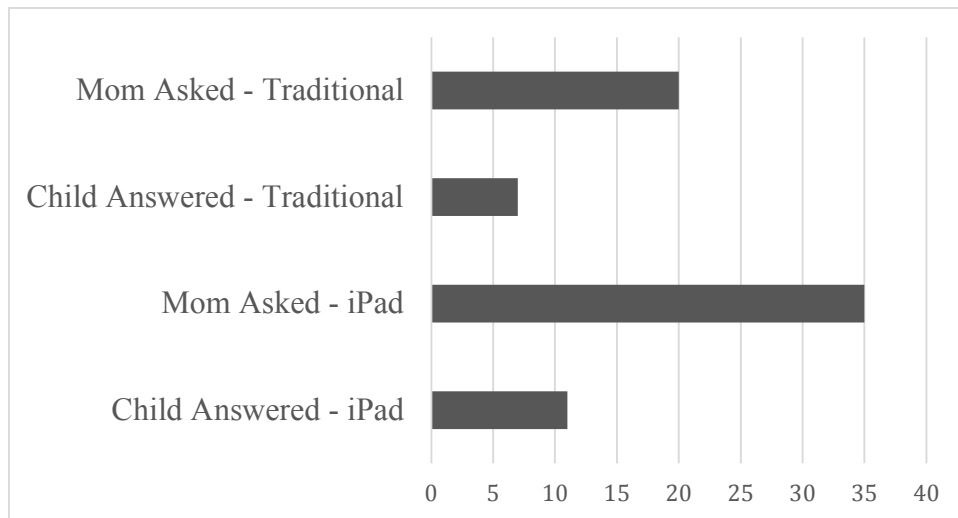


Figure U12. Tyler – *Green Eggs and Ham*.

Traditional – Tyler answered 35% of his mother's questions

iPad – Tyler answered 31% of his mother's questions