The Effects of an Enhanced eBook on Parent Dialogic Reading Behaviors

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Abstract

Children's reading experiences have changed due to the increasing use of new digital media, such as eBooks. However, it is important for parents to actively engage with their child during reading no matter the medium. This can be done by prompting children to think more deeply about and discuss the content, for instance. One method to encourage active parent-child engagement that may be effective is *dialogic reading*. Using the mnemonic PEER to structure the interaction (prompt, evaluate, expand, and recall), and CROWD (for different kinds of prompts: completion, recall, open ended, wh- prompts, and distancing), this technique, developed by Whitehurst and colleagues, teaches parents to use open-ended questions and conversation prompts to structure their shared reading interactions and promote children's language development. The current study examined how much parents learn these strategies from being exposed to a dialogic reading character who modeled these strategies in a narrated eBook they used with their 3- and 4-year-old children over a two-week period. After this experience, parents applied the dialogic reading techniques when reading a different eBook and print book. This paper also discusses future directions for this type of research.

The Effects of an Enhanced eBook on Parent Dialogic Reading Behaviors

Shared book reading is an important contributor to preschool children's language development. When parents actively engage with their child during reading, their child gains more information and vocabulary from the content of a story (Barkin et al., 2006; Nathanson, 2001; van Kleeck, 1997). One method that increases parents-children talk while reading is *dialogic reading*. Parents are trained to provide their children with specific types of prompts, offer feedback to their child, and model complex responses while reading to promote language development (Whitehurst et at., 1994, 1988). When this method is used effectively, research shows significant increases in shared conversation and children's expressive vocabulary (Strouse et al., 2013; Whitehurst et al., 1994).

Dialogic reading research was originally conducted with print books (Whitehurst et al., 1994). With the recent increased usage of eBooks by families, it is important to consider how reading on an interactive touch screen such as an iPad, tablet, or phone may change parent-child reading behavior and how dialogic reading techniques can be implemented with new, digital formats (Krcmar & Cingel, 2014). Electronic books have grown significantly in popularity within the past decade. Between 2012 and 2013, the proportion of families who reported owning an eBook or eBook-capable device rose from 38% to 65% (Picton, 2014). Many features of eBooks (such as content-related animations and sound effects) can help children increase focus on the story content (Takacs et al., 2015). However, eBooks often contain interactive features, such as touch-activated hotspots and games, that can be distracting and limit positive learning outcomes. This may contribute to parents' well-documented preference toward traditional, printed storybooks (Maynard, 2010; Takacs, et al., 2015). Due to increased accessibility,

adaptability, and children's affinity for this electronic format, it is important to determine how to utilize eBooks to increase positive outcomes for both parents and children.

The current research examines how well parents can learn dialogic reading techniques through reading an eBook with an embedded model of the techniques over two weeks with their children. In previous research, when parents were explicitly taught dialogic strategies and used them while viewing a storybook video with their children on a TV screen (similar to Reading Rainbow), the children understood the story better and learned more words than children whose parents did not receive training (Strouse et al., 2013). Additionally, more recent research has shown that with only two uses of an enhanced eBook with a character who models dialogic prompts, parents are likely to increase their uses of dialogic reading strategies (Troseth, et al., 2020). The current research explores if parents can learn these techniques through an enhanced, dialogic eBook over a two-week period, and then apply these techniques when reading new storybooks, both print and digital, with their children.

Section 1: Shared book reading

Section 1a: Language and Literacy

Shared book reading interactions are important tools that promote language and literacy development for preschool aged children. This interaction can be a dedicated time for parents and children to discuss what they are looking at and learning about together. While reading, children are exposed to a wider variety of words, ideas, images, and actions than what they normally experience, such as dinosaurs, wild animals, cartoon characters, and people who look different from them (Demir-Lira et al., 2018; DeTemple & Snow, 2003). Given all of these novel terms and concepts, it is crucial for parents to talk to their child throughout a story, as increased quality and variety of parent talk, in addition to social interaction during shared book reading,

results in benefits to children's vocabulary acquisition and language development (van Kleeck et al., 1997). This research team suggests that when reading an unfamiliar book, parents can use practices, such as labeling and defining novel terms, to help their child understand new concepts. In contrast, when reading a familiar book, parents can continue to promote learning by using more complex or abstract prompts, such as asking children to make inferences or predictions. Research reveals that meaning related talk is a strong predictor for literacy skills, as it helps children put words and character actions into context (Hindman et al., 2013). Thus, parents discussing various book content with children while reading is clearly crucial, as it can be a significant contributor toward language and literacy development (Hindman et al., 2013).

However, exposure to shared reading interactions may not always be consistent across all children of preschool age, which can affect their vocabulary levels. In fact, research indicates that preschool-aged children who already had larger vocabularies produced more novel words after reading a storybook when compared to children with smaller vocabularies (Sénéchal et al., 1995). According to these authors, for children beginning at lower levels of vocabulary, shared book reading can be one of the most important aspects of producing and comprehending novel words. In their research, when compared to children who passively listened to a story, children who were asked to point to or label pictures performed substantially better on vocabulary comprehension tests. Active participation in reading can therefore be an important skill for parents to learn and use with their children to try to combat discrepancies in vocabulary early on.

Section 1b: Supportive Parenting During Reading

Parent-child interactions during reading are extremely important for children's language and literacy development. These interactions can vary depending on parent and child interest during book reading, but parent supportiveness is a strong predictor of children's early language

and literacy skills (Roberts et al., 2005). In these authors' study of different home literacy practices, a global measure of overall responsiveness and support of the home environment was the strongest predictor of children's language and emergent literacy skills between the ages of 3-5. Home supportiveness included several factors of the child's literary experience: maternal sensitivity, the frequency at which parents read with their children, the caregiver's emotional responsiveness, parental involvement, and the enjoyment of the reading experience. The more positive, warm, and responsive feedback the mother gave during reading, the more the child engaged with the book and had positive literacy attitudes and engagement. Roberts and her colleagues hypothesize that supportiveness can most accurately represent the child's overall learning environment, which is important to future vocabulary development and literacy skills. In order to maximize the benefits of shared book reading, it is important have supportive and comfortable environment for children to learn in.

Section 2: Dialogic Reading

Section 2a: What is dialogic reading?

One way to create a supportive reading environment is by increasing parent-child interactions with dialogic reading. Through the use of this method over an extended period, children's vocabulary and learning skills increase significantly (Zevenbergen & Whitehurst, 2003). This method teaches parents two mnemonic strategies to help them interact with their child during reading to benefit their child's vocabulary and story comprehension (Strouse et al., 2013). With the mnemonic PEER, parents are taught how to structure each interaction or utterance. They are taught to *prompt* their child, *evaluate* what their child has said, *expand* on what their child said, and ask their child to *recall* what they had previously read (Strouse et al., 2013; Zevenbergen & Grover, 2003). The mnemonic CROWD reminds parents of a range of

different kinds of prompts they could use. *Completion* prompts ask children to fill in the blanks

in a parent's statement. *Recall* prompts ask the child to remember previous information in the

story. *Open-ended* prompts ask children to critically think and provide multiple word answers.

Wh- prompts include who, what, when, where why, and how questions. *Distancing* prompts

relate the story to the child's own life. Parents are to use a variety of these prompts across each

reading session, choosing which one(s) work best. While some may be easier and more intuitive

for parents to use in earlier readings, they then move to using more challenging prompts (open

ended, distancing, completion) later on. All of these strategies encourage the child to engage

more deeply with the story (Strouse et al., 2013; Whitehurst, 1994; Zevenbergen & Grover,

2003).

Section 2b: Dialogic Reading Interventions

Implementation of dialogic reading methods has been varied throughout the literature.

When parents were explicitly taught this technique for reading print storybooks with their child,

they were able to apply the mnemonic strategies to their conversations while reading (Arnold et

al., 1994; Zevenbergen & Whitehurst, 1998). These results have even been replicated when

parents are taught dialogic reading techniques through video tutorials (rather than being taught

in person), demonstrating the possibility of using digital media to teach and reach more parents

about this beneficial shared-reading style (Arnold et al.,1994).

Further studies illustrate that dialogic reading techniques can be applied not only to

paper storybooks, but also to digital storybooks. When parents were explicitly taught dialogic

reading techniques and then used them while watching storybook videos with their children, the

children scored significantly higher on story specific vocabulary and story comprehension than

a group with no interventions (Strouse et al., 2013). In comparison, children who watched the

digital storybook with an on-screen actress (in the corner of the screen), who modeled dialogic

reading strategies instead of the parent, also appeared to learn somewhat more than the children

who watched alone, but not as much as those who watched with their parent. These results

demonstrate the promise of introducing dialogic questioning techniques in new formats, such as

being modeled by the dialogic actress on a video screen.

Despite these observed benefits, there are limitations of the degree dialogic reading

techniques can be implemented. Depending on parents' backgrounds, education levels, work

commitments, and beliefs about the overall value of reading, they may spend significantly more

or less time reading with their child (Janes & Kermani, 2001). Learning dialogic reading

strategies can also be time consuming, and, thus, inaccessible to many parents, particularly if

they need to visit a lab or library for the training. It follows if parents do not emphasize the

importance of reading or simply do not have the time to learn this technique themselves,

dialogic reading cannot be implemented as widely (Janes & Kermani, 2001). Therefore, it is

important to look at ways (that are more accessible than in person training) to expose more

people to dialogic reading, such as digital media and eBooks.

Section 3: eBooks

Section 3a: Popularity and Learning from Digital Media

The use of digital media offers some strong advantages, and possible pitfalls (such as the

presence of hotspots and other distractions) that can be overcome with thoughtful design of the

reading application. Reading with digital media has become popular within the past several years

(Strouse et al., 2013). In fact, Kabali, Irigoyen, Nunez-Davis, Budacki, Mohanty, Leister, &

Bonner (2015) showed that 90% of toddlers from low-income, minority populations had used a

touch screen by age 2 and 83% had a tablet computer in their home by age 5. Through

touchscreens and digital media, children are able to interact with a variety of different resources and applications that can enhance and promote learning. One such resource is electronic books (eBooks), which have become readily available on a variety of devices. Since 52% of parents report that their children have access to one of the newer forms of mobile media such as a tablet, iPhone, or iPad, this also gives them the opportunity to obtain eBooks through already owned devices (Common Sense Media, 2011).

While the popularity of using digital media for reading is growing, parent-child interactions with print books tends to be more common than engagement when using digital media (Strouse et al., 2013). As previously stated, active participation from both the parent and child is critical in ensuring that children fully comprehend the material in any reading format (Barkin et al., 2006; Nathanson, 2001). However, parents are much more likely to simply be passively present while their child is engaged with a digital device, such as watching television or playing a touchscreen app, with little to no interaction. In contrast, parents are more likely to actively discuss the contents of a print book before, during, or after reading ("active mediation"; Barkin et al., 2006; Nathanson, 2001). Since learning from video is already difficult for young children, parent scaffolding is important in supporting their learning and in increasing the educational benefits from eBooks (Krcmar & Cingel, 2014; Troseth et al., 2004). For these reasons, understanding and learning about parent-child interactions during digital media viewing is growing even more critical because of the difficulty children may have in learning from digital media on their own.

Section 3b: The Benefits of eBooks

Electronic books offer many benefits that traditional print storybooks do not. In her article, *The Impact of eBooks on Young Children's Reading Habits*, Sally Maynard describes

eBooks as "the combination of the advantages of the printed book with the capabilities of the computer" (2010, p. 239). Many features not possible in print can be incorporated in eBooks, a format that children who do not enjoy traditional reading activities may enjoy (Maynard, 2010). For example, certain multimedia features have been found to be beneficial in story comprehension and expressive vocabulary development (Takacs et al., 2015). These can include animations and sound effects that direct a child's attention to the content through adding nonverbal information to help the child visualize the story in a deeper way (Takacs et al., 2015; Cingel & Piper, 2017). Additionally, some audio features can help indicate the mood of the story or feelings of the characters and facilitate story comprehension (Takacs et al., 2015). These features offer a sense of interactivity between a child and the story, which can increase engagement (Maynard, 2010).

Similarly, adding cues to aid learning, such as haptic response (i.e., touch response), can also provide parents with a new way to draw children's attention to the story narrative; if the interactive element calls attention to a character or action in the text, parents are more likely to begin a discussion about what is occurring in the story (Cingel & Piper, 2017). This is only beneficial if it is supportive of the story narrative and not does not distract children (Takacs et al., 2015). However, focused and specific haptic responses allow parents and children to engage directly with the content of the story, as they are able to make connections between what is happening in the illustrations to the story narrative, which fosters further discussions about the actions, objects, and people in the book.

Section 3c: The Pitfalls of eBooks

Although many aspects of eBooks can be advantageous to the learning experience, there are also clear disadvantages. While children typically enjoy eBooks more than print storybooks,

parents tend to prefer print books because there are no issues with technology, and they are used to print books. However, this results in decreased parent engagement when reading eBooks (Maynard, 2010). Additionally, interactive elements, including hotspots (places on the eBook a child can touch where the eBook will provide a response such as noise or movement) and games, can be distracting because they compete with the content of the book and draw the child's attention elsewhere (Takacs et al., 2015). For example, when an animation is incongruent to the narration of the story, parents often have less expressivity when reading (Cingel & Piper, 2017).

Another pitfall of eBooks is that parent talk can become more focused on redirecting attention, correcting behavior, and dealing with technology, such as discussing who will control page turning (Krcmar & Cingel, 2014). Studies show that parents will talk more about the book format and the environment when reading an eBook than when reading a traditional print book, resulting in less content related talk (Krcmar & Cingel, 2014). Further studies indicate that it is not the overall quantity of talk during book reading that is important, but the use of complex, content-based talk creates quality experiences (Cingel & Piper, 2017; Tackacs et al., 2015). With both the advantages and disadvantages in mind, researchers have recognized the importance of teaching parents how to use eBooks in order to maximize their benefits and minimize their pitfalls for child learning.

Section 4: Incorporating Dialogic Reading into eBooks

Given the easy accessibility of eBooks and the benefits of dialogic reading techniques to vocabulary comprehension and development, researchers have attempted to combine the two to provide non-distracting assistance to parents for productive, content-based conversation during shared reading. In a study conducted by Troseth, Strouse, Flores, Stuckelman, and Russo-Johnson (2020), parents and their children (ages 3-5) used an enhanced eBook with an

interactive character, Ramone, who modeled dialogic questioning for the parent. A widely used eBook from a child's TV show (*Peg + Cat's "The Big Dog Problem"*, Oxley & Aaronson, 2016) was adapted for this study by removing distracting hotspots and unnecessary interactive features, as well as adding the dialogic character, who was part of the overall *Peg and* Cat property but was not an existing character in the researched eBook. These changes were made to emphasize the beneficial aspects of eBooks and minimize the possible pitfalls. Troseth and her colleagues hoped that parents would learn the dialogic reading technique implicitly, without being directly taught, and children might also learn directly from the character.

After using the enhanced eBook just twice, parents talked significantly more and asked significantly more story-specific questions than parents who did not read the story with Ramone (Troseth et al., 2020). For example, on pages in the second version of the enhanced eBook where Ramone did not say any prompts, parents used more prompts with their children when compared to parents in the control condition. These results demonstrate that after listening to the dialogic model just twice, parents interacted with their child more during reading, without having to be directly instructed. This is promising for the future of dialogic reading and eBooks, as it provides an example of how to increase parent-child interactions during eBook reading.

The Current Study

A major limitation of the prior study was that it was conducted in a lab setting, within one visit. The present research is one part of a larger study in which parents were assigned to read a version of the eBook for two weeks at home. Groups either read the enhanced or control eBook or were given a choice which to read each day. The final condition of giving families a choice was added to see if parents and children would choose to read the version of the eBook with the dialogic character and if any exposure to his example would result in an increase of dialogic

reading tactics by the parent. After two weeks of at home reading, participants read a new eBook and a new paper book during a second lab visit.

The main focus of the current study is to see how much parents learn from the dialogic character and the degree to which dialogic skills can be transferred to new book formats over a longer period of time. In previous research, when parents were directly taught dialogic reading techniques, they were able to implement those strategies to future readings (Arnold et al., 1994; Zevenbergen & Whitehurst, 1998). I hypothesize that the more exposure parents have to the dialogic model, the more they will be able to implement dialogic strategies. More specifically, participants who read the enhanced eBook with the dialogic character will increase the number of dialogic reading tactics they used over the two-week period, while participants who read the control eBook will have little to no change in reading strategies. I also predict that the participants who have the choice of which version of the book to read will have the most variation in their post-intervention readings, as the participants likely will differ in the number of times they use the enhanced eBook.

Methods

Participants

Participants were 80 children between the ages of 3.0 and 4.92 years old, with a mean age of 3.89 years, and a parent, recruited from the Nashville area and from rural South Dakota. Families were recruited from state birth records and local recruitment events in the community. Children were typically developing and spoke English as their primary language. On a parent questionnaire, parents identified their children as European American (86.6%), African American (1.25%), Hispanic (1.25%), or multi-racial (10%). One parent (1.25%) declined to answer this question. Seven (9%) of parents were male, while seventy-three (91%) of parents

were female. The majority of participating parents (85%) had obtained a bachelor's degree or higher. Data were collected in 2019 before the beginning of the COVID-19 pandemic.

Materials

At-Home Materials. To read at home, parents and children were provided with an Amazon Fire Kids tablet pre-loaded with their designated eBook version of *The Big Dog Problem*, depending on their condition. This eBook was chosen for its age-appropriate content and language and has been used in prior studies (Troseth et al., 2020). In this study, parents and children in the control group were given a version of the eBook with minimal modifications from the original, commercial version. The few modifications included removing a few potentially distracting hotspots.

Families in the experimental group were given the same eBook, with an added dialogic character (Ramone) that appeared in the corner of the page. On the title page, Ramone introduced the importance of parents discussing the content of the book with their children during reading (duration: 20 seconds) but did not overtly teach any dialogic reading techniques. On subsequent pages of the book, after the story narration concluded, Ramone modeled offering a dialogic reading prompt. Across the pages, he offered different prompts from among the kinds represented by the CROWD mnemonic (such as open-ended and wh- questions and distancing prompts; see Tables 1 and 2 for Ramone's prompts). It is important to note that Ramone did not model the PEER sequence – besides, prompts, he only offered brief evaluations (e.g., "That's right!" Or "Try again") on three early pages where children could answer Ramone's question (e.g., "Who is taller, Peg or Cat?") by tapping in one of two places (one correct and one incorrect). We constrained touch response to these three pages.

Table 1: Ramone prompts, eBook version 1

Ramone	Page Number	PEER	CROWD
Can you tap the letters?	1	Prompt	Other-closed
Try again./That's right.	1	Evaluate	n/a
Who is taller?	2	Prompt	Wh- closed
Peg or Cat?	2	Prompt	Other-closed
Try again./That's right.	2	Evaluate	n/a
What do you think is in the special red letter?	3	Prompt	Open ended, wh- open
Why are Peg and Cat afraid?	4	Prompt	Open ended, wh- open
Who is wearing the coat?	5	Prompt	Wh- closed
Now who is taller?	6	Prompt	Wh- closed
Try again./That's right.	6	Evaluate	n/a
Do you think the dog is scary?	7	Prompt	Other-closed
Why?	7	Prompt	Open ended, wh- open
How can Peg and Cat get the letter back?	8	Prompt	Open ended, wh- open
Is the dog nice or mean?	9	Prompt	Other – closed
What could Peg and Cat do to get the letters in the mailbox?	10	Prompt	Open ended, wh- open
How did the dog help Peg and Cat?	11	Prompt	Wh- closed
Why is Peg's mom happy?	12	Prompt	Open ended, wh- open

As with previous studies using this eBook, two versions of the enhanced eBook were used. In the first, Ramone appeared on every page, providing easier dialogic prompts (Table 1). In the second version of the eBook, Ramone only appeared on 7 of 12 pages, asking slightly more challenging questions (Table 2). Additionally, on the 5 pages in which Ramone did not

Table 2: Ramone prompts, eBook version 2

Ramone	Page Number	PEER	CROWD
Why is Peg excited?	1	Prompt	Open ended,wh- open
Who is the tallest in your family?	2	Prompt	Wh- closed, distancing
What do you share with your friends?	3	Prompt	Wh- closed, distancing
What is Peg and Cat's really big problem?	4	Prompt	Wh- closed
You could talk about what it's like to ride on someone's shoulders.	5	Prompt	Distancing
Why do Peg and Cat want to be taller than the dog?	6	Prompt	Open ended, wh- open
I wonder how Peg is feeling. What do you think?	7	Prompt	Open ended, wh- open
Do Peg and Cat get the letter back?	8	Prompt	Other-closed
How do you think Peg got the red letter back?	9	Prompt	Open ended, wh- open, recall
What do you think Peg and Cat could do to reach the mailbox?	10	Prompt	Open ended, wh- open
How did Peg and cat reach the mailbox?	11	Prompt	Open ended, wh- open

appear (near the end of the book), parents could click on a coffee cup icon in the top corner of the page if they wanted a hint from Ramone. Families in the choice condition had all three versions of the eBook (the control, non-Ramone version and the two enhanced versions) on their tablets.

Lastly, parents were given an audio recorder to record their at home readings. They were instructed on how to use the audio recorder on their first lab visit and told that all accidental or unrelated audio would be deleted for purposes of confidentiality.

In-Lab Materials. Families read a print book version of *The Big Dog Problem* (Oxley & Aaronson, 2016a) at their first lab visit. On their second visit, two weeks later, parents and children read a similar eBook from the Peg and Cat series from the PBS website, *The Election Problem (*Oxley & Aaronson, 2016b). This book contained similar vocabulary to *The Big Dog Problem* and was not modified in any way in order to see if the intervention could be applied to a commercially available eBook. Therefore, the eBook contained some story-irrelevant touch interactive features (e.g., every time a child touched a chicken in the eBook, it clucked). Parents and children also read a print book, a rhyming book called *Bear Snores On* (Wilson, 2002), which contained similar language and content, with no relation to the *Peg + Cat* series. Video cameras and an audio recorder were also used to record parent-child interactions in the lab for future analysis.

Design

Families were randomly assigned to one of three conditions: control, experimental, and choice. When assigning the last 10 participants, we tried to balance gender and age across the three conditions. One-third of participants (n = 26), including 11 girls and 15 boys, were assigned to the control group. Another third (n = 27), including 12 girls and 15 boys, were assigned to the experimental group. Lastly, the final third of participants (n = 25), including 12 girls and 13 boys, were assigned to the choice group. Approximately half of the participants were recruited at each of the testing sites.

Each group was told to listen to their designated version of the eBook ten times over two weeks. The control group listened to an eBook without Ramone over the two weeks. The experimental group was told to listen to the version with easier Ramone prompts on each page for the first week (five readings), and the version of the eBook with more difficult Ramone

prompts for the second week (five readings). The choice group received all three versions of the

eBook (both versions with Ramone and the version without) and could choose which version

they wanted to read for each of their ten readings. This was done in order to see which versions

parents and children would choose, and if their choice to use or avoid Ramone would affect

reading behaviors, including the number of dialogic reading techniques parents used in the

second lab visit.

Procedure

This study involved two in lab visits, both lasting approximately an hour and conducted

in a quiet research lab on Vanderbilt's campus or a quiet room of a daycare in South Dakota.

During the first visit, an assistant asked the parent to complete a consent form and an extensive

survey regarding family demographics and their beliefs about the use of technology and digital

media. Meanwhile, the researcher played with the child to allow them to become acclimated to

the researcher and lab setting. Once they seemed comfortable, the researcher obtained verbal

assent from the child. The child then completed expressive and receptive vocabulary tests to

assess their baseline knowledge of story specific vocabulary words. Then, the researcher

administered the Quick Interactive Language Screener (QUILS™) on an iPad to determine the

child's standardized receptive vocabulary abilities. These data will not be reported in this thesis

but were part of the larger study.

Next, all parents were given the paper book version of *The Big Dog Problem* to read with

their child in the lab. This provided a baseline of the amount of parent-child talk for each family

during shared book reading. After the researcher gave the parent the book, they told the parent to

read the book as they normally would at home, and then left the room. This reading session was

video recorded. When the parent and child were done reading, the researcher came back, and

gave the parent the correct materials to take home for two weeks, depending on their assigned

condition. They were also given a reading diary to record which days they read and which

version they read, and asked to read their assigned eBook version on each of ten days during the

two weeks, audio-taping their reading session. No specific instructions were given on how to

interact with the eBook or child during reading. Lastly, while the child picked out a toy, parents

had time to ask any questions about the at home readings or technology.

During the two weeks in between lab visits, a member of the research lab checked in with

the parent through a phone call at scheduled intervals. The first call, two days after the initial lab

visit, focused on making sure that the eBook was functioning properly. If it was malfunctioning,

the researcher offered technical support over the phone, and if needed, would offer to provide a

new eBook to the family. One week after the initial visit, a researcher called the family again – if

the family was in the experimental condition, the researcher would remind them to switch

versions of the book they were reading. If they were in the control or choice condition, the

researcher would again ask if the parent was having any trouble with the technology or had any

additional questions. Lastly, one day before the second lab visit, a researcher called the family to

make sure all procedures had been followed and remind them of their lab visit the next day.

On the second lab visit, the researcher again asked for assent from the child and the

parent completed a condition-specific exit survey. The child then completed receptive and

expressive vocabulary post-tests which contained identical words as the tests on the initial visits.

In addition, they completed story-specific comprehension and sequencing questions about the

book they read over the two-week period. The results of these tests will not be reported in this

thesis but were part of a larger study. The researcher then gave the parent *The Election Problem*

eBook to read with their child. They were told to read it once through, as they would typically at

home. Next, parents read the paper book version of *Bear Snores On.* Again, they were told to

read it once, as they normally would. This reading session was video recorded. At the end of the

session, parents received a gift card, and the child received another age-appropriate toy.

Measures

Parent-child interactions were transcribed and then coded for each of the three in lab

book readings. For this study, there were three coding passes. First, the three transcripts for each

family were coded for content-based talk to assess whether or not parent-child interactions were

related to the actual subject matter of the book. Each line of the transcript for both the parent and

child was assigned a code based on the content of their utterance. An utterance was considered

content-related if it involved any talk related to the content of the book (i.e. direct questions or

comments about the content or direct responses to questions or comments about the content). An

utterance was considered *attention/behavioral directed talk* if it involved directing the attention

or behavior of the child or parent. This includes comments or questions related to the use of the

iPad or book, comments or questions directing the parent or child's attention during the reading,

feedback comments related to the behavior of the parent or child, and comments or questions

made in order to modify or direct the parent or child's behavior. Lastly, *off-topic talk* was

assigned to an utterance if it was not at all related to the overarching experience of reading the

book, does not fall into either of the other categories, or involved noises that do not contain

semantic meaning.

Two undergraduate research assistants coded the transcripts for the first coding pass.

They first practiced the coding scheme on transcripts from 5 participants from a different study

that also used dialogic and control eBooks. Both then coded 19 of the current participant

families' transcripts (25%), achieving a high level of inter-rater reliability. Interclass correlations

were: parent content, r = .999; parent attention behavior, r = .974; parent off-topic, r = .952; child

content, r = .998; child attention behavior, r = .966; child off topic, r = .976. The remaining 59

participants were coded by one of the two coders (the master coder).

The transcripts were then coded for the parents' use of dialogic reading techniques with

the mnemonics *PEER* and *CROWD*. This coding scheme has been used in previous studies to

establish the amount of dialogic reading comments and questions from the parent (Strouse et

al.,2013; Troseth et al., 2020). Every parent utterance that had previously received a content code

received *PEER* code(s) in the second round of coding. Each utterance could receive multiple

PEER codes for each part of the acronym/each strategy. First, each utterance was deemed either

a *prompt* or *non-prompt*. A *prompt* was a content-related parent utterance to which parents

expect child to respond verbally. Any other parent utterance (one that did not expect a child's

response) received a *non-prompt* code. Next, an utterance received an *evaluate* code if the parent

directly praised a child's correct response and offered alternative answers or corrected their child

if they gave an incorrect response. An *expand* code was assigned to lines of parent content-

related talk when the parent added information to the child's response. Lastly, *recall* codes were

assigned when the child is asked to repeat back information that the parents gave during an

expansion.

Again, two undergraduate research assistants coded 9 practice participants from another

study that used dialogic and control eBooks. They then achieved reliability by double-coding

transcripts of 20 of the current parent participants (25% of total sample), achieving a high level

of inter-rater reliability. Interclass correlations were: prompt, r = .994; non-prompt, r = .996;

evaluate, r = .922; expand, r = .751; repeat, r = 1.00. The remaining 58 participants' transcripts

were coded by one of the two coders.

Lastly, each utterance that had previously received a content code and a prompt code was assigned a *CROWD* code to indicate what types of questions parents asked. Utterances frequently received multiple CROWD codes. These involve *completion prompts* (i.e. when the parent leaves a blank for the child to fill in), *recall prompts* (i.e. questions about something that has happened in the story or from previous readings of the book), *open-ended prompts* (i.e. asking the child for multiple word answers), *wh- prompts* (i.e. who, what, when, where, why, and how questions), and *distancing prompts* (i.e. asking the child to relate the story to their life). If an utterance previously coded as parent content and prompt did not fall into any of these categories, it was coded as an *other-closed prompt* (often yes or no questions). Additionally, if the parent repeated the same question multiple times, it was CROWD coded once, and the additional repetitions were coded as *repetition of self*.

Two coders practice-coded transcripts from 9 participants from the other study using dialogic and control eBooks. They achieved reliability by double-coding transcripts from 20 parent participants (25% of total sample), achieving a high level of inter-rater reliability. Interclass correlations were: completion, r = 1.00; recall, r = .977; open-ended, r = .989; wh-open, r = .988; wh- closed, r = .974; distancing, r = .992; other closed, r = .988; self-repetition, r = .948. The transcripts for each of the remaining 58 participants were coded by one of the two coders.

Results

Fidelity of Implementation

Families reported reading approximately the same number of times across conditions (experimental *M* = 10.30, *SD* = 2.05; choice *M* = 10.83, *SD* = 2.37; control *M* = 10.54, *SD* = 3.73). Families in the experimental condition reported reading each version of the eBook with

Ramone a similar number of times (easy Ramone: $M = 5.37$, $SD = 1.01$; complex Ramone: $M = 4.89$, $SD = 1.50$). Families in the choice condition varied in the number of times they read each of the three versions of the eBook (easy Ramone: $M = 3.5$, $SD = 2.67$; complex Ramone: $M = 3.08$, $SD = 1.81$; no Ramone: $M = 4.25$, $SD = 3.19$).

Parent-Child Interaction Behaviors

To assess pre- to post-intervention changes in parent dialogic reading behaviors that resulted from at home exposure to the various versions of the eBook, I used mixed-effects ANOVAs with multiple levels of post-hoc follow-ups. More specifically, repeated-measures ANOVAs were used to test for growth in parent reading behaviors in each condition and one-way ANOVAs with Tukey HSD post-hoc tests were used to test for condition differences during each reading. Significant post-hoc tests are reported in the text, and all results can be found in Tables 3 - 6.

Parent Dialogic Reading Behaviors

PEER. During the day 2 eBook reading, parents in the experimental group increased their use of prompt ($F(1,26) = 66.10$, $p < .001$), non-prompt ($F(1,26) = 38.310$, $p<.001$), evaluate ($F(1,26) = 10.889$, $p = .003$), and expand ($F(1,26) = 6.140$, $p = .020$) utterances compared to their baseline reading on day 1. Similarly, during the day 2 print book reading, the experimental group increased from their initial usage of prompt ($F(1,26) = 22.227$, $p <.001$), non-prompt ($F(1,26) = 42.728$, $p < .001$), evaluate ($F(1,26) = 35.071$, $p <.001$), and expand ($F(1,26) = 8.155$, $p = .008$) utterances.

Parents in the choice condition had more variation in their results, however. They increased from the initial lab visit in their use of prompts during the eBook reading ($F(1,24) = 4.626$, $p = .042$), but not during the print book reading that followed. They significantly

increased their use of non-prompts when using the eBook ($F(1,24) = 6.901$, $p = .002$) and print

book ($F(1,24) = 14.187$, $p < .001$), but had no increase in evaluations or expansions for either

book. For the control group, no significant changes in the number of PEER utterances between

the initial and second lab visits were found. All PEER means by group can be found in Table 3.

Table 3. *Means and One-Way ANOVAs by Condition and Reading for PEER Utterances*

	Control M(SD)	Experimental M(SD)	Choice M(SD)	One way ANOVA Testing Condition Differences
Visit 1 Print book				
Prompt	10.32 (9.87)	8.85 (5.86)	17.60 (21.08)	$F(2,77) = 3.066$, $p = .052$
Non-Prompt	12.61 (10.20)	11.07 (7.89)	17.16 (13.53)	$F(2,77) = 2.253$, $p = .112$
Evaluate	2.29 (2.65)	2.22 (2.62)	4.56 (8.54)	$F(2,77) = 1.661$, $p = .197$
Expand	.57 (1.10)	.70 (1.38)	.84 (1.57)	$F(2,77) = .259$, $p = .773$
Recall	.00	.00	.00	n/a
Visit 2 eBook				
Prompt	9.21 (10.48)	30.78 (16.04)	27.6 (21.22)	$F(2,77) = 14.278$, $p < .001$
Non-Prompt	12.86 (10.04)	30.30 (15.52)	28.08 (19.50)	$F(2,77) = 10.509$, $p < .001$
Evaluate	1.64 (2.18)	5.59 (4.80)	2.92 (2.36)	$F(2,77) = 9.951$, $p < .001$
Expand	.39 (.76)	1.74 (1.93)	.84 (1.18)	$F(2,77) = 6.737$, $p = .002$
Recall	.00	.26 (.86)	.080 (.40)	$F(2,77) = 1.609$, $p = .207$
Visit 2 Print Book				
Prompt	9.64 (11.29)	19.63(14.75)	20.32 (19.54)	$F(2,77) = 4.099$, $p = .020$
Non-Prompt	14.64 (14.10)	26.78. (12.51)	28.32 (17.36)	$F(2,77) = 7.041$ $p = .002$
Evaluate	2.00 (2.54)	5.41 (3.93)	5.12 (4.16)	$F(2,77) = 7.597$, $p <. 001$
Expand	0.61 (1.07)	2.11 (2.51)	1.40 (1.89)	$F(2,77) = 4.779$, $p = .011$
Recall	.00	.00	.00	n/a

There were no significant condition differences in PEER utterances during the pre-

intervention reading session. Following the intervention, one-way ANOVAs revealed an effect

of condition for prompt, non-prompt, evaluate, and expand utterances for both the second day

eBook and second day print book readings (see Table 4 for full results). Tukey's HSD post-hoc

test revealed that parents in both the experimental and choice conditions produced significantly

more prompts during the second day eBook reading (experimental: $p < .001$, choice: $p < .001$)

Table 4 *Repeated-measures ANOVAs Testing Changes from the First to the Second Visit, PEER*

Behavior and Condition	eBook	Print Book
Prompt		
Experimental	$F(1, 26) = 66.10, p < .001$	$F(1, 26) = 19.82, p < .001$
Choice	$F(1,24) = 4.63, p = .042$	$F(1,24) = 1.02, p = .321$
Control	$F(1,27) = .583, p = .452$	$F(1,27) = .14, p = .707$
Non-Prompt		
Experimental	$F(1, 26) = 38.31, p < .001$	$F(1, 26) = 42.73, p < .001$
Choice	$F(1,24) = 6.90, p = .002$	$F(1,24) = 14.19, p < .001$
Control	$F(1,27) = .017, p = .898$	$F(1,27) = .957, p = .337$
Evaluate		
Experimental	$F(1, 26) = 10.89, p < .001$	$F(1, 26) = 35.07, p < .001$
Choice	$F(1,24) = .91, p = .350$	$F(1,24) = .213, p = .649$
Control	$F(1,27) = 2.29, p = .142$	$F(1,27) = .359, p = .554$
Expand		
Experimental	$F(1,26) = 6.14, p = .020$	$F(1,26) = 8.16, p = .008$
Choice	$F(1,24) = 1.00, p = 1.00$	$F(1,24) = 2.68, p = .115$
Control	$F(1,27) = 1.00, p = .326$	$F(1,27) = .024, p = .879$
Recall		
Experimental	$F(1, 26) = 2.56, p = .129$	n/a
Choice	$F(1,24) = 1.00, p = .327$	n/a
Control	n/a	n/a

and print book reading (experimental: $p = .048$, choice: $p < .036$), compared to parents in the control group. They also produce more non-prompt utterances while reading the eBook (experimental: $p < .001$, choice: $p = .002$) and print book (experimental: $p < .001$, choice: $p < .001$), and more evaluations (eBook reading, experimental: $p < .001$, choice: $p = .014$; print book

reading, experimental: $p = .002$, choice: $p = .006$). For expansions, only the experimental group was higher than the control group for the second day readings of the eBook ($p = .002$) and print book ($p = .008$) readings.

CROWD. As with PEER utterances, parents in the experimental group showed the most significant increases from the initial to second lab visit in their use of the various kinds of prompts given CROWD codes as well. They significantly increased in their use of open ended ($F(1,26) = 29.820$, $p < .001$), wh- open ($F(1,26) = 28.152$, $p < .001$), and wh- closed ($F(1,26) = 36.21$, $p < .001$) prompts during the eBook reading. Similarly, parents in the experimental group significantly increased their use of open ended ($F(1,26) = 14.212$, $p < .001$), wh- open ($F(1,26) = 14.212$, $p < .001$), and wh- closed ($F(1,26) = 12.511$, $p = .002$) prompts while reading the print book. Parents in the choice group only had significant increases from their day one baseline in wh- closed prompts for the eBook reading ($F(1,24) = 5.981$, $p = .022$). There were no significant changes in the number of CROWD prompts across days for the control group. All CROWD means by group can be found in Table 5 in Appendix A.

One-way ANOVAS revealed an effect of condition for both the second day eBook and second day print book readings for wh- closed prompts (see Table 6 in Appendix A for full results). For the second day eBook reading, there was also an effect of condition for open ended, wh- open, recall, and distancing prompts. Tukey's HSD post-hoc test revealed that, compared to the control group parents, those in the experimental and choice groups produced more open-ended prompts (experimental: $p = .002$, choice: $p < .001$), wh- open prompts (experimental: $p = .002$, choice: $p < .001$), wh- closed prompts (experimental: $p = .002$, choice: $p = .007$) and other-closed prompts (experimental: $p < .001$, choice: $p < .001$) on the second day eBook reading. Additionally, parents in the choice group used significantly more distancing prompts than

parents in the control group ($p = .018$) during the eBook reading. When reading the print book on

day 2, only parents in the experimental group were higher than those in the control group on wh-

closed prompts ($p = .022$) and other-closed prompts ($p = .001$).

Discussion

In the current study, I sought to explore whether or not parents would increase their use

of dialogic reading strategies after exposure to an eBook with an embedded dialogic character.

Previous research (Troseth et al., 2020) shows that this eBook was successful in promoting these

behaviors within a one-day lab visit while reading the eBook, so I hypothesized that families

who had consistent, repeated exposure to the eBook would be able to use these skills over a

longer period of time and apply them to reading new books. Parents who had the most exposure

to Ramone over the two weeks (those in the experimental condition) had the most consistent

increases in their use of dialogic reading techniques. Interestingly, parents who had some

exposure to Ramone (in the choice condition) also increased in their use of the strategies, though

not as much as parents with consistent exposure.

Pre-Intervention Parent Reading Behaviors

During the initial lab visit, parents were told to read the print book version of *The Big*

Dog Problem as they typically would at home, and the majority of parents exhibited few

interactions with their child regarding the content of the book. This result demonstrates that

while parents may view reading as an important learning activity, they do not use dialogic

reading tactics to a significant degree on their own. This is consistent with previous research

which illustrates that while shared interaction during reading may be the most critical aspect to

children's learning from books, parents do not always interact with their child during these

experiences (Hindman et al., 2013; Roberts et al., 2005). When using digital media, it is

important to encourage parents to converse and interact with their children due to the potential

additional distractions, such as hotspots and games, and intricacies, such as waiting until the

narration is complete to turn to the next page, of digital media, demonstrating the significance of

this study's use of an eBook over the two-week period (Barkin et al., 2006; Nathanson, 2001).

Evaluating Dialogic Reading Strategies Two Weeks Later

While parents in the experimental condition used the enhanced eBook with Ramone

every time they read, on average parents in the choice condition read the eBook with Ramone

slightly more than half the time and the control eBook the rest of the time. By condition

assignment, parents in the control group had no exposure to Ramone. Following exposure to the

various versions of the eBook over two weeks, there were substantial differences in parent

behaviors across conditions. First, there were no significant increases in parent reading behaviors

for the control group. In contrast, as hypothesized, parents in the experimental group, who

experienced the most regular dialogic modeling at home, showed the most consistent increases in

their use of PEER and CROWD strategies two weeks later. This improvement occurred without

any direct teaching of dialogic reading strategies. It is important to note that Ramone modeled

CROWD prompts but did not explicitly teach them to parents or instruct parents to use the

prompts. However, parents who were consistently exposed to his model picked up on and

generalized most of the specific kinds of prompts he modeled. Additionally, Ramone did not

model the PEER sequence. He only evaluated children's touch responses to his prompts on three

pages of the 'easy' version of the eBook, yet parents spontaneously started using PEER

strategies after being exposed to Ramone's example of prompting conversation, such as

evaluating their child's responses and expanding on what their child has said. Consistent with

past research on using dialogic reading strategies with eBooks, the intervention was successful in

teaching parents to interact more with their child during reading without direct instruction (Troseth et al., 2020). Additionally, as described below, it demonstrates that when modeled over a longer period of time, these techniques are transferable to new reading formats. This gives hope that the more exposure and the longer amount of time a parent uses an enhanced eBook, the more likely they are to continue to use dialogic reading techniques.

While past research with direct in-person dialogic training shows an increase across almost all dialogic strategies (Blom-Hoffman et al., 2007; Strouse et al., 2013; Whitehurst et al., 1998), parents in the current study, exposed to a model of dialogic prompts without explicit training, increased in some, but not all, dialogic techniques. Since parents do not typically engage in content related dialogue with their child during digital media usage, it is possible that those exposed to Ramone's example were able to apply the dialogic strategies that they were already most comfortable with or that were the easiest to learn (Barkin et al., 2006; Nathanson, 2001; Strouse et al., 2013). Regarding parts of the PEER sequence, it may be more common, in general, for parents to ask their child questions (prompt), give their child feedback on their responses (evaluate), and provide their child with more information about the content (expand), rather than asking their child to recall information from prior pages. If parents are already accustomed to interacting with their child in certain ways, they may be more likely to use those in novel contexts as well. Since parents were not directly taught dialogic techniques while using the enhanced eBook, they may have recognized that they should talk more with their child, and used techniques that they already knew, which may be why parents used certain aspects of PEER.

Similarly, when looking at parents' use of CROWD prompts, parents most often used wh- open, wh- closed, and open-ended prompts. Distancing, completion, and recall techniques

may be less familiar to parents and therefore more difficult for to apply if not directly taught

(Arnold et al., 1994). This may explain why there were increases in the more familiar strategies –

parents could discern them faster and apply them to the second lab readings more often than the

more difficult aspects of dialogic reading. Parents appeared to learn from Ramone; however, it is

possible with even more exposure to dialogic strategies, or by including some explanation of the

difficult strategies in the eBook, they would pick up and apply a wider variety of dialogic

techniques.

       Another possible explanation for the increase in specific PEER and CROWD techniques

is that parents followed the types of prompts the dialogic model most consistently provided. As

shown in Tables 1 and 2, Ramone's dialogue contained mostly prompt, non-prompt, wh- open

and closed, and open-ended questions, and did not model the PEER sequence of following up on

what the child said. This exposure is reflected in types of dialogic reading tactics that parents

used significantly more when reading new books during the post-intervention readings. After

parents heard Ramone asking certain types of questions, they increased their usage of those

types. In future studies, it would be interesting to increase the number of challenging prompts

(such as suggestions to connect between the book and the child's life) and to incorporate

additional aspects of dialogic reading (e.g., modeling or suggesting full PEER sequences) to

discern whether or not it is the amount of exposure, or perhaps the need for explicit training that

affects parents' future reading behaviors.

Choice Condition

       As hypothesized, at the post-test, parents in the choice condition were more variable than

those in the experimental condition in their use of dialogic reading strategies after two weeks.

This follows, as parents-child dyads had varied amounts of exposure to Ramone, depending on

how often they chose to read the versions of the eBook with the embedded dialogic character. An intriguing result is that, although parents in the choice condition exhibited fewer significant pre- to post-intervention increases in dialogic strategies compared to parents in the experimental group, they did use significantly more of the techniques during the day two reading compared to the control group on most of the day two readings. By chance, parents randomly assigned to the choice group started out with somewhat (but not significantly) higher use of some dialogic strategies on their pre-test reading session. They then received less exposure to the model of dialogic prompts compared to the experimental group. Nevertheless, choice group parents increased their use of dialogic strategies enough to end up with significantly higher strategy use than the control group. Thus, exposure to a dialogic character increases parents' use of dialogic reading strategies without the need to directly train parents in this form of parent-child interaction.

Parents' Generalization of the Strategies

Across the two types of books parents read on the second visit (a novel eBook and then a novel print book), parents in the experimental condition consistently increased in their use of many aspects of the PEER and CROWD strategies. This result demonstrates that continued exposure to the enhanced eBook for two weeks gives parents the tools to apply to new formats. In past research, pre-test to post-test assessments have focused on parents applying learned dialogic reading techniques to the same book or story they had previously read in the same format (Arnold et al., 1994; Troseth et al., 2020). In contrast, in the current study, parents read a print version of the eBook to be used at home on the initial lab visit, and a new eBook and different print book during the second lab visit. Additionally, the eBook that parents read on the second lab visit included some possibly distracting hotspots and sound effects, unlike the

dialogic character-enhanced eBook that families used at home. It was possible that those

distracting features might have prevented parents from interacting with their children regarding

the actual contents of the book (Cingel & Piper, 2017; Takacs et al., 2015). However, the parents

who had exposure to Ramone were able to overcome the potential pitfalls of using a new eBook

with hotspots and sound effects, and still use the dialogic reading techniques they had implicitly

learned from Ramone. While parents in the experimental group consistently used dialogic

strategies in both the novel eBook and print book readings, parents in the choice condition most

consistently increased their dialogic reading strategies only for the eBook reading. Since these

parents in general had less exposure to Ramone, compared to the experimental group, they may

have been less prepared to transfer those skills to a novel format (the print book). Following

exposure to the eBook at home (both the versions with Ramone and the non-Ramone control

version), the parents in the choice group acted differently than parents in past research who

reported being less enthusiastic about and interacting with their children less when reading an

electronic book compared to a print book (Krcmar & Cingel, 2014).

Limitations

There are a couple significant limitations to the current study. First, this was a relatively

uniform sample demographically – 86.6% of families identified as White and 85% of parents had

obtained a bachelor's degree or higher. Although past studies have demonstrated that families

from varying cultural and socioeconomic backgrounds were just as successful with using this

same eBook in a single lab session (Troseth et al., 2020), results of the current 2-week

longitudinal results cannot be generalized to families from a more diverse background. Future

studies should include a more diverse group of participants to demonstrate whether an eBook

with a helpful character can teach parents to generalize dialogic reading strategies. If so, this

would provide a way to effortlessly expose parents from all backgrounds to dialogic strategies without the need for inconvenient in person training (Janes & Kermani, 2001).

Secondly, while this study intervention was longer than the previous research conducted with this eBook (Troseth et al., 2020), the intervention only occurred over the course of two weeks. It cannot be determined whether or not parents would retain the strategies over a longer period of time, as happened with in-person training (Huebner & Payne, 2010). It is possible that longer use of the enhanced eBook would result in more adoption of dialogic reading techniques. Follow-up interviews could be conducted to see if parents are still using these strategies after the initial study is complete. Additionally, as with all lab studies, parents may have changed their behavior in lab because they knew they were being watched. Further analysis from the larger study will look at how parents and children interacted with the enhanced eBook during their readings in a more comfortable and private setting during the two weeks reading at home. It would be interesting to note whether or not these parents continued using these strategies, or if they stopped once the study was complete. Since past research shows that parents do not consistently interact with their children while reading eBooks (Nathanson, 2001), future studies could determine the amount of exposure necessary to a dialogic model in order to maintain the results of this study over a longer period of time.

Future Directions

In the larger study, we will look at whether individual differences in parents' exposure to Ramone in the choice condition affected how much they adopted the modeled techniques. Future studies could be conducted to determine the amount of exposure to the dialogic reading character needed for significant parent increases in dialogic reading strategies. In the current study, parents could not control whether to have Ramone on every page – he was either 'on' or 'off'. It would

be interesting to conduct future studies controlling how much exposure parents receive to the model in an eBook, allowing researchers to note how many experiences with various dialogic strategies are enough to get parents interacting with their children more while reading.

The current study demonstrated that after exposure to the dialogic model, parents talked more with their child, possibly because they were reminded of strategies they already knew, and/or they were reminded that it was good to talk while reading. A future possible study direction would be to have Ramone use more of the difficult dialogic prompts to see if they would also adopt these strategies, such as those connecting between the story and the child's life – the ones that parents less frequently produce.

Additionally, it would be interesting to include a dialogic character to other forms of media such as digital applications or short videos. When interacting with technology, such as television or digital applications, parents interact with their children less than they do during book reading (Barkin et al., 2006; Nathanson, 2001; Strouse et al., 2013). Since we now know that an interacting character is successful in teaching parents some dialogic reading strategies in a digital format, future studies could determine if this form of an embedded character would get parents more involved in other forms of digital media, potentially increasing children's understanding of the content.

Conclusion

After two weeks of exposure to an eBook with an embedded character who asked dialogic questions, parents increased in their own use of dialogic reading techniques as well. Even though parents were not explicitly taught these strategies, they were still able to indirectly learn from the dialogic character and interact more with their child when reading new books in digital and print formats two weeks later. Depending on the amount of exposure to the character,

parents used varied amounts of these strategies during the post-intervention print book and

eBook readings. Overall, parents with exposure to the dialogic character exhibited significantly

more dialogic strategies than parents with no exposure at all, no matter the format of the book.

When parents ask their children questions and have conversations while reading, over time this

increases children's language and literacy skills. Thus, while parents may see eBooks as having

potential negative effects on their children, when used in the right way, eBooks can actually have

a positive effect. This enhanced eBook may serve as a model to apply in other digital media to

promote beneficial interactions between parents and children.

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Appendix A

Table 5: *Behavioral Means and One-Way ANOVAs by Condition and Reading for CROWD Prompts*

	Control M(SD)	Experimental M(SD)	Choice M(SD)	One way ANOVA Testing Condition Differences
Visit 1 Print book				
Completion	.14 (.45)	0 (0)	0 (0)	$F(2,77) = 2.634, p = .078$
Recall	.46 (1.4)	0 (0)	.20 (.50)	$F(2,77) = 1.949, p = .149$
Open Ended	1.43 (2.20)	1.11 (1.22)	2.40 (3.65)	$F(2,77) = 1.827 , p = .168$
Wh- Open	1.43 (2.20)	1.11 (1.22)	2.40 (3.65)	$F(2,77) = 1.827, p = .168$
Wh- Closed	2.75 (3.00)	2.44 (2.39)	4.52 (5.33)	$F(2,77) = 2.317, p = .105$
Distancing	1.32 (2.45)	.93 (1.30)	1.96 (3.34)	$F(2,77) = 1.145, p = .323$
Other Closed	4.21 (3.45)	4.33 (3.59)	8.24 (9.51)	$F(2,77) = 3.686, p = .030$
Self-Repetition	.48 (1.12)	.19 (.40)	.84 (2.25)	$F(2,77) = 1.339, p = .268$
Visit 2 eBook				
Completion	.04 (.19)	.22 (.64)	.12 (.33)	$F(2,77) = 1.292, p = .281$
Recall	.39 (.96)	.74 (1.06)	.76 (1.05)	$F(2,77) = 1.11, p = .028$
Open Ended	.71 (1.08)	3.56 (2.44)	4.00 (4.54)	$F(2,77) = 9.756, p < .001$
Wh- Open	.71 (1.08)	3.52 (2.44)	4.00 (4.54)	$F(2,77) = 9.660, p < .001$
Wh- Closed	3.14 (4.89)	9.04 (6.16)	8.36 (7.18)	$F(2,77) = 7.650, p < .001$
Distancing	.21 (.63)	.96 (1.53)	1.48 (2.38)	$F(2,77) = 3.994, p = .022$
Other Closed	4.04 (3.53)	14.67 (8.18)	11.16 (8.14)	$F(2,77) = 16.968, p < .001$
Self-Repetition	.89 (2.27)	2.15 (3.29)	2.20 (2.93)	$F(2,77) = 1.836, p = .166$
Visit 2 Print Book				
Completion	.25 (.80)	.22 (.58)	.04 (.20)	$F(2,77) = .956, p = .386.$
Recall	.11 (.31)	.15 (.60)	.24 (.66)	$F(2,77) = .411, p = .665$
Open Ended	1.46 (2.94)	3.15 (3.12)	3.16 (3.60)	$F(2,77) = 2,507, p = .061$
Wh- Open	1.46 (2.94)	3.15 (3.12)	3.16 (3.60)	$F(2,77) = 2.507, p = .061$
Wh- Closed	2.39 (3.05)	6.19 (5.84)	5.56 (6.19)	$F(2,77) = 4.244, p = .018$
Distancing	.68 (1.25)	1.89 (2.64)	1.6 (2.25)	$F(2,77) = 2.454, p = .060$
Other Closed	4.46 (5.04)	7.63 (5.62)	8.80 (10.19)	$F(2,77) = 2.604, p = .081$
Self-Repetition	.39 (.87)	.89 (1.05)	1.00 (1.63)	$F(2,77) = .1.921, p = .153$

Table 6: *Repeated-measures ANOVAs Testing Changes from the First to the Second Visit, CROWD*

Behavior and Condition	eBook	Print Book
Completion		
Experimental	$F(1, 26) = 3.250, p = .083$	$F(1, 26) = 4.00, p = .056$
Choice	$F(1,24) = 3.273, p = .083$	$F(1,24) = 1.00, p = .327$
Control	$F(1,27) = 1.855, p = .184$	$F(1,27) = .352, p = .558$
Recall		
Experimental	$F(1, 26) = 13.198, p < .001$	$F(1, 26) = 1.638, p = .212$

Choice	$F(1,24) = 4.93, p = .036$	$F(1,24) = .088, p = .770$
Control	$F(1,27) = .054, p = .819$	$F(1,27) = 1.650, p = .210$
Open Ended		
Experimental	$F(1, 26) = 29.82, p < .001$	$F(1, 26) = 14.21, p < .001$
Choice	$F(1,24) = 3.268, p = .083$	$F(1,24) = .805, p = .379$
Control	$F(1,27) = 2.30, p = .141$	$F(1,27) = .006, p = .936$
Wh- Open		
Experimental	$F(1,26) = 28.15, p = < .001$	$F(1,26) = 14.21, p < .001$
Choice	$F(1,24) = 3.268, p = .083$	$F(1,24) = .805, p = .379$
Control	$F(1,27) = 2.300, p = .141$	$F(1,27) = .006, p = .936$
Wh - Closed		
Experimental	$F(1, 26) = 36.21, p < .001$	$F(1,26) = 12.511, p = .002$
Choice	$F(1,24) = 5.981, p = .022$	$F(1,24) = 2.156, p = .155$
Control	$F(1,27) = .393, p = .536$	$F(1,27) = .788, p = .383$
Distancing		
Experimental	$F(1,26) = .008, p = .928$	$F(1,26) = 3.721, p = .065$
Choice	$F(1,24) = .331, p = .571$	$F(1,24) = .282, p = .600$
Control	$F(1,27) = 5.840, p = .023$	$F(1,27) = 1.641, p = .211$
Other Closed		
Experimental	$F(1,24) = 61.34, p < .001$	$F(1,26) = 11.78, p = .002$
Choice	$F(1,26) = 2.262, p = .146$	$F(1,24) = .161, p = .692$
Control	$F(1,27) = .097, p = .758$	$F(1,27) = .074, p = .788$
Self-Repetition		
Experimental	$F(1,26) = 9.171 , p = .005$	$F(1,26) = 9.757, p = .004$
Choice	$F(1,24) = 4.339, p = .048$	$F(1,24) = .101, p = .758$
Control	$F(1,27) = .923, p = .345$	$F(1,27) = .074, p = .787$