Critical Review:

Do interactive electronic books elicit different types of adult-child interactions than traditional books during story reading?

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This critical review examines whether interactive electronic books (IEB) elicit different types of adult-child interaction than traditional books during shared story reading. A literature search provided five studies of relevance; two between-subject designs, one repeated measures design, one single-group design and one single-subject design. Overall, the results of this literature suggest that IEBs elicit more interactions centered on manipulating the interactive features of the IEB than discussion of the story's content. Clinical implications and future ways to strengthen these findings are discussed below.

Introduction

LeapFrog Enterprises, a popular producer of interactive books and reading systems for children, reports sales of $553.6 million in 2013 (LeapFrog Enterprises, 2014). Electronic educational toys are a popular choice for many parents as they provide their child with entertainment, while targeting key educational areas. Interactive electronic books (IEB) include, "oral reading, written text, oral discourse, music, sound effects, and animations" (Korat, 2010, p. 24) that allow the child to access hidden interactive locations, request repetitions or expansions of provided text (Korat, 2010).

Many families integrate shared story reading of both traditional books and IEBs into their daily routines (Korat & Or, 2010). Shared story reading incorporates the child into the story, offering the opportunity to comment, expand, and ask questions about the story (Parish-Morris, Mahajan, Hirsh-Pasek, Michnick Golinkoff & Fuller Collins, 2013). Parents may also use distancing prompts, which requires the child to reflect on their own experiences in relation to the story (Parish-Morris et al., 2013). Shared story reading has been found to be beneficial for the development of children's sentence length, vocabulary, and expressive language. Shared story reading is also beneficial for the development of literacy skills (Hindman, Skibbe, & Foster, 2014).

Many forms of IEBs allow children with emerging literacy skills to navigate their way through a story with minimal adult support. During the shared reading of IEBs parents may feel less of a need to discuss the story as the additional interactive features of IEBs engage their child (Kim & Anderson, 2008). Parents may also choose to comment on the interactive features of the IEB, rather than the story.

The benefits of traditional books to literacy and language development are well established; however the benefits of IEBs are not yet fully understood. Do IEBs provide the same or greater benefits on literacy and language development as traditional books? As IEBs become more common, it is important to fully understand their influence on language and literacy development before they are regarded as an equivalent to traditional books and viewed as a more appealing alternative to tech-savvy children. Shared story reading provides many benefits to language and literacy development, however do adults engage children in the same types of beneficial language during the reading of IEBs as traditional books? In this paper, a critical review of literature examining whether interactive electronic books elicit different types of adult-child interactions than traditional books during story reading will be conducted.

Objectives

The objective of this literature review is to critically evaluate existing literature examining any variations in adult-child interactions during shared story reading comparing interactive electronic books and traditional books.

Methods

Search Strategy

Electronic databases provided by Western University including PsycINFO, PubMed and Scholars Portal were searched using the terms [(electronic book) AND (child) AND (parent mediation)]. The reference lists of obtain articles were also searched for additional related papers of interest.

Selection Criteria

The search was limited to papers dating onwards from 2000. Papers that examined the interactions between a child and adult while reading an electronic book in comparison to a traditional paper book were selected. All of the included studies examined students who were of primary school (5–7 years) or preschool (3–5 years) age.

Data Collection

Literature reviews resulted in five relevant articles from the past 12 years. The research designs of the relevant studies include: two between-subject designs, one repeated measures design, one single-group design and one single-subject design.

Results

Parish-Morris et al. (2013) conducted a between-subjects design examining comprehension and language use during shared story reading of traditional books and IEBs in 92 four- and five-year-old children and their parents. All families spoke English and were of a mid to high socioeconomic status (SES). Five traditional books were offered to the dyads in the traditional group (N=36) while the IEB group (N=36) read a story that consisted of a paper-based book that used a console and cartridges that allowed page-turning and interactive features (text-to-voice output, music, and interactive games). The control group (N=20) read the paper-based book used in the IEB group without the console and cartridges that made the story interactive.

Appropriate statistical analysis (ANOVA, independent samples t-test) revealed that parents made more story-related utterances, questions and distancing prompts when reading a traditional book than an IEB. IEB reading resulted in the parent making more behaviour related utterances than traditional books. Reading times were shorter for traditional books however they had a greater concentration of distancing prompts than IEBs. The children made more distancing utterances when reading the traditional book and made more behaviour-related utterances when reading the IEB. The control group revealed the same findings as the traditional book, suggesting that it was the electronic and interactive features of the IEB that created the difference in interactions.

Parish-Morris et al. (2013) presented a clear research question with an easy to reproduce design. The sample size strengthens the results; however participants with a greater range of socioeconomic statuses would have allowed for greater generalization of the findings. All of the participants had typically developing language which does not reflect the greater population; however this enabled the study to have clear inclusion criteria for its participants. The control group insured that any differences noted between groups was because of the interactive features of the IEB and not a result of different stories used for the IEB and traditional book group. Parish-Morris et al. (2013) present compelling evidence that there is a difference in the interactions of parent-child dyads reading IEBs and traditional books.

Korat and Or (2010) conducted a between subjects design study examining mother-child interactions during one of four conditions: a traditional book (1), a commercial IEB (same story as the traditional book 1), an educational IEB and a traditional book (2 - same story as the educational IEB). Forty-eight mother-child dyads (child mean age: 69.28 months) attending a middle SES kindergarten class were randomly assigned to one of the four conditions. Transcripts were analyzed using the Observing Mediational Interaction scale adapted for literacy (Korat & Klein, 2004) and for instances where the mother used expanding utterances.

Appropriate statistical analyses were conducted (two-way, 2 x 2 ANOVAs with Bonferroni corrections). Korat and Or (2010) found that the mothers made more focusing, affecting, and regulating utterances when reading the IEBs, however they used more expanding with the traditional books. The mothers made more expanding on word meaning, personal experience, and distancing prompts with the traditional book. Significantly more utterances pertaining to the illustrations were found with the commercial IEB and more discussion about word meaning was found with the education IEB. The educational IEB elicited the most requesting. The children used significantly more initiations and responses with the two IEBs.

Korat and Or (2010) conducted thorough statistical analyses and produced a well-designed study. Methods were clear and repeatable. Comparing two different models of IEBs to the same story in traditional book format allowed for detailed examination of any possible group effects. This study would have been strengthened by a larger sample size in each condition as each group only had 12 participants. A greater sample size may have resulted in more pronounced differences between groups. All of the participants came from a similar SES background. A more diverse sample would have strengthened the findings. This study offers

compelling evidence that there is a difference in the interactions of mother-child dyads while reading an IEB versus a traditional book.

Barnett and Crowe (2008) investigated whether the pragmatic language used by adult-child dyads differed when reading IEBs versus traditional books. The participants in this repeated measures design were ten children with a mean age of 29.9 months. Each child read a randomly assigned story format (IEB or traditional book) with one of their four preschool teachers for three sessions. The teachers were instructed to read the book as they would normally do. Later the same day, the student selected one of three books of the other format to read. The IEB system used consisted of narration, sounds, music, and an activity mode which enabled game-play. All of the children's and teachers' utterances were transcribed and coded using Dore's Speech Acts (Dore, 1974; Dore, 1978).

Appropriate statistical measures (repeated measures t-test) revealed no significant difference in the number of utterances produced by the children with the different book formats. When reading a traditional book, the children used more repeating utterances, labeling, and practising utterances, whereas when reading the IEB, the children used more requests for action, answering, and protesting utterances. The teachers made more requests, acknowledgements, and organizational utterances when reading the IEB and made more statements with the traditional book. The teachers took statistically significantly more time to read the IEB than the traditional book.

Barnett and Crowe (2008) presented a repeatable and clear design for their study. The inclusion criterion for the participants of this study was not clearly defined and the small sample size was a limitation of this study. All of the participants came from a mid to high SES, therefore the participants did not accurately reflect the general population. A larger and more diverse sample size would strengthen the findings. This study did not examine whether the order the dyads read the books in influenced interactions. The researchers noted that not all of the teachers were familiar with the format of the IEB being used, which may have influenced how they interacted with the IEB. The teachers also had formal education in early childhood education which may have influenced their interaction styles and may not reflect the interactions of a typical adult. Despite these limitations, Barnett and Crowe produce compelling evidence that interactions do differ with adult-child dyadic reading IEBs and traditional books in this population.

Fisch, Shulman, Akerman, and Levin (2002) examined the types of behaviours elicited by parent-child dyads during shared story reading of an IEB. This single group study compared interactions with an IEB to previous research examining parent-child interactions during traditional book reading. Seven parent-child dyads (two three-year-olds, and five four-year-olds) participated. The IEB was based on an online story that consisted of a passage of text, an illustration, buttons to turn the page, and three choice points where the child could select the direction of the story. Parents were instructed to read the IEB with their child as they would normally do. The shared story reading was transcribed for behaviours in six categories; designating/labelling, story/comprehension-related, external references, medium-specific references, reading the text, and miscellaneous utterances. Fisch et al. (2002) reported that parents used medium-specific references most frequently when reading the IEB, followed by distancing prompts, and labeling. Children made the most medium-specific utterance when reading the IEB, particularly pertaining to instruction on where to click.

The strengths of Fisch et al.'s (2002) single-group study include thorough transcription and coding of the parent-child utterances and a clear, repeatable design. A small sample size and limited background information on the participants limits the ability to generalize the findings of this study. Fisch et al. (2002) do not indicate if any statistical analysis were conducted. Results suggest that the data obtained from the seven parent-child dyads was average to obtain frequencies of behaviours, however it is not clear. A major limitation of this study is the absence of a traditional book group and the dependence on previous research for the interactions observed in parent-child dyads sharing a traditional book. Although this study suggests a difference in parent-child interaction during IEB reading, the lack of clear statistical analysis and a small sample size indicate that these results cannot be readily accepted. This study presents equivocal evidence towards differences in interaction styles.

Kim and Anderson (2008) conducted a single subject design examining the types and frequencies of interactions of a mother and her two sons (3;9 and 7;3) when reading a traditional book, an IEB with minimal interactive features (IEB1) and an IEB that used animated scenes (IEB2). Kim and Anderson (2008) also examined whether the children initiated interactions differently across the three conditions.

Coding of message units and number of utterances indicated that the mother spent more time interacting with both children with the traditional book. The IEBs produced less discussion, partially because the rate of the narration was difficult to control, interrupting parent-child interactions. The mother produced more utterances with the traditional book, followed by IEB1 and then IEB2. The same pattern was observed in both children's interactions. More immediate discussion was observed with the traditional book and more non-immediate discussion was observed with the IEBs. The mother adjusted her mediation based on the age and ability of the child she was reading with. Data collected was analyzed to determine general trends, but no formal statistical analysis was discussed examining if the trends found were of statistical significance.

This single subject design study consisted of a thorough and repeatable design which included a period of observations with the family to become familiar with their interaction styles prior to the study. This study is limited by the single subject and the lack of formal statistical analysis. The methods of this study could be applied to a larger sample size to establish if the observed interactions apply to a broader population. Although the findings may be valid for this one family, it is difficult to generalize these findings to a broader population. Kim and Anderson (2008) provide equivocal evidence that IEBs elicit different interactions than traditional books in mother-child dyads.

Discussion

Evidence from these five studies indicates that interactive electronic books do elicit different types of adult-child interactions than traditional books during shared story reading. When reading an IEB, both adults and children made more requests, utterances related to behaviour, and utterances that pertained to the medium of the IEB. Children also made more responses, likely in response to their parent's requests. The increase in requests when reading an IEB reflects the dyad's ability to have greater control and interaction with the story, such as requesting the activation of a specific interactive location. More behaviour related utterances, such as requests to stop pushing a button (Parish-Morris et al., 2013), were likely seen as adults tried to direct the child's interaction with the IEB. Children also used more behaviour related utterances to try and fulfill their own ideal of how the IEB should be used. The interactive features of IEBs, such as animation, music, and games, predispose IEBs to elicit more discussion about the features than the actual story plot, which was observed in these studies.

Traditional books elicited more adult interactions directly related to the story, such as questions, expansions on word meaning, personal experiences related to the story, and distancing prompts. These interactions are known to help promote development of children's sentence length, vocabulary, expressive language, and literacy skills. During the sharing of a traditional book, children used more distancing prompts, repeating utterances, labeling, and practising utterance. These behaviours indicate that the children focused more on the story than the media and used language that encourages literacy and language development.

The five reviewed studies all present clear research questions and repeatable designs. A recurrent limitation observed across all but one study (Parish-Morris et al., 2013), was small sample sizes. As this area of research did not require a specific disorder type, participant criteria would not have limited the recruitment of a larger sample. All of the participants in the five studies were of a mid to high SES, which suggests that these findings do not accurately reflect the entire population, however it did insure for a homogenous sample. Further examination with a larger sample size and participants with a broader diversity of backgrounds, may lead to different types of interactions being observed. The quality of statistical analysis varied across the studies, with Parish-Morris et al. (2013) conducting extensive and appropriate statistical analysis, to Fisch et al. (2002) conducing minimal statistical analysis of their findings. In all studies, the familiarity of participants with the model of IEB used varied. Some dyads had extensive experience using the model of IEB used while others had no experience with the model of IEB used. The influence of familiarity with the model of IEB used was not examined in any of the studies. It is possible that participants made more comments about the media with the IEB as it was a new and novel format. With regular use and familiarity with the model of IEB used perhaps the novelty of the IEB's interactive features would diminish and more discussion would evolve about the actually story. Future research examining these limitations may lead to strengthening the findings of these findings or perhaps new patterns of interaction would be found.

The difference in interactions between an IEB and a traditional book found in these five studies suggest that the interactive features of the story deters from discussion of the actual story. With less discussion about the story the child does not receive the same

rich language with an IEB as they do with a traditional book.

Clinical Implications

Despite the increasing popularity of IEBs, careful consideration must be taken when choosing to engage in shared story reading with an IEB. Although Barnett and Crowe (2008) found no difference in the number of utterances made by adults while interacting with IEBs, the consensus from these five studies is that IEBs elicit different types of adult-child interactions than traditional books during shared story reading. The types of interactions elicited by adult-child interactions with IEBs do not provide the same rich language found when these dyads engage in reading a traditional book. From a clinical point of view, shared story reading has long been promoted as a method of developing early language and literacy skills in children. As shared story reading of IEBs becomes more common, we may see a decrease in the beneficial behaviours of shared story reading and that the adult-child discussion begins to shift to discussing the interactive features of the story, not the story itself. IEBs are perhaps best used as a game or activity with children, rather than a rich reading experience. The rich language that adults use with traditional books during shared story reading has been found to, and will continue to be key, in the development of children's sentence length, vocabulary, expressive language, and literacy skills (Hindman, Skibbe, & Foster, 2014).

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