

Critical Review:

Does electronic versus paper book experience result in differences in level of emergent literacy development in young children?

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This critical review examines the literature measuring the effectiveness of electronic-book (e-book) technology in promoting early literacy skills in young children compared to traditional print based methods. Study designs include: randomized block design (3), mixed group design (1), and a systematic review (1). Overall, the findings neither fully support nor refute the use of e-books to assist in the development of emergent literacy skills. Further experimental investigation is required to determine if e-books are as effective as traditional print books in promoting emergent literacy.

Introduction

Early childhood is a critical developmental period for acquiring emergent literacy. Emergent literacy skills are the developmental precursors for reading and writing that young children gain prior to achieving conventional literacy. Examples of these skills include book conventions, phonological awareness, word awareness and comprehension. Young children's daily experiences within the home and in early educational settings are fundamental to their development of early literacy skills. Adult-guided storybook reading with print based books traditionally represents the cornerstone of literacy instruction (Phillips & Lonigan, 2005; Korat, Klein, & Segal-Driori, 2007). Research has consistently demonstrated that adult-guided storybook reading facilitates literacy growth and is positively related to future language growth and later reading achievement, especially if the child is an active participant in the reading activity (Whitehurst & Lonigan, 1998).

Computer technology and multimedia has transformed early storybook reading experiences through the development of commercially available e-books (Korat & Shamir, 2007). E-books can be broadly defined as a digital form of a book containing similar features to traditional print books (e.g., central themes, pages that turn), however they are different as they also often contain electronic enhancements (e.g. animations, games, sounds) (Zucker, Moody & McKenna, 2009). E-books are currently heavily marketed by highlighting their ability to promote emergent literacy through the unique features available such as read alouds, which allow children to listen to storybooks independent of adults, along with multimedia effects (e.g., text highlighted simultaneously with narrator's reading, words divided into their sounds) and interactive elements (e.g., animations that move once clicked on by the mouse). Given the extensive marketing of e-books, it is not surprising that within the last decade, e-book

popularity has grown significantly among parents and teachers of young children. A national survey targeting American children ranging from birth to 6 years of age, revealed that 20% of 3-4 year olds and 10% of 5-6 year olds used e-books daily and on average, spent 36 minutes and 47 minutes respectively interacting with them (Vandewater et al. 2007). Additionally, despite the growing use of e-books among young children, the extent to which e-books promote emergent literacy skills is variable among research results (Korat & Shamir, 2007). Thus, it is imperative for parents, teachers and health professionals to be informed consumers. Since traditional adult-guided storybook reading with print books has proven effective in promoting emergent literacy skills in young children, it is important to compare the efficacy of e-book reading experiences. Reviewing the literature in this area will allow speech-language pathologists to advise parents and teachers about how to use e-books in an optimal way.

Objectives

The primary objective of this paper is to critically evaluate the existing literature in order to discover if e-books are as effective as traditional print based books in promoting emergent literacy in young children aged 3;0 to 6;0.

Methods

Search Strategy

Computerized catalogued databases including Web of Knowledge, CINAHL, Proquest Education Journals, ERIC and JSTOR were searched to find journal articles. The following search strategy was initially used:

(CD-ROM) OR (Electronic books) AND (Print books) AND (Literacy) OR (Language) AND (young children) OR (preschoolers).

The search was limited to articles written in English. The initial search criteria yielded limited relevant

articles. Reference lists of relevant articles were searched to find subsequent articles of interest.

Selection Criteria

Studies selected for inclusion in this critical review paper were required to investigate the differences in emergent literacy levels of young children when reading e-books versus traditional print based books. With the exception of age (3 years to 6 years), no limits were set on demographics of research participants or outcome measures.

Data Collection

The literature search yielded 3 randomized block designs, 1 mixed group design, and a systematic review. Articles are discussed based on significance of research findings to the primary objective.

Results

Study #1 de Jong and Bus (2002) conducted a randomized block design study to examine whether young children's emergent story reading differed based on the type of book format used, comparing reading of a regular print and electronic form of the same storybook. Emergent reading was defined by children's level of internalization based on measures of story meaning, phrasing and features of written text. Participants included 48 children aged 4 to 6 with no history of a learning disability. They were recruited from 4 different classrooms of the same school in the Netherlands. Students enrolled in this school were from families of low socioeconomic status. Prior to initial pre-testing measures, children were required to score at least a Level 3 (a story-like retelling) based on Sulzby's Emergent Storybook Reading Scale (Sulzby, 1985). This scale outlines a series of 11 levels containing behaviours children typically exhibit when progressing from emergent to formal reading. Children were evaluated based on their emergent reading of a storybook the teacher had previously read to them three times.

Participants were assigned to book format in 2 phases. In the first phase, participants completed tests of letter knowledge, rhyming, word dictation, and word reading. These tests were spread over the course of 3 weeks and given on four different occasions. Baseline scores were obtained to group participants into 1 of 3 levels of emergent literacy; children were equally divided into the low, middle, or high levels respectively.

In the second phase, children from each of the 3 emergent literacy levels were randomly assigned to 1 of 4 conditions: 1) regular book, where the paper version of the book was read to children by the examiner, 2)

restricted computer book group, where children were not able to activate games included in the e-book, 3) unrestricted computer book group, where children were allowed to access games, and 4) a control group. Each condition contained 12 children who participated in six, 20 to 45 minute sessions over a period of 2.5 weeks.

The researchers used an overall MANOVA, followed by individual ANOVA's that were found to be significant for pre-post measures. Results revealed from pretest to posttest that children in the regular book reading condition achieved higher word reading scores than children in all other conditions. Additionally, emergent reading scores were obtained at post-test only. Participant's scores were compared across children and conditions. These scores determined how closely the participants' story retell resembled the print book or e-book through examination of the participant's attention to text, word similarity, letter naming and decoding abilities. Results revealed that only children in the regular book reading condition achieved scores on measures of emergent story readings that were statistically better than those children in the control condition.

Comparatively, this study did not find a significant effect for any conditions on measures of letter knowledge, rhyming or word dictation. Furthermore, participants in the unrestricted e-book condition were reported to be distracted by e-book features and did not read the text completely. The overall findings suggest that children who were read to by adults using a print book possess more favorable outcomes for both emergent story reading and word reading compared to children in the e-book condition.

Limitations of this study include the limited demographic status of the sample. Thus, the findings cannot be generalized to children from different socioeconomic statuses. Also, variables including gender, age and computer familiarity were also not controlled, thereby creating potential for these variables to confound results. Another limitation is that the authors of the study, despite stating the existence of a control condition, did not provide a description, which could explain improvements in the control condition. Additionally, the sample size of this study can be considered another limitation. Since this study has the smallest sample size compared to all other studies reviewed, the results are more vulnerable to errors in statistical significance. Despite such limitations, this study's findings are suggestive due to its high level (2a) experimental evidence, strong inter-rater reliability and successful randomization of participants.

Study #2 Wood (2005) conducted a mixed group design study to evaluate two outcomes: 1) whether a phonic-based 'talking book' (e-book) was more effective in improving early readers' phonological awareness skills than one-to-one adult reading instruction using a print book and 2) whether the use of 'talking books' impacted children's reading strategies.

A total of 80 participants aged 5 and 6 were recruited from the same school in the United Kingdom. Group assignment was staged in two phases. Participants were first subdivided into 2 age groups: 40 five year olds and 40 six year olds. In the second phase, each of the age groups were further split into 2 groups of 20: 1) the 'talking book' intervention and 2) the comparison group who received one-to-one reading support from an adult using print books. Children in the talking book intervention group were matched to children in the comparison group on age, gender, rhyme detection and alliteration detection, however a broad range of phonological awareness and word reading skills was demonstrated by each group.

The comparison group was assessed and treated first. Once post-testing was completed, the 'talking book' intervention group was assessed and treated. All participants, regardless of group assignment, were assessed during pre and posttests using the Phonological Assessment Battery (PhAB) and Neale Analysis of Reading Ability: Revised (NARA II). The PhAB was used to obtain scores on phonological awareness, particularly rhyme awareness, alliteration, rapid picture naming and fluency. Additionally, the NARA was used to determine reading performance. Although not considered a pre-test measure, the British Picture Vocabulary Scales II (BPVS) was also administered prior to the treatment conditions. The BPVS was used to assess participants' receptive vocabulary in order to determine the level of vocabulary appropriate for verbal instructions during intervention conditions.

All participants in both conditions participated in 6 sessions lasting 15 minutes each, where the participants were asked to read aloud three different print books to the same adult. Sessions were conducted 3 days apart and in the first two sessions the child read book 1, the next two sessions, book 2 and last two sessions, book 3. However, level of instruction differed by condition. The adult in the comparison condition was allowed to instruct the participants when necessary, while the participants in the e-book condition received no instruction once a brief introduction to the software was completed.

Nonparametric chi-square analysis was utilized to examine categorical data pre to post. For the first outcome measurement, results of this study revealed no significant differences between the comparison group with one-to-one adult support and the 'talking book' intervention group for children's overall achievement in measures of phonological awareness. However, in the talking book' condition significant associations were found between children's use of specific speech feedback features (i.e., 'segment the word function' and 'read the page function') and improvements in rhyme detection. For the second outcome measurement, results revealed all participants showed similar changes in reading strategies pre to post-testing, with the exception of children in the five-year-old 'talking book' group who showed significant improvements in decoding. Overall this study found highly relevant findings favouring the e-book condition. Particularly, e-book features were found to have the ability to support the emergent literacy skills of rhyme detection and decoding.

A limitation of this particular study is that the authors neglected to provide information regarding inclusion criteria of participants. The diagnosis of certain disorders, such as learning disabilities, may have influenced outcomes in various conditions. Despite this limitation, this study has high level (2a) experimental evidence. In addition to this study's relatively sound experimental design, another strength of this study is that the authors adequately controlled for differences in variables across both conditions matching for age, gender and pre-assessment measures.

Study #3 Korat & Shamir (2007) conducted a randomized block design study to evaluate two outcomes. The authors wanted to determine which activity, children reading the e-book independently or children being read the same book in its printed version by an adult, produce better outcomes in the child's overall emergent literacy. Additionally, they wanted to identify if improvements in children's emergent literacy levels differ as a function of social economic status. A sample of 128 participants was recruited from 8 kindergarten classrooms in Israel. Four classrooms were from schools in lower socio-economic neighborhoods and four from middle socio-economic neighborhoods. From each of the four classrooms, 16 children were chosen at random to participate. The authors determined neighbourhood SES levels based on data from the Israel Center Bureau of Statistics (1995) statistical report.

Participants were then divided randomly into 1 of 3 groups: 1) work independently on the e-book, 2) adults read the same book in its print format and 3) a control

group which received the regular kindergarten program. Twenty-five children from each SES group were assigned to both experimental intervention conditions, while 14 were assigned to the control condition. Gender was controlled for in all conditions and between SES levels, and all children in the study had familiarity with computers because of curriculum expectations.

Pretest and post-test measures were used to determine changes in emergent literacy outcome measures, which included word recognition, vocabulary and phonological awareness. However, a fourth measure, story comprehension, was administered only during post-testing. Pretests and post-tests were given in the same order and testing occurred over two sessions, with no more than 5 days between sessions.

Experimental intervention conditions took place over three activity sessions and each session lasted on average about 30 minutes over 3 weeks. Children in the e-book condition worked individually with the e-book and experienced two modes: 1) 'read the story with dictionary' occurring in the 1st and 3rd session and 2) 'read the story and play occurring in the 2nd and 3rd session. E-book software modes were programmed to allow activation only after all text on the page was read. 'Read the story with dictionary' mode provides an oral reading of the text, but also automatically provides definitions for difficult words following the narrator's complete reading of the page. 'Read the story and play' mode provides an oral reading of the text, but also allows children to interact with the story by activating characters or objects on the page.

In the experimental intervention condition where an adult read the printed version of the same book to participants, reading sessions were completed following a list of prescribed instructions. Five undergraduate, third year students in the school of education represented the adults. The way adults read to participants was based on kindergarten teacher's responses to a questionnaire describing how teachers typically read books to their students. The list included 4 comments to be said by the adult, as well as 5 words and 5 questions expected to be introduced at specific points during the reading.

The authors utilized a two way MANOVA followed by univariate analysis with Bonferoni corrections for pre – post measures to examine data. Results of this study revealed no significant differences in children's overall emergent literacy scores across all conditions and no significant differences between SES level and experimental condition. Interestingly, repeated measures MANOVA of group by time revealed a significant interaction effect. A repeated measures test

(i.e., ANOVA) for each treatment group revealed a significant improvement in vocabulary scores for the e-book reading group and for the adult reading group, but not for the control. Therefore, these findings suggest kindergarteners that independently read the e-book and those who are read the same book by an adult achieve similar emergent literacy scores.

Limitations of this study include the presentation of an educational e-book designed specifically to include features suggested to be supportive for children's literacy. The scores of the participants in the e-book experimental condition may not be a valid representation because software was programmed with features favorable to literacy gains. A second limitation is the study only provides the average age of participants, failing to mention the age range. Different ages of participants may have potentially confounded results, as it was not completely controlled. Despite limitations, this study has high level (2a) experimental evidence. In addition to the study's relatively sound experimental design, another strength of this study is that the researchers considered the importance of ecological validity as illustrated by their efforts to design a reading method in the adult reading condition that was similar to that utilized by kindergarten teachers.

Study #4 Segal-Driori, Korat, Shamir & Klein (2010) conducted a randomized block design study to examine the extent to which reading a printed book with an adult and reading an electronic book with and without adult instruction, effects kindergarten children's emergent reading. One hundred and twenty-eight participants from 12 kindergarten classes in Israel were recruited. All participants were enrolled in schools located in lower socio-economic neighbourhoods. The authors determined neighbourhood SES level based on data from the Israel Center Bureau of Statistics (2005) statistical report.

Participants in each of the kindergarten classes were then randomly equally divided into 1 of 4 groups: 1) read the e-book independently without adult instruction (EB), 2) read the e-book with adult instruction (EBI), 3) read the printed book with adult instruction (PBI), and 4) control group which received the regular kindergarten program. Gender was controlled in all conditions and between SES levels, and all children in the study had familiarity with computers because of curriculum expectations. Pretest and post-test measures were used to determine changes in the emergent reading measures, which included phonological awareness, word reading and concepts about print. Concepts about print scores were determined based on children's

answers to questions regarding concepts such as writing, page, line, direction of reading etc.

Experimental intervention conditions occurred over four book-reading sessions which each lasted on average about 15-20 minutes. Two different books were used during all experimental conditions. Half of the children read book 1 and half read book 2.

Additionally, all participants in each experimental condition worked in pairs, but in a separate room in their kindergarten classroom. Rationale for working in pairs was provided in the study and was based on previous research findings that revealed working in pairs during e-book use promoted young children's emergent literacy (Shamir, 2009; Shamir & Korat, 2007; Shamir, et al., 2008)

Participants in the e-book conditions were shown how the software operated at the beginning of each session and following completion of e-book reading, the examiners asked comprehension-based questions. Participants were allowed to select from two modes including 'read the story only', or 'read the story and play during their reading sessions. 'Read story only' mode provides an oral reading of the text with multimedia effects. 'Read the story and play' mode provides an oral reading of the text, but also allows children to interact with the story.

Level of adult assistance differed based on condition. Children in the EB group were only given technical support when needed during the session. However, in the EBI and PBI groups, assistance was given during and after book reading sessions. Assistance during the sessions included using activities to promote emergent reading, such as the adult focusing the child's attention on sounds and syllables in words. While assistance given after sessions included activities where children related their current book reading experience to past experiences.

For this study, a univariate analysis of variance was completed for pre and post measures comparing the EB, EBI, PBI and control groups. This analysis was followed by a univariate one-way analysis of variance with Bonferroni corrections for the EBI and EB groups. Results of this study revealed the EBI group achieved greater improvements in word reading and concepts about print compared to all other conditions. The EBI group also achieved greater improvements in phonological awareness compared to the EB and control group. Overall, these findings suggest that e-books have the ability to be more effective than print based, guided reading instruction at facilitating certain emergent reading skills, particularly word reading and

concepts about print for young children, however adult mediation is necessary.

Limitations of this study include working in pairs during experimental conditions. The study did not control for levels of peer assistance given during experimental conditions, which possibly confounded results. Additional limitations are the use of two different books and offering two different modes to participants in the e-book conditions. Having half of the participants read book 1 and half read book 2 does not allow for the standardization of conditions. Offering two different program modes for participants in the e-book conditions also disrupts standardization and produces a confounding variable. Despite limitations, a particular strength of this study is its large sample size. Larger sample sizes are typically more representative of the population and allow greater confidence that results are accurate and less likely due to chance. Furthermore another strength is this study's high level (2a) experimental evidence, illustrating a relatively sound experimental design.

Systematic review. Authors of this systematic review, Zuker, Moody & McKenna (2009) discuss the efficacy of e-books in promoting pre-kindergarten to grade 5 students' literacy and language skills, through reviewing relevant research that met criteria to be included in either a meta analysis, or narrative review. More specifically, their aims were to assess current research to find evidence on: 1) the effectiveness of e-books for different profiles of readers, particularly early and struggling readers, 2) the effectiveness of e-books in supporting comprehension and decoding skills, and 3) features of e-books that support literacy and language. For the purpose of this critical review, sections examined included studies comparing electronic and paper book experiences and their effects on literacy skills of children aged 3 to 6.

The methodology employed in this review is a considerable strength. Although this review employed a meta-analysis and a systematic narrative review, selection criteria outlining how studies were chosen for inclusion in each approach was discussed. The research design of studies determined their inclusion in the meta-analysis (i.e., randomized control trials), or narrative review (i.e., quasi experimental or qualitative/observational). Seven studies were included in the meta analysis and 20 in the narrative review. Further selection criteria included use of specific independent and dependent variables, age of participants and publication type (i.e. peer reviewed). Additionally, the authors of this review thoroughly outlined search criteria used during their literature

search, coding features employed to all studies and fully described how data was analyzed.

A limitation of this systematic review is that the analysis of the studies included in the narrative review was quite vague. Although main findings were highlighted for each of the studies, the reliability and validity of results was minimally evaluated. Additionally, another limitation is the potential publication bias as all the journals included in the study were required to be peer reviewed and between the dates of January 1997 to January 2007. Two problems emerge from this bias including missing highly relevant studies with significant findings prior to 1997 and potentially overestimating effects as a result of including only peer reviewed journals. The authors included this statement: “Our inclusionary criteria only allowed studies published in peer reviewed journals, which may have contributed to a publication bias; published studies may represent a biased sample or overestimate effects, especially considering that some of our own work showing null effects was not included because it was not published in a peer-reviewed source.” (McKenna, 1998).

Despite the limitations of this review, the findings from the meta-analysis and narrative review are valuable to understanding the efficacy of e-book use. For studies included in the meta-analysis, Cohen’s *d* statistic for effect size was calculated. Results revealed e-book usage had small to medium effect size for comprehension and zero to small effects on print skills. Estimates for the effect size for decoding could not be determined due to the limited number of studies.

Findings from the narrative review regarding the efficacy of e-books for different profiles of readers were quite minimal, particularly for struggling readers. However, a small number of studies have shown promising results suggesting e-book benefits related to comprehension outcomes for early readers. Regarding the third purpose of the systematic review, studies reveal beneficial and problematic features of e-books, however the features identified are inconsistent. The one exception to the inconsistencies is that of cued animations, or hotspots. Researchers typically agree that when hotspots are related to the meaning of the text, they contribute to children’s understanding of the story, however if they are unrelated, students can become distracted and their story understanding can be compromised.

Overall, Zuker et al. (2009) suggest the need for high quality research focusing not only on the efficacy of e-books in promoting literacy, but also comparing e-books to print books and their subsequent effects on

language and literacy since minimal literature is currently available. They also offer valuable suggestions to consider when working with e-books including that e-books are most effective when teachers mediate their use and that children’s comprehension can be facilitated or hindered depending on the e-book features used.

Incidental Findings

Although each of the studies discussed above contributed to the main research question, factors within those articles and in articles not quite meeting inclusionary criteria for the review offer compelling information influencing e-book use and outcomes of emergent literacy. Software features of the e-book itself are associated with more or less supportive outcomes for emergent literacy. Labbo & Kuhn (2000), in their qualitative case study found that multimedia features including music, sound effects and animation that are related to story structure, support children’s understanding and story retell, however e-books with multimedia feature unrelated to the story were associated with reduced story comprehension and recall. Additionally, e-books with unrelated multimedia features were also found to promote more passive viewing behaviours, which could potentially teach children to disengage from activities important for effective comprehension monitoring.

The population using the e-book is another factor to be considered, since the type of individuals using the e-book has been associated with different outcomes for emergent literacy. Segers, Takke & Verhoeven (2004), in their mixed pretest-posttest group design found that multicultural children showed greater improvements compared to native speaking children in vocabulary development and story comprehension when listening to the teacher read a story compared to listening to the e-book. Furthermore in Korat & Shamir’s (2007) study, they hypothesized that children of lower socio-economic status would benefit more from e-book use compared to middle socio-economic status. They found however, that emergent literacy outcomes associated with e-book use was not a function of social class as both levels improved in different areas.

Finally, adult mediation during e-book use needs to be considered, as adult assistance has been associated with improved outcomes for emergent literacy. Segal-Driori, et al. (2010) found that reading an e-book with adult instruction showed greater improvements in word reading and concepts about print compared to e-book use without adult mediation.

Discussion

Overall, a review of the research regarding the efficacy of e-book use compared to traditional adult-guided print book methods in promoting emergent literacy in children aged 3 to 6 provides variable suggestive evidence. Researchers have identified both positive and negative effects of electronic book reading on emergent literacy development in this population.

Differences in methodological procedures across all studies create difficulty in drawing overarching conclusions regarding the effectiveness of e-book use compared to traditional adult-guided print book methods in promoting emergent literacy skills. Methodology differed in measures of emergent literacy, software features used during e-book conditions, reading profiles of the participants, degree of uniformity of the e-book to its print version, inclusion of adult mediation during e-book use, level of assistance given during conditions, and skill level of the adult in the traditional book reading condition (e.g., researcher, undergraduate student).

However, when variance in methodology is removed as a factor restricting comparison among research, the literature reviewed has identified some areas of emergent literacy that are better promoted depending on the method of instruction, being either adult-guided print book reading or e-book reading experiences. de Jong and Bus (2002), found the traditional adult-guided print book reading condition produced better outcomes for children's story understanding and word reading. Wood (2005), found e-books were associated with greater improvements in decoding and rhyme detection abilities for different age groups. Furthermore Segal-Driori et al. (2010), found outcomes favourable to e-book reading experiences with regards to children's improvements in measures of word reading and concepts about print, however the e-book condition was mediated by adult guidance. Conversely, the research reviewed also highlighted areas of emergent literacy that improved at similar levels regardless of the type of instruction used. These areas include general phonological awareness as found in both Wood's (2005) and Driori et al. (2010) research, and vocabulary as found in Korat and Shamir's (2007) study.

Additionally, within the reviewed literature some authors identified how different features of e-book software affected emergent literacy outcomes. Wood (2005) found the speech feedback features of 'read the page' and 'segment the word' had positive effects associated with children's improvement in rhyme identification. Conversely, de Jong & Bus (2002) found that children who were able to access games when

interacting with the e-book opted for playing games at the expense of reading the text, thereby contributing to lower scores on story understanding. Zuker et al. (2009) systematic review found similar results across inclusionary research concluding when e-books contain many hotspots irrelevant to the text of the story, children become less engaged in the story thereby compromising their understanding of the story.

Conclusion

Currently, a firm statement regarding the efficacy of e-book use compared to adult-guided print book methods in promoting emergent literacy skills in this population cannot be made due to inconclusive results. Overall, research findings are suggestive revealing e-books have the ability to promote, but also hinder, aspects of emergent literacy. Specifically, e-books were found to improve word reading, decoding, and concepts about print and rhyme detection abilities. Comparatively, e-books have the ability to distract children from reading the text, thereby reducing their story comprehension and recall. This is especially true when games and unrelated hotspots are features of the book.

In order for young children to optimally use e-books as a method of instruction for promoting emergent literacy, the following variables need to be included in e-book reading experiences: ensuring e-book hotspots are congruent to the text of the story, mediating e-book use through adult involvement and selecting software modes considered most favorable to literacy development. Further research in this area should be conducted in order to make firmer statements regarding e-books effectiveness in promoting emergent literacy outcomes compared to traditional print methods.

Recommendations

The following recommendations are proposed to improve the strength of evidence aimed at this question:

1. Further large scale studies examining the effect of individual e-book use compared to adult guided print book reading on children's emergent literacy should be conducted in order to determine clinical importance.
2. A longitudinal prospective study would be beneficial to determine whether the effects of e-book use on emergent literacy skills observed at a young age transfer or dissolve with age.
3. Research samples should include different profiles of children including struggling readers, those with

learning disabilities and/or special needs to evaluate the effects of e-book use on these populations.

Clinical Implications

As a result of mixed evidence regarding e-books effectiveness in promoting emergent literacy, speech-language pathologists (SLP) should be advised that e-books be used as a complement to traditional adult guided print book reading experiences and not as a replacement. As well, SLP's should inform other professionals and parents about the features of e-books considered favourable and unfavourable to emergent literacy development so as to facilitate optimal use of e-books. Thus, SLP's should be aware of the following:

- 1) Speech feedback features of e-books are favourable for developing the rhyming aspect of phonological awareness.
- 2) Although results are equivocal for vocabulary development, adult guided print book reading is favourable for the development of comprehension related outcomes such as story understanding and recall.
- 3) Games and incongruent hotspot features of e-books may distract children from the text and negatively affect story understanding, recall and possibly comprehension monitoring.
- 4) E-book use mediated by adults is favourable for the development of decoding skills including concepts about print and word reading.

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