

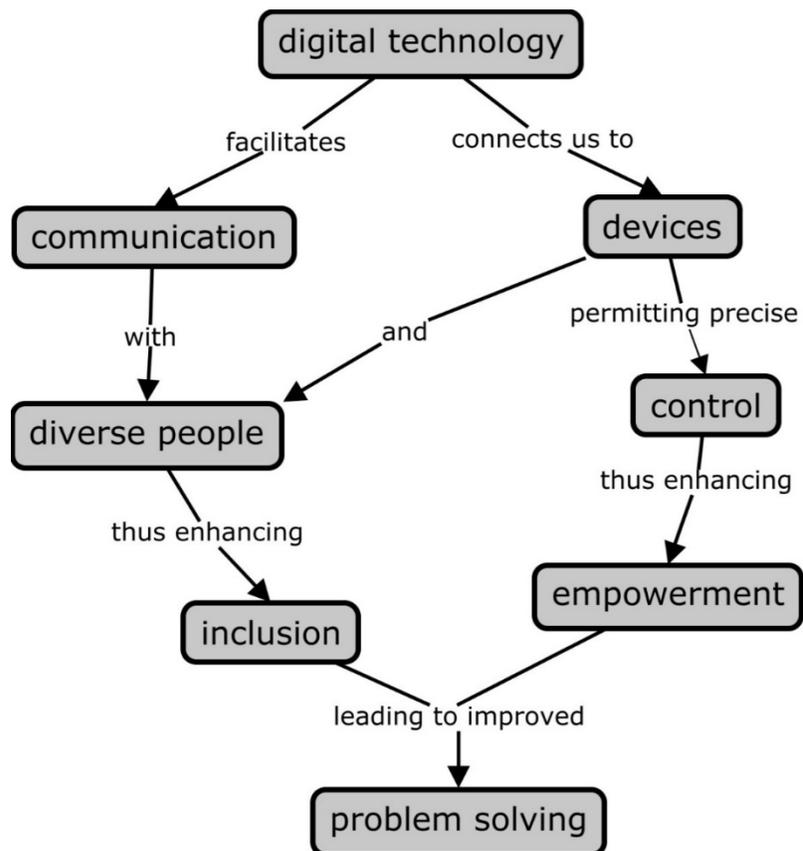
Revisiting the Digital Divide: Collective Responsibilities and Individual Responses

Susan Rvachew, SCSD, McGill University

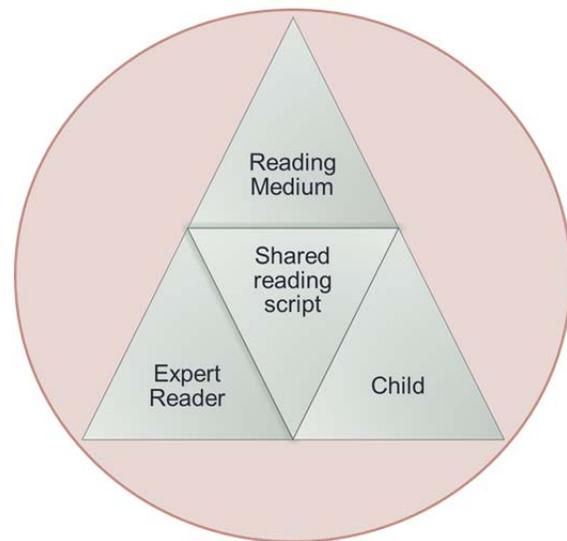
Keynote Address, Working Group 3 Panel, September 1, 2017

The most common attitude to digital media that is projected in the public sphere at present [https://digitalmediaprojectforchildren.wordpress.com/2015/12/09/digitmcgill-conference-day-2-theme-ii-report/] is one of moral panic [https://en.wikipedia.org/wiki/Moral_panic], especially with regard to digital media use by children. However, it is evident that that digital technologies have been integrated – or, depending on your view, one might say they have intruded – into every sphere of adult activity (a point illustrated by this YouTube clip of Mauril Bélanger introducing a bill into the Canadian House of Parliament during the late stages of his struggle with ALS, [http://www.cbc.ca/news/politics/dreams-gender-neutral-anthem-1.4180545?cmp=rss]) . We now use tablets and laptops and smart phones indoors and outdoors, for work and for play, alone and with others, for teaching and for learning, for solitary entertainment and for communicating in new ways and with more people than we ever did in the past. These technologies allow us to solve problems that were previously intractable although I admit they introduce many new problems that perhaps we have failed to fully anticipate.

I can repeat this idea somewhat more formally with this concept map: digital technologies facilitate communication by and with diverse people, thus enhancing inclusion and participation by more segments of our society. Furthermore, these technologies connect us to the material world in new ways, permitting more precise control of our environment. Jointly, these two aspects, inclusiveness on the one hand and empowerment on the other, lead to better problem solving. So, these benefits of technology combined with the sheer ubiquity of these mobile devices in adult life mean that we have no choice about teaching our children to live in this technology rich, or if you prefer, technology-laden, environment.



How do we prepare children to live out in the world? One tool that parents and early educators have is shared reading. Although picture books present situations that children are unlikely to encounter in real life (fairies, monsters and talking bears), they provide opportunities to identify familiar emotions and to talk about solutions to problems that arise from differences in perspective. Borrowing from Kathrin Rees' doctoral dissertation, the graphic below indicates that shared reading necessarily involves shared attention by the child and adult to the reading medium. The adult and child also share a common script for the exchange – in our research we found that there was some variation among families in how they managed the shared reading interaction but each dyad adhered to a well-practiced script. The child typically accepted their role which was surprisingly quite passive, even for those children who were rather chatty; they knew when it was their turn to listen and their turn to speak and these turns were largely coordinated by the parent. Another aspect is the way that the close proximity of the adult and child creates a safe cocoon for exploration of difficult or frightening realities. For example, in our recordings of parents and children reading "The Big Bear Hug", we were surprised to find that all of our Canadian research participants, with the exception of one indigenous child, were unfamiliar with axes. Their parents clearly considered the ax to be an unsafe object that should be kept away from their children; however, shared book reading provided a safe environment for exploring the concept, not to mention the encounter with the large bear. Many of the shared reading sessions that we recorded in my laboratory began with the parent encouraging the child to come closer, no matter how close the child was to start with. With words and gesture 'come closer' was the cue that shared reading was about to begin.



As already mentioned the child in these shared reading exchanges took on a relatively passive role, recognizing the expert role of the parent as the reader and teacher in these exchanges. The notion of an expert reader is so well ingrained that when we video recorded co-reading by kindergarten children in a school setting, one child always took on the role of expert reader, either reading or pretending to read the story and maintaining complete control of the book until the end. The reading child would use gestures and words, both subtle and blatant to maintain control of the book and lead the interaction throughout. When finished reading the child would offer the book to the listener, saying "it's your turn now" but often the second child would refuse to take their turn with the book because they did not want to take on the expert role even though they expressed their interest in interacting with the book medium more actively while the first child was reading. Equal co-viewing of the book did not happen among the preliterate French-speaking children in our study, even when sharing ebooks.

We know from much research [Bus, Van Ijzendoorn, & Pellegrini, 1995; Reese & Cox, 1999] that shared reading interactions between adults and children have long-term benefits for the cognitive-linguistic,

academic, and social development of the child. Given those known benefits, many parents and teachers see no reason to share ebooks with children. But let's explore some reasons to disrupt this well-known interaction by introducing a new reading medium.

Although a lot of the literature on reading with ebooks has focused on potential disadvantages [e.g., Parish-Morris et al., 2013], there are some aspects of well designed ebooks that can promote learning, especially in the area of print referencing. It has been shown in eye-tracking studies that preliterate children do not look at the print in paper books unless specifically directed to do so, and that expert readers rarely reference print explicitly [Evans & Saint-Aubin, 2005] without prompting or special training [Justice, McGinty, Piasta, Kaderavek, & Fan, 2010]. Ebooks highlight the print in a number of ways. We consulted with Tribal Nova Inc. (now an HMM company) to create a series of ebooks that contained certain features designed to draw attention to print: specifically, highlighting of key words in the text invited adults and children to touch these "living words" that were also hotspots activating relevant animations that linked text to meaning as well as a prompt bar for the adult reader that suggested comments or questions the adult reader might use to help the child make connections between print, word structure and meaning. We found that the living words in the iReadWith series naturally drew the attention of children and adults, raising the frequency of print referencing, right from the first page. A very few parents in the highest income bracket in our observational studies did this kind of print referencing with paper books, but for the most part it did not occur in that context [Rees, Rvachew, & Nadig, 2017].

We compared use of print referencing by adult readers when sharing paper books versus the iReadWith book that our partnership developed in a recent randomized control cross-over trial [Rvachew, Rees, Carolan & Nadig, 2017]. This study was conducted in English-speaking kindergarten classrooms in low income neighborhoods using volunteer readers who read a paper book or the equivalent ebook to children 3 times in a week. Children were randomly assigned to order of condition with story and book type counter-balanced. The reading exchanges between the adult readers and each child were recorded and transcribed. Each adult utterance that was not verbatim reading of the book text was coded according to five categories: rapport and behavior; book mechanics; story related; word meanings; print or word structure. There were very few references to print in the print book condition, fewer than one on average per reading session; the number of print references per read in the ebook condition was not great but still, five times greater with the iReadwith book compared to the paper book condition. The mean raw frequencies per reading session are shown in the table to the right. Another significant difference shown in the same table was talk about book mechanics – the adult readers engaged in direct teaching about how to access and use hot spots and other features. Finally, there were differences in adult talk about word meanings. This experiment showed that when the book is designed well the animations can support the child's comprehension of new vocabulary.

	Paper Book	iReadWith
Rapport & Behavior	11.67	15.99
Book Mechanics	1.14	4.46
Story Related	16.77	20.21
Word Meanings	3.36	5.89
Print or Word Structure	0.67	3.41

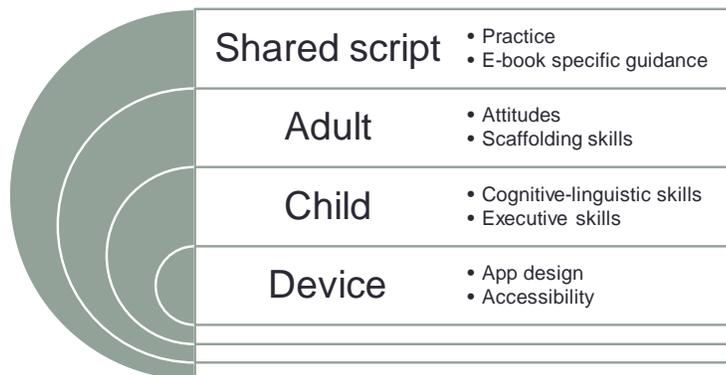
We have observed similar interactions among second language learners in the school and in the home environment. The most gratifying observations have involved immigrant parents and their children learning the language of their new home together when jointly engaged with these animations that are carefully designed to highlight the meaning of specific words and concepts as described in detail by Rees, Rvachew and Nadig (2017). It is not clear which theoretical model best describes the power of multimedia to support vocabulary learning (see dual-coding hypothesis, e.g., Paivio, and the related synergy hypothesis, e.g., Wong & Neumann) but in any case there is now a consensus that multimedia presentations create more robust representations [Takacs, Swart, & Bus, 2015)].

Returning to the small randomized control trial that we conducted in the school environment, the outcomes in the paper book and ebook conditions were similar for story retell and story comprehension. We found a significant advantage to the ebook condition over the paper book condition for emergent literacy results however: here we measured learning to recognize key words in the story and certain phonological awareness skills that were targeted by the stories. There was a significant effect of book medium and the children’s letter knowledge but also a significant interaction, such that children who had no letter knowledge to start with obtained the largest benefit from sharing the ebook with the volunteer reader. Children who had good letter knowledge to start with were better able to learn from print books, which is not surprising because eye tracking studies have shown that these children are most likely to attend to print without prompting [Evans, Saint-Aubin, & Landry, 2009].

In this study [Rvachew, Rees, Carolan & Nadig, 2017], we have suggested that the beneficial effect of sharing ebooks was mediated by changes in adult behavior, triggered in part by a prompt bar meant to facilitate adult use of dialogic reading strategies. This may not be necessary however as shown in a recent study by Strouse and Ganea (2017) in which toddlers showed superior vocabulary learning in the ebook condition even though there were no differences in parent behaviors across reading media. There was significantly greater child engagement however with the ebook.

Having established that there can be benefits from sharing ebooks with young children, I will turn to the question of how we maximize those benefits for diverse children in relation to potential threats to children’s learning from shared ebook interactions. To do that we must consider four factors that contribute to a successful shared ebook interaction: the device, the child, the adult reader, and the reading script shared by the child and adult while reading ebooks.

Successful shared reading with ebooks

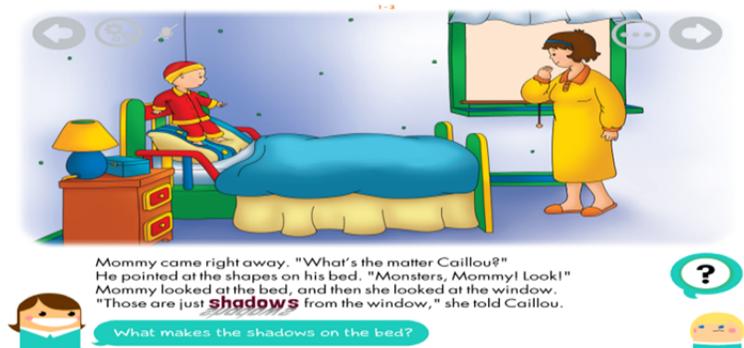


Starting with the device, accessibility remains a concern with regional and social class inequities continuing, especially with respect to broad band access, but this is a problem that governments are actively engaged with and access to devices is near universal in developed countries at present [Comon Sense, 2016]. Therefore I will turn to the question of app design which is more critical.

Obviously there is huge variability in the quality of apps that are available to families. Parents prefer that their children play with apps that are educational but many appear to be educational while not adhering to research principles. However, a number of studies have shown that nudges can be built into books that support the adult reader to provide better quality scaffolding of child learning from books. In the iRead With books the living words attract the adult's and the child's attention to print and animations that link text to meaning. This ebook was designed to support shared reading by parent and child with the inclusion of the prompt bar which nudges the parent to use dialogic reading strategies.

These prompts explicitly target vocabulary, emergent literacy and narrative skills. Furthermore, in 'read and talk' mode, the text is not narrated to the child; it is intended that the adult and child read this book together. However, after HMH bought Tribal Nova Inc., they did not support this series of books and it is no longer on the market. HMH has focused on a subscription based service that provides content to parents along with a facility for parents to track their child's online activity. Their webpage makes it clear the parent participation is defined as remote monitoring of their child's on-line activity. Corporate definitions of "educational" and "parent involvement" are not aligned with the views of the research community or that of experts in early childhood education [Rvachew, 2016]. As Hirsh-Pasek et al. [2015] point out, not all content labelled educational actually supports learning. Interestingly, a lot of these subscription based services include material that is freely available on the internet but wealthier parents have the option of paying to shield their children from advertisements and in-app purchasing. Poorer parents can obtain some of the same content for free while exposing their children to a lot of advertising which is a significant concern.

Source: Images taken from What's That Funny Noise?, published by Chouette Publishing. All rights reserved. Caillou™ Chouette Publishing (1987) Inc.



The approach to improving app quality and ensuring access to good quality apps thus far has been the publication of guidelines for evaluating and selecting apps [<http://www.joanganzcooneycenter.org/2017/05/08/a-checklist-for-evaluating-diverse-childrens-media/>] as well as the recent development of a voluntary ethical framework for marketing apps to children developed by the Kid's Media Centre in Canada [<http://kidsmediacentre.ca/downloads/Ethical-Framework-Best-Practices-kmc.pdf>]. These are valuable enterprises but the difficulty that I have is that a lot of the responsibility is placed on individuals - consumers such as parents, teachers and librarians-and also on individual researchers who collaborate with industry. In the past, collective action in the form of government regulation and support for content development has been used in the domain of children's television but there seems to be a consensus that this approach is untenable in the modern context in which trust in government has been eroded. Such declines in public trust are perhaps warranted given that the moral panic [<https://www.psychologytoday.com/blog/wicked-deeds/201507/moral-panic-who->

benefits-public-fear] around children's social media use has led to government regulations that have resulted in greater social control than the public might otherwise accept [https://www.thestar.com/opinion/commentary/2014/11/22/bill_c13_has_little_to_do_with_cyberbullying.html].

Moving on to child factors, recent research demonstrates that cognitive-linguistic and executive skills play an important role. Engagement and attention control are clearly associated with app design and therefore researchers can encourage app designers to support child learning through evidence informed app design. However, there are factors intrinsic to the child that also determine outcomes. Richter and Courage (2017) published research showing that when adult support is controlled across reading media, story comprehension was predicted by the child's language and executive skills and not by reading media, hotspot use or child age.

My doctoral student, Kathrin Rees, described shared reading by parents and their children who had language impairments (Rees, Rvachew and Nadig, 2017). Children with language impairments have previously been described as unengaged by paper books [Kaderavek & Justice, 2002] but Rees found that they produced more verbal initiations with a wordless print book than age matched children with typical language development, reflecting the better match of the book to their language abilities. Verbal engagement went down in the ebook context, reflecting the greater linguistic and executive function demands of the iReadWith book. The message here, by the way, is not to avoid using ebooks with language impaired children. Prior to this study, I conducted a randomized trial with another doctoral student, Francoise Brosseau Lapré, in which we taught speech impaired children to listen and process language input first and then we taught the parents dialogic reading skills, with a good impact on phonological awareness skills and greater parent satisfaction [Rvachew & Brosseau-Lapré, 2015]. I have always thought the typical practice of introducing the parent intervention before the speech and language therapy rather than after was completely backwards. But in any case, there is a need to match books in any medium to the child's linguistic and cognitive abilities which creates a selection challenge for parents and teachers, especially when there are developmental discontinuities across these domains within a child.

Regarding the adult reader, one important challenge is to not make assumptions and to allow for the full range of diversity in terms of attitudes and skills that exists among parents and teachers. On the basis of much research it is known that there are, on average, differences in language input to children as a function of social class [Hart & Risley, 1992]. But recent data obtained using the LENA recording device shows that socio-economic status is a poor proxy for actual observations of parental behavior (Gilkerson et al., 2017). These researchers recorded adult words and conversational turns over a twelve hour period for families with more or less parental education. Their data show that half the children in the homes with college educated mothers received less language input than half the children in the homes whose mothers had less education. One of the benefits of universally targeted television programs and ebook apps is that built in nudges for parents can be used or not according to their own judgment about their child's needs and their own abilities.

Parental attitudes to technology and these kind of technological nudges vary with social group as well however. In recent experimental work, Troseth and colleagues (2017) have been testing parent's responses to a built in avatar that produces dialogic reading prompts [<http://joanganzcooneycenter.org/2017/07/26/judging-a-book-by-more-than-its-cover-exploring-features-of-traditional-and-e-book-reading-experiences-that-support-childrens-learning/#.WX1E9J0K9GA.twitter>]. She has found that less educated parents respond more favourably to this avatar than more educated parents. Survey research also reveals social class differences in attitudes toward technology use by children [Rideout & Katz, 2016]. Some parents in wealthier homes view technology as a poor quality and potentially unsafe replacement for the parent or other adult guidance. On the other hand some poorer parents sometimes report that they don't have time to play games or read to their children as often as they would like and see these apps as a relatively safe and educational activity for their children to engage in. It behooves us to make sure that the apps are in fact safe and educational for those families that are relying on them.

An anomaly that always strikes me when I read the parent surveys is how often the parents report that not only do they not enjoy reading ebooks to their children, but they report their children do not enjoy ebook reading either. Our observations specifically and the published research in general clearly shows that children are highly engaged by these apps but the source of this disconnect is clear in our video data. We observe during paper book sharing that children typically respond to their parent's questions with responses that meet their parent's expectations – verbal replies or points to relevant parts of the illustrations. When children become engaged with “inconsiderate” interactive elements within ebooks however, children may stop responding to their parent's bids for attention. It becomes difficult to synchronize a three-way interaction between child, parent, and device. In some studies however, objective measures of engagement actually confirmed more engagement by the child in the ebook condition, for example more story relevant comments by children during the ebook condition compared to the paper book condition alongside equivalent story comprehension across conditions (e.g., Richter & Courage, 2017). However, adult participants or observers rate the children in the ebook condition to be less attentive. The parent feels like they are competing with the device for the child's attention and they are not aware of how much learning occurs when the parent follows the child lead, providing parallel talk while the child focuses on the ebook.

A related problem from the parent's perspective, is that the app can be perceived as usurping the parent's role as expert in the familiar shared reading routine. Different parents have different ways of dealing with this. In our video observation studies we observed some parents achieve successful interactions by establishing a “total control” strategy at the outset, making it clear that the parent would control the device and let their child know when it was their turn to touch hotspots, answer questions and so forth. Other parents did not negotiate a strategy with their child at any point during the shared reading session and subsequently experienced an ongoing battle for control of the device, desperately trying to regain their role as expert reader in an unfamiliar context. Other parents achieved successful interactions with their children by following the child's lead and then negotiating a new role for themselves-a role in which they and their child co-created meaning as they engaged jointly with the interactive elements.

My interpretation of our video observations is that the advice that we are giving parents and early educators about ebooks is not always the most helpful. Firstly, the idea that you can read an ebook “just like a print book” is clearly incorrect. A new strategy is required in which the adult reader allows the child a much more active role in the exchange. And this brings me to the final point, and that is much of what we see when we watch adults and children share ebooks is caused not by the medium itself but by the lack of practice that these dyads have had with the device. Shared print-book reading is an activity that parent and child have engaged in for 3 or 4 years before we turn our cameras on them. This is not the case for shared ebook reading. The child’s experience with ebooks may be limited or extensive but it is almost exclusively solitary because of the way the books are designed and because of conflicted attitude that the parent has towards these apps—not surprising given the scaremongering that is so common in the media. If adults and children are to develop productive working relationships with ebooks, we need to permit them to practice this activity so that they can develop a new reading script that is adapted to this new context. Relatedly we need to develop many kinds of books with features that can be adapted to different kinds of families with different needs.

References

- Bus, A. G., Van Ijzendoorn, M. H., & Pellegrini, A. D. (1995). Joint book reading makes for success in learning to read: A meta-analysis on intergenerational transmission of literacy. *Review of Educational Research, 65*, 1-21.
- Common Sense. (2017). *The Common Sense Census: Media Use by Kids Aged Two to Eight*. Common Sense Media Inc. Retrieved from <https://www.commonsensemedia.org/>
- Evans, M. A., & Saint-Aubin, J. (2005). What children are looking at during shared storybook reading; Evidence from eye movement monitoring. *Psychological Science, 16*, 913-920.
- Evans, M. A., Saint-Aubin, Jean, & Landry, Nadine. (2009). Letter names and alphabet book reading by senior kindergartners: an eye movement study. *Child Development, 80*(6), 1824-1841.
- Gilkerson, J., Richards, J. A., Warren, S. F., Montgomery, J. K., Greenwood, C. R., Kimbrough Oller, D., . . . Paul, T. D. (2017). Mapping the Early Language Environment Using All-Day Recordings and Automated Analysis. *American Journal of Speech-Language Pathology, 26*(2), 248-265. doi:10.1044/2016_AJSLP-15-0169
- Hart, B., & Risley, T. (1992). American parenting of language-learning children: Persisting differences in family-child interactions observed in natural home environments. *Developmental Psychology, 28*, 1096-1105.
- Hirsh-Pasek, K., Zosh, J. M., Golinkoff, R. M., Gray, J. H., & Kaufman, J. (2015). Putting education in "educational" apps: Lessons from the science of learning. *Psychological Science in the Public Interest, 16*, 3-34.

Justice, L. M., McGinty, A. S., Piasta, S. B., Kaderavek, J. N., & Fan, X. (2010). Print-focused read-alouds in preschool classrooms: Intervention effectiveness and moderators of child outcomes. *Language, Speech & Hearing Services in Schools, 41*, 504-520.

Kaderavek, J. N., & Justice, L. M. (2002). Shared storybook reading as an intervention context: Practices and potential pitfalls. *American Journal of Speech-Language Pathology, 11*, 395-406.

Parish-Morris, J., Mahajan, Neha, Hirsh-Pasek, Kathy, Michnick Golinkoff, Roberta, & Fuller Collins, Molly. (2013). Once upon a time: Parent-child dialogue and storybook reading in the electronic era. *Mind, Brain, and Education, 7*(3), 200-211. doi:10.1111/mbe.12028

Rees, K., Nadig, A., & Rvachew, S. (2017). Story-related discourse by parent-child dyads: A comparison of typically developing children and children with language impairments. *International Journal of Child-Computer Interaction, 12*, 16-23. doi:https://doi.org/10.1016/j.ijcci.2017.01.001

Rees, K., Rvachew, S., & Nadig, A. (2017). eBooks transform shared reading interactions between adults and children. In N. Kucirkova & G. Falloon (Eds.), *Apps, Technology and Younger Learners* (pp. 147-159): Taylor and Francis.

Reese, E., & Cox, A. (1999). Quality of adult book reading affects children's emergent literacy. *Developmental Psychology, 35*(1), 20-28.

Richter, A., & Courage, M. L. (2017). Comparing electronic and paper storybooks for preschoolers: Attention, engagement, and recall. *Journal of Applied Developmental Psychology, 48*, 92-102. doi:https://doi.org/10.1016/j.appdev.2017.01.002

Rideout V, Katz VS. Opportunity for all? Technology and learning in lower-income families. Available at http://www.joanganzcooneycenter.org/wp-content/uploads/2016/01/jgcc_opportunityforall.pdf. Published Winter 2016.

Rvachew, S. (2016). Technology in early childhood education. In R.E. Tremblay, M. Boivin, & R. deV. Peters (Eds.) *Encyclopedia on Early Childhood Development*. <http://www.child-encyclopedia.com/technology-early-childhood-education-0>

Rvachew, S., & Brosseau-Lapr e, F. (2015). A randomized trial of twelve week interventions for the treatment of developmental phonological disorder in francophone children. *American Journal of Speech-Language Pathology, 24*, 637-658. doi:10.1044/2015_AJSLP-14-0056

Rvachew, S., Rees, K., Carolan, E., & Nadig, A. (2017). Improving emergent literacy with school-based shared reading: Paper versus ebooks. *International Journal of Child-Computer Interaction, 12*, 24-29. doi:http://dx.doi.org/10.1016/j.ijcci.2017.01.002

Strouse, G. A., & Ganea, P. A. (2017). Parent-Toddler Behavior and Language Differ When Reading Electronic and Print Picture Books. *Frontiers in Psychology, 8*(677). doi:10.3389/fpsyg.2017.00677

Takacs, Z., Swart, E. K., & Bus, A. G. (2015). Benefits and pitfalls of multimedia and interactive features in technology-enhanced storybooks: a meta-analysis. *Review of Educational Research*. doi:10.3102/0034654314566989

Troseth, G., Strouse, G., & Russo-Johnson, C. (2017, June). *Read to Me, Talk to Me: an E-Book App that Incorporates Dialogic Questioning*. Paper presented in the symposium (Hassinger-Das, Dore, & Golinkoff, co-Chairs), Taming Technology: Making Evidence-Based Decisions Regarding Digital Media, at the meetings of the Jean Piaget Society, San Francisco.