Bridging the Digital Divide with iPads: Effects on Early Literacy

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Abstract

This three phase mixed methods study is examining the effects of a 1:1 iPad initiative on families reading practices and beliefs and children’s early literacy development. Families and their 3-7 year old children from two schools located in disadvantaged communities in Tasmania, Australia participated in the study. During the second phase, a shared reading intervention was implemented and families were provided with electronic books to read on their school provided iPads. Findings of this phase of the study suggest that providing iPads and ebooks to families can positively effect children’s early literacy development and home-school partnerships. Training parents to read dialogically with their children may serve to improve the effects of such an intervention. Establishing home-school partnerships and providing two-way knowledge-exchange activities should be important considerations when implementing 1:1 digital shared reading initiatives.

Keywords: home-school partnerships, early childhood, literacy, 1:1 initiatives

The findings contained in this paper focus on Phase Two of my PhD Research project at the University of Tasmania, Australia, under the supervision of Associate Professor Ruth Fielding-Barnsley and Professor Ian Hay.
Introduction

The importance of involving parents in their children’s education and building effective and sustainable home-school partnerships is reflected in national curriculum, policy and funding documents, both in Australia and internationally (Australian Department of Education Employment and Workplace Relations & Council of Australian Governments, 2009; Department for Education, 2011; Department of Education Employment and Workplace Relations, 2008; Gonski et al., December 2011; Ministerial Council on Education Employment Training and Youth Affairs, 2008; "NCLB," 2002). Seminal and contemporary research demonstrates that parental involvement has a positive effect on reading acquisition; however, little is known about the effects of parents sharing digital texts with their young children.

This study aims to present evidence about the ways families experience reading digital texts, the quality of these experiences, and the effects of these experiences and practices on children’s early literacy development. It is anticipated that the findings of this study may contribute to the growing body of knowledge that may be used to inform schools, curriculum developers and education departments as they take up the challenge of bridging the digital divide, fostering meaningful and authentic home school partnerships and assisting all children to become successful readers.

Review of Literature

Historically, researchers have been examining the links between home reading experiences and reading, language and literacy outcomes since the 1950s (Bus, van Ijzendoorn, & Pellegrini, 1995; Chall & Snow, 1982; Fielding-Barnsley & Purdey, 2002; Lonigan & Whitehurst, 1998). Research to date has primarily focused on preschool children, and indeed the relationships between shared book reading and reading development are comprehensively
documented (Anderson, Hiebert, Scott, & Wilkinson, 1985; Robbins & Ehri, 1994; Sénéchal & LeFevre, 2002). Whilst it is evident that parent-child shared reading affects the acquisition of language, emergent literacy skills and reading achievement for preschool children, the effect size begins to diminish when children become independent readers (Bus et al., 1995). Bus’s et al (1995) meta-analysis on intergenerational transmission of literacy, however, demonstrates that the effects of shared book reading are not restricted to the pre-kindergarten period, particularly with regard to lower socio-economic status families. Therefore, children from lower-socio economic status families may benefit from shared reading experiences that extend beyond the pre-school years.

A shared reading method, called dialogic reading, was developed by Arnold, Lonigan, Whitehurst, and Epstein (1994) to promote more formal teaching and learning experiences for parents and children as they share picture books. The interactive method of reading involves parents engaging their children in meaningful conversations about the story and making connections to the child’s prior knowledge and experiences, asking and answering questions, extending understandings, and providing feedback. Thus, the child moves from being a passive onlooker to an active participant in the reading experience. The dialogic reading intervention produced considerable effects on children's early language development at post-test and follow up measures (Arnold et al., 1994). Fielding-Barnsley and Purdie (2003) further developed the dialogic reading intervention to include additional instruction in developing concepts about print, alphabet knowledge and an awareness of rhyme. Children in the experimental group outperformed children in the control group on measures of early literacy development.

Scholastic, together with the Harrison Group, surveyed a nationally representative sample of children and their families (n=2148) to examine family attitudes and reading values
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(Scholastic & Harrison Group, 2012). Forty-nine percent of parents, an increase of thirteen percent since 2010, felt their children did not spend enough time reading for pleasure and seventy-two percent of parents were interested in having their child read e-books. Fifty-one percent of children who had not previously read an e-book were interested in doing so. The report (Scholastic & Harrison Group, 2012) revealed that interactive features are an important consideration when parents and children choose children’s books. More than seventy percent of parents cited the read aloud option, highlighted text to help child follow the narration feature, and built-in activities to develop reading and vocabulary skills as important considerations when choosing ebooks for children.

Vaala and Takeuchi (2012) surveyed 462 parents, who reported owning an iPad, to explore parents’ perceptions and practices surrounding co-reading with children on iPads. They found that whilst some ebook features are perceived as helpful for early readers, other features are considered distracting. More than seventy-five percent of iPad owners who read ebooks with their 2-to-6-year old children believed the highlighted text during narration feature and the audio narration feature helped children learn to read: however, with regards to interactive features, nearly fifty percent of parents indicated they believed the hotspots/animations distracted their child from reading and over sixty percent believed the videos and games in ebooks also distracted their child from reading. It is important to note that the parents in the Vaala and Takeuchi (2012) were mainly “white/non-Hispanic, relatively well-educated and affluent” (p. 1) and their findings may not be generalizable to families in other socio-economic populations.

Young children’s home lives are becoming increasingly shaped by their engagement with a wide range of digital technologies (Marsh, 2010; Marsh et al., 2005; Rideout, Vandewater, & Wartella, 2003). Data from an Australian study of 4 and 5 year old children “indicates that
young children have considerable access to computers in out-of-centre contexts” (Zevenbergen & Logan, 2008, p. 43) and enter early childhood education settings with a repertoire of digital skills. Furthermore, studies in the United States of America and the United Kingdom suggest that computer games, laptop computers, television, DVD players, and mobile phones are popular with young children and their families (Gutnick, Robb, Takeuchi, & Kotler, 2010; Marsh, 2004; Prensky, 2001). It must, however, be acknowledged that not all children come to school with the same experiences, and experiences with digital technologies are no exception. Therefore, early childhood educators have a responsibility to address the potential digital divide and provide learning experiences that cater for the needs of all students, particularly those from digitally poor families, “before the gap widens” (Zevenbergen & Logan, 2008, p. 38). Bridging the digital divide in the lives of some students will depend on providing them with access to technology, not only at school but in the home environment as well.

Currently, a debate is arising, both locally and internationally, about the value of schools investing funds in 1:1 mobile media device initiatives. Arguments for and against providing digital technologies to young children and their families seem futile in the absence of cumulative and robust research findings. Takeuchi and Stevens (2011) assert that family and digital media research is limited and “the bias has been toward the study of middle-class families” leaving an “incomplete picture of other families, including lower income families” (p. 55). Studies that provide a deeper understanding into the digital media experiences of a variety of families are required. Indeed, research into computer-assisted learning employing digital hand held tablet devices is relatively new, particularly with regard to one-to-one implementation in schools in low socio-economic populations. Thus, there would seem to be an imperative to acknowledge that such practices and programmes exist and investigate the effects on young children’s early education and home-school relationships.
Theoretical Framework

This research is framed within a sociocultural view of literacy development (Vygotsky, 1978) and joint media engagement (Takeuchi & Stevens, 2011), and informed by the digital divide theory (Hohlfeld, Ritzhaupt, Barron, & Kemker, 2008; Zevenbergen & Logan, 2008) and Matthew Effects theory (Stanovich, 1986). A sociocultural view of literacy development recognises the social construction of knowledge and thus the influence of culture, ethnicity, social class, gender, and relationships on literacy development (Green & Campbell, 2003; Hannon, 1995). Joint media engagement also acknowledges the social construction of knowledge and for this study refers to families’ shared reading experiences where participants interact whilst using digital media to read, view, and make sense of digital books. The digital divide refers to the “large inequalities of access to and mastery of new technologies” (International ICT Literacy Panel, 2002, p. 4) that exist in contemporary societies. Inequalities that arise due to inabilities to access and master new technologies may result in what Stanovich (1986) termed the Matthew Effect, where the rich get richer and the poor get poorer. This study recognises that not all families have access to digital media and are therefore at risk of the effects of the digital divide.

Research Questions

The methodology for this study was formed from a question–driven perspective (O'Leary, 2010). The questions guiding the study are:

1. How are parents in a low socio-economic status school using digital and traditional books with their children?
2. What are the effects of reading digital texts on young children’s early literacy development and how does this differ from traditional reading practices?
3. What are the most effective ways for schools to support parents to engage their
children in digital books and reading that promotes literacy development?

4. What are parents’ perceptions regarding school provided iPads in literacy education?

Overview

The mixed-methods study is progressing in three distinct phases. The first phase employed a family literacy and demographic survey. During the second phase of the study, a six-week reading intervention, pre and post intervention literacy assessments, interviews and videoed shared-reading sessions were employed to discover how school provided iPads are fitting into family life and helping young children learn. The aim of the second phase was to provide a comprehensive description and analysis of families’ digital home reading experiences and the effects of a 1:1 iPad intervention on shared experiences and children’s early literacy development. Data from Phase 2 will provide baseline data for the third and final phase. As the project requires an in-depth understanding of families’ experiences, a mixed methodology approach was adopted to add breadth and depth to the research project (O'Leary, 2010). Mixed methodology approaches are becoming increasingly popular in social science research as they are designed to provide a holistic understanding. Analysis of the interview data seeks to provide a broader explanation of the assessment results than would have been achievable by the analysis of quantitative data alone.

Families were targeted to participate in the study, based on the Index of Community Socio-Educational Advantage (ICSEA) data on the Australian My School website. The ICSEA scale represents levels of educational advantage. Families from two schools with low ICSEA values, or low socio-economic status, were invited to participate in the study. Research frequently supports the premise that low reading achievement correlates with low socio-economic status; however, there is a growing body of research that suggests positive parental perceptions of education and access to educational materials are likely to mediate this
phenomenon. At the commencement of the study, only one Tasmanian primary school was addressing the digital divide by implementing a 1:1 iPad initiative where every student enrolled in the school received an iPad for home and school use. The number of invited participants for this study reflects the size of the participating school (intervention group) and a statistically similar school (control group). Sixty-one families with male or female children aged between 3 and 8 in grades Pre-Kinder to Grade Two accepted an invitation to participate in the first phase of the study. This age range was selected to test children’s development at an age when they are likely to be developing their emergent literacy skills.

Methods
The control group received four traditional texts and the experimental group received four electronic books on iPads. A six-week shared reading intervention was implemented after the collection of pre-test data. Post-tests were administered at the completion. Parents were interviewed about their experience and videoed reading with their children after the intervention was completed. No training or information was given to parents about shared or dialogic reading, as the aim of this phase was to gather baseline data and explore how parents use digital and traditional books with their children without instruction.

Participants
Fifty-nine families with children enrolled at two schools located in low socio-economic areas of Tasmania were invited to nominate themselves for Phase 2 of the study. The families had previously completed Phase 1, which involved completing a family literacy and demographic survey. The survey included an option to indicate interest in participating in the second and third phases of the study. Twenty-four families who elected to continue with the study met the criteria; a child enrolled in Kinder to Grade 1, and aged between 5 years and 7 years 4 months. Adult participants completed informed consent forms and children gave verbal
consent to participate. Children with a mean age of 6 years and 3 months made up the total sample. There were 12 children in the experimental group and 12 children in the control group. There were 14 girls and 10 boys, with a balance of each in the two groups.

**Data Collection**

During the second phase of the study four types of data were collected: tests of early reading skills, semi-structured interviews with parents, videos of parents sharing books with their children and a self-reported reading behaviours survey. The tests of early reading skills provided quantitative data about children's pre- and post-intervention vocabulary development, concepts about print knowledge and phonological abilities. The semi-structured interviews provided information about parents’ beliefs regarding iPads in education and digital texts, families reading behaviours prior to as well as during the intervention, and demographic information. The shared reading videos provided qualitative data about families’ shared reading behaviours.

Outcome measures were divided into two categories: language and early literacy skills. Two measures of receptive vocabulary and one measure of expressive vocabulary were employed. The *Peabody Picture Vocabulary Test 4th Edition (PPVT)* (Dunn & Dunn, 2007) and the *McNab Picture Vocabulary Test* (MPVT) (McNab, 2012) were employed to assesses children’s receptive vocabulary. The researcher developed the MPVT as a measure of receptive vocabulary contained in the four children’s books employed during the six-week intervention. Expressive vocabulary and rapid naming ability was assessed with the Hundred Picture Naming Test (HPNT) (Fisher & Glenister, 1992). Children’s attention to print and understandings about conventions of print were assessed with the *Concepts about Print* test (Clay, 2000). Children’s phonological skills were assessed with the *Phonological Abilities Test* (PAT) (Muter, Hulme, & Snowling, 1997). The PAT is a measure of rhyme detection,
rhyme production, word completion (syllables and phonemes), phoneme deletion (beginning and end sounds), speech rate, and letter knowledge.

The books
The aforementioned findings of Takeuchi and Stevens (2011) and Scholastic and Harrison Group (2012) informed the book selection process. The books selected for the intervention included a variety of genres and interactive features that were chosen to appeal to a wide range of children. The books included fiction, alphabet, rhyme, and information books. The interactive features varied between the books, with the least interactive book containing only one interactive element and the most interactive book containing eleven. The books did not contain videos or interactive games.

Data Analysis Procedures
Analyses were performed using IBM’s Statistical Product and Service Solutions predictive analytical software (SPSS). T-Tests were employed to examine the pre- (Time 1) and post- (Time 2) test early-reading assessment scores and Cohen’s d was employed to determine the intervention effect sizes. Ten parents from the experimental group were individually interviewed. Nine of the adults interviewed were mothers, although one father was present. Interview data was analysed using QSR International’s NVivo10 software.

Preliminary Findings
The first research question examined how parents are using digital with their children. Parents were videoed reading two familiar ebooks and one unfamiliar ebook at the completion of the six-week shared reading intervention. Evidence of dialogic reading behaviours was rare and in some instances did not occur at all. For example, none of the parents in the experimental group related information in the books to the child’s previous knowledge or experiences, or
asked their child to recall information from the text. Only half the parents asked open-ended questions and only two parents discussed difficult or unfamiliar words. During the interviews, almost half the parents indicated that their child preferred to read ebooks independently, with one child resisting the parents’ attempts to engage the child in shared reading by walking off. Families continued to read traditional texts for shared and independent reading.

The second research question explored the effects of reading digital texts on young children’s early literacy development and how this differs from traditional reading practices. An investigation of the effect size of the intervention compared to the control group was conducted on the four conditions; PAT, CAP, PPVT, HPNT and MPVT. There was no effect size as demonstrated by Cohen’s d for either the experimental group or the control group between the pre-intervention and post-intervention data collection. The maximum effect size failed to reach criteria and all of them were less than 1.

The third research question considers the most effective ways for schools to support parents as they engage their children in digital books and reading that promotes literacy development. Parent responses to interview questions suggest that for the programme to be successful, a wide variety of texts are required to cater for the diverse preferences of young children. When asked to nominate their child’s favourite ebook, the answers were primarily restricted to one of the four books provided for the shared reading intervention, indicating families’ limited experience with digital texts. Parents were also asked to identify their child’s favourite print books and participants’ preferences varied, from popular fiction titles such as Disney, Lego and to non-fiction books about flowers and trucks, confirming that the inclusion of a variety of genres in the shared reading programme is an important element. One parent reported that her son had only read the four ebooks once during the six weeks, despite being an avid reader and frequently using the iPad for games. Her son found that the books were not very
interesting so it was a struggle to motivate him to read. This finding aligns with those of Fielding-Barnsley and Purdey (2002) who also found that including different genres was an important component of the program design.

When asked to suggest ways the school could help parents with their child’s literacy development or using an iPad with their child, participants’ views varied. The benefits of school information sessions and handouts were discussed. Several parents acknowledged they would appreciate information about the mechanics of using an iPad and information about specific apps, and others were unsure if they required any support at all. A recurring theme was children’s independent use of the iPad. If children were happy and able to engage with the iPad independently, it was believed they did not require assistance from an adult. Two parents felt the school was currently providing adequate information and this may be attributed to the school information sessions. At the time of this intervention, the school was implementing regular parent sessions to provide information about iPads for education. The small group sessions were particularly useful for one participant who believed the school was doing a “top job” of supporting her to use the iPad with her child. Information she received from other parents attending the sessions reassured her that she was not the only one learning to use the iPad for the first time. She appreciated being able to work things out with other mothers and the assistance of the teacher. For this parent, the sessions served to empower her to assist her children with their literacy development using a tool she was previously unfamiliar with.

The fourth question investigated parents’ perceptions regarding school provided iPads in literacy education and focused on the experience of using an iPad at home. All of the parents who were interviewed believe that using an iPad at home has a positive effect on children’s learning, with three parents indicating that reading frequency increased during the six-week
intervention. One parent indicated that her daughter had doubled the amount of time spent reading during the intervention. Parents cited access to books and increased engagement as the reasons for the rise in reading frequency. One parent perceived the digital reading experience as more interesting than the traditional experience for her child. The “aesthetic” experience of reading digital texts on iPads is indeed a very personal experience. The parents’ attitudes, feelings and beliefs about reading digital texts on iPads were influenced by their prior experiences with traditional texts. This finding is supported by Rosenblatt’s (1978) transactional literary theory and reader response theory in that the reader’s response is linked to their personal experiences. Several parents reflected on their own early reading experiences and discussed their concerns regarding the balance between old and new technologies. One parent explained that children need to read and experience traditional books and learn to write with pens and pencils just as they had at school. Furthermore, when asked about their favourite digital book, the majority of parents cited Dr Seuss, explaining they had read it as a child. Whilst the majority of the parents in the experimental group believed that iPads were helping their children learn, some parents viewed the device as an entertainment device and restricted their child’s use at home.

Discussion.

Digital and printed texts co-existed as families continued to read the school provided home readers and personal collections of printed books during the intervention period. Rather than replacing print books with e-books, evidence from parents suggests that many of the children perceive the two types of books differently, particularly with regards to independent and shared reading. Whilst the families read the digital texts for the purpose of shared reading, many of the children preferred to read them independently and these results were mirrored in the Joan Ganz Cooney Parent Survey QuickReport (Vaala & Takeuchi, 2012).
The interactive features in the books appeared to undermine the shared reading experience for some families with one parent indicating that she had been made redundant because the digital book could read to her son. When asked how she felt about being made redundant she replied “Well, I still get questions. The iPad can’t answer questions yet so it’s not quite that clever”. Indeed, it is not time to throw the baby out with the bath water. Despite the accessibility functions afforded by digital reading devices such as iPads, they cannot replace the important contributions parents provide as they read dialogically with their children. Providing families with access to iPads and ebooks for shared reading does not ensure the quality of the shared reading experience will improve or the effects will be significant. The findings suggest that families may benefit from a shared home reading programme in which the objectives and benefits of reading dialogically to children are made explicit to parents through a variety of options including parent information sessions and school newsletters, for as Fielding-Barnsley and Purdie (2003) assert, “parents are usually willing partners in the process of teaching children to read but they do need to know how to help them” (p.81). Dialogic reading programmes serve to promote positive partnerships, increase reading frequency, empower parents to assist their children, and improve short- and long-term language and literacy outcomes for children (Fielding-Barnsley & Purdey, 2002; Fielding-Barnsley & Purdie, 2003; Hay & Fielding-Barnsley, 2007; Malani et al., 2010) and may be particularly beneficial as parents and children adjust to new ways of reading and experiencing ebooks and iPads. Overall, the findings of this phase of the study make important contributions to future research and to the growing body of knowledge about families’ shared digital reading experiences. The findings may assist those who are taking up the challenge of bridging the digital divide, fostering meaningful and authentic home school partnerships and assisting all children to become successful readers.
Limitations

Phase Two of this study was conducted with only 24 families. Participation in the study was voluntary, and of the twelve families in the experimental group, only nine families chose to be interviewed. The small sample size limits the generalizability of the findings to the wider population.

Future Research

The next phase of the study will investigate whether parents and children’s perceptions of digital texts and their features will change with education, training and experience. Furthermore the next phase will also examine whether changed perceptions and understandings impact on families digital reading practices and children’s literacy development. Two-way knowledge exchange sessions will be implemented during an eight-week shared reading intervention. Families will receive information about the iPad and the specific features in the digital texts as well as information about reading dialogically with children. The suite of ibooks and ebook apps will include a variety of genres and a range of interactive features to cater for the diverse preferences of the participants.
References


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Robbins, C., & Ehri, L. (1994). Reading storybooks to kindergartners helps them learn new vocabulary words. *Journal of Educational Psychology, 86*(1), 54-64.


