Using tablets and apps to enhance emergent literacy skills in young children

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ABSTRACT

Touch screen tablets (e.g., iPads) are being increasingly used by young children due to their stimulating multimodal features and intuitive touch-based interface. However, little is known about the effects of tablets and apps on the development of emergent literacy skills. This pre-post-test randomised controlled study explored the effects of using literacy apps on emergent literacy skills in English speaking children aged 2–5 years ($N = 48$). There were 24 children in the iPad group and 24 children in the waitlist control group. The 9-week (30 min/week) iPad literacy program focussed on three new alphabet letters each week using three apps (letter matching, letter tracing, and drawing). Following the program, children in the iPad group showed significantly higher letter name and sound knowledge, print concepts and name writing skills than children in the control group. No significant group differences were found for letter writing skills or numeral knowledge. The findings showed that tablets can positively support letter name and sound learning and aspects of emergent writing development. How teachers can best utilise these digital tools in early childhood classrooms to support emergent literacy requires further investigation.

1. Introduction

The touch based interface of tablet computers such as iPads allows young children to interact with the digital world from an early age (Marsh et al., 2015; Merchant, 2015). From a sociocultural perspective (Vygotsky, 1978) tablets can transmit knowledge to children about their world through a range of interactive media experiences, helping them learn to use meaning making systems (Kucirkova, Sheehy, & Messer, 2015; Marsh, 2016; Neumann, 2014a). Learning may occur through the scaffolding of children's interactions with tablets by an adult or through the inbuilt features of an app itself (Neumann & Neumann, 2016; Yelland & Masters,2007). As such, tablets have the potential to provide young children with learning opportunities that can foster emerging understandings about literacy (Crescenzi, Jewitt, & Price, 2014; Kucirkova, Messer, Sheehy, & Flewitt, 2013). As young children play with apps, emergent literacy skills may be fostered through children's exploration of print (e.g., icons, symbols, letters, and words) displayed on tablet screens (Marsh, 2016; Neumann & Neumann, 2014; Neumann, Finger, & Neumann, 2016).

Emergent literacy develops from birth when infants begin their visual exploration of surrounding print (Goodman, 1986; Harste, Woodward, & Burke, 1984; Whitehurst & Lonigan, 1998). Development of emergent literacy skills is important in the preschool years as these skills strongly influence future reading and writing ability (Adams, 1990; Snow, Burns, & Griffin, 1998). The emergent literacy skills young children need to acquire in order to become successful readers and writers include print concepts (Clay, 1998; Justice & Ezell, 2001; Lomax & McGee, 1987), alphabet knowledge (letter sounds and names; Bowman & Treiman, 2004; Foulin, 2005; Levin, Shatil-Carmon, & Asif-Rave, 2006), phonological awareness (Byrne & Fielding-Barnsley, 1989; Mann & Foy, 2003), and emergent writing (Aram & Biron, 2004; Welsch, Sullivan, & Justice, 2003). These are foundational skills upon which children build proficient literacy skills with alphabet knowledge being one of the strongest predictors of future word reading ability (Adams, 1990; Ehri & Roberts, 2006; Molfese, Beswick, Molnar, & Jacobi-Vessels, 2006; Storch & Whitehurst, 2002). Research has highlighted how non-digital early literacy games and activities (e.g., alphabet book reading, writing, and identifying environmental print) can support the development of emergent literacy skills in the years prior to school (Adams, 1990; Aram & Biron, 2004; Clay, 1998; Neumann, 2014b; Welsch et al., 2003). These experiences can foster children's knowledge and understanding about print, preparing them for school (Clay, 1998; Snow et al., 1998; Teale & Sulzby, 1986). In addition, digital tools such as tablets and apps also have the potential to support emergent literacy skills but little research to date has investigated this (Aram and Bar-Am, 2016; Neumann, 2014, 2015; Neumann, 2015).

As touch screen tablets and apps are becoming increasingly common in this digital world, it is important to explore the effects of these tools on emergent literacy development. Tablets differ from traditional computers because they are light weight, portable, mobile, and consist of a flat glass screen that responds to a range of tactile actions such as

tap, swipe, and drag. Unlike mouse operated computers that require greater fine motor control, tablets remove this operational barrier and provide increased opportunities for learning in the early years (Merchant, 2015). Nearly half of 0–2 year olds and two thirds of 3–5 year olds are able to turn tablets on and off, swipe, drag, tap, open, and exit apps (Marsh et al., 2015; N = 2000). Due to these user friendly features, tablets are becoming an increasingly popular digital device amongst toddlers and preschoolers in homes and early childhood settings (Beschorner & Hutchsion, 2013; Marsh et al., 2015).

The multimodal features of tablets (e.g., sounds, animations, and text) engage young children's attention in multisensory ways by stimulating visual, auditory, kinaesthetic, and tactile senses (Roskos, Burnstein, Shang, & Gray, 2014). Therefore, it is not surprising that young children are spending significant amounts of their time on tablets. For example, in a UK based study, 0–5 year olds used tablets on average for 79 min/day (Marsh et al., 2015). An Australian survey (N = 109; Neumann, 2014a) reported that 61% of children had access to tablets at home and were using them for 20 min per day on average. The American Academy of Pediatrics (2016) recommends that screen time for children aged 2–5 years is limited to one hour per day of high quality media experiences and it is important for parents and educators to ensure that a balanced and supervised approach is adopted in order to foster healthy development (Neumann, 2015).

Young children use tablets for a range of educational and entertainment purposes and play downloadable educational (math, e-book, literacy apps; Neumann, 2014a) and gaming apps (e.g., Temple Run; Neumann, 2014a). Children also use apps for communicating (e.g., Skype, Facetime, messenger chat, email), information gathering (e.g., Google, You Tube), and creating (e.g., story making, drawing, writing, music and audio recordings, photos and videos; Livingstone, Marsh, Plowman, Ottovordemgentschenfelde, & Fletcher-Watson, 2014; Marsh et al., 2015). Therefore, tablets are a potentially positive literacy learning tool because children's interactions with apps allow them to make meaning, communicate through various digital representations (e.g., icons, text, pictures, audio) and create digital products (Crescenzi et al., 2014; Kucirkova et al., 2013; Sandvik, Smørdal., & Østerud, 2012). Such digital tools may also foster children's motivation for literacy learning (Hatherly & Chapman, 2013; McManis & Gunnewig, 2012).

Little empirical research currently exists on the effects of tablets on the development of emergent literacy skills (Neumann & Neumann, 2015), however, some qualitative work has begun to highlight potential benefits of tablets for emergent literacy learning in the preschool setting. An early literacy program was conducted with two children over the course of a school semester that used alphabet matching and letter tracing apps (Huang, Clark, & Wedel, 2013). The app activities involved children dragging letters to match words and tracing letter shapes with a finger. Following the program, the teacher reported positive outcomes in the children's letter name and sound knowledge. Although a case study design makes it difficult to generalise these findings (Huang et al., 2013) this work highlights the need to more closely investigate the effects of letter tracing and matching apps on emergent literacy development.

Larger qualitative preschool studies have described how tablets and literacy apps can positively support emergent literacy in preschool classrooms. Beschorner and Hutchison (2013) conducted a study across two preschool classrooms (N = 35) over seven weeks and teachers were provided with six iPads for individual, group, and whole class activities. New apps (e.g., Magnetic ABCs, Story kit app, Doodle Buddy) were introduced each week on a specific literacy area (e.g., print awareness and writing) and children were free to use the apps for a variety of purposes. The data collected for this study included anecdotal notes, digital work samples, and semi-structured interviews. Children enjoyed using tablets and were observed to develop an increasing awareness of digital print through the use of tablets for emergent writing (e.g., letter and name writing, symbols, typing, and constructing emails and

messages to family members). The authors concluded that iPads are a positive tool young children can use independently to develop their knowledge and understanding about print. This study also reveals the need to further evaluate what effects different literacy apps have on specific emergent literacy skills.

Only a small number of studies to date have used a pretest-posttest control group methodology to examine the effects of tablets on emergent literacy skills. Brown and Harmon (2013) conducted a pilot study that randomly allocated twenty English speaking preschool children (aged 48–59 months) to either a treatment or control group. Children in the treatment group used three literacy and numeracy based apps for a 60 min session per week over 10 weeks. Children were tested on upper and lower case letter knowledge and number concepts before and after the program. The control group used iPads with different apps for 60 min per week over 10 weeks (details of the apps used during the study were not reported). No significant differences were found between groups on alphabet and numeral skills. As the details regarding the content of the apps used in the treatment and control groups was not reported and the sample size of the treatment group was small, it is difficult to draw clear conclusions from this study.

A larger iPad literacy intervention involved 16 kindergarten classrooms (Cubelic & Larwin, 2014). Using a non-randomised experimental design, the treatment classrooms (n = 144) were provided with iPads and the children used literacy apps such as Pocket Phonics, ABC Phonics, and ABC Touch n Learn for approximately 60 min per week over the whole school year. Classroom teachers supervised children's use of the iPads during the sessions directing students to the app that best supported children's literacy learning. The non-treatment control group classrooms (n = 147) did not receive iPads but engaged in regular face to face literacy activities with their classroom teachers. Pre- and post-test data was collected for letter name and sound fluency, phoneme fluency, and nonsense word fluency. The iPad group showed greater gains in phoneme segmentation and nonsense word fluency than the control group. Children in the control group showed greater gains for sound and letter naming fluency. Although, it was concluded that iPads can have a positive impact upon aspects of emergent literacy skills more research is needed to examine the effects of iPads and literacy apps on a wider age range of preschool children.

As the findings of these studies are mixed it is necessary to further examine the effects of iPads and apps on specific emergent literacy skills. This would help clarify the benefits of iPads and apps on emergent literacy and guide the direction of future research to support the practical use of these tools in early childhood settings. Providing detailed descriptions of the apps selected, considering home use of tablets, and testing a range of emergent literacy skills in a wider age range of preschool children would extend the work of current studies.

2. The present study

In order to explore the effects of using literacy apps and tablets on emergent literacy, the present study used a pretest-posttest randomised control group design. Children were given a 9 week iPad literacy intervention program (using three literacy apps for a 30 min session per week) and were tested on a range of emergent literacy skills (letter name and sound knowledge, letter name and letter writing, and print concepts). The literacy apps were selected based on digital application criteria (e.g., interactivity and age appropriateness) developed by Hillman and Marshall (2009) to ensure the apps were suitable for young children and designed to support early literacy learning. These literacy apps contained key literacy features and activities such as letter matching (dragging letters into words), letter tracing (forming letter shapes with a finger), and drawing (experimenting with mark making and writing). These apps had the potential to support alphabet letter knowledge, print concepts (e.g., concept of a letter and word), and letter shaping and writing. For these reasons, literacy assessments were conducted for print concepts, upper and lower case letter name