

Contents lists available at [ScienceDirect](http://www.sciencedirect.com)

Computers & Education

journal homepage: www.elsevier.com/locate/compedu

Using tablet computers to teach preschool children to write letters: Exploring the impact of extrinsic and intrinsic feedback



Melissa M. Patchan, Cynthia S. Puranik*

Georgia State University, 30 Pryor Street, Suite 850, Atlanta, GA 30303, USA

ARTICLE INFO

Article history:

Received 13 November 2015

Received in revised form 28 July 2016

Accepted 30 July 2016

Available online 2 August 2016

Keywords:

Emergent writing

Handwriting

Tablet computers

Extrinsic feedback

Intrinsic feedback

ABSTRACT

With the increasing popularity of touchscreen devices, using technology to support young children's learning has become more accessible. However, given the relative novelty of tablet computers, the research regarding their effectiveness in education is limited. The current study extends findings of current research demonstrating that tablet computers helped students improve writing, reading, and math abilities of elementary students by examining how tablet computers could support the development of preschool children's writing ability. We explored the effects of two types of feedback afforded by tablet computers: concurrent, extrinsic feedback (i.e., feedback provided by a tablet computer as soon as an error was made) and intrinsic feedback (i.e., naturally occurring sensory information resulting from practicing writing with one's finger). Preschool children (ages 41–65 months) learned to write eight uppercase letters in small groups three times a week for eight weeks in one of three ways: paper and pencil, tablet computer and finger, or tablet computer and stylus. The number of letters correctly written on a paper-and-pencil posttest depended on the instructional condition. Those who practiced writing with a stylus on a tablet computer wrote a similar number of letters correctly at posttest as those who practiced using paper and pencil. This result suggests that concurrent, extrinsic feedback did not provide an additional benefit over the visual feedback in this context. More interestingly, those who practiced writing with their finger on a tablet computer wrote more letters correctly at posttest than those who practiced using a stylus on a tablet computer. This finding indicates that an enhanced tactile experience was more beneficial for learning to write on a tablet computer than increasing the similarity between the practice tasks and the transfer task. However, whether the use of tablet computers is superior to practicing with one's finger on paper worksheets remains an open question. Several future directions are offered.

© 2016 Elsevier Ltd. All rights reserved.

1. Introduction

Over the past three decades, more educators and researchers are recognizing the significance of the preschool years for the development of later academic skills. Alarming, as many as 35% of children in the United States enter public schools with

* Corresponding author.

E-mail addresses: mpatchan@gsu.edu (M.M. Patchan), cpuranik@gsu.edu (C.S. Puranik).

such low levels of skills and motivation that they are at substantial risk of early academic difficulties (Boyer, 1991; Zill & West, 2001). These early academic difficulties have serious, long-term consequences. For example, children who experience early difficulties in learning to read and write are likely to continue experiencing problems with reading and writing throughout their school years (Aram & Levin, 2004; Felton, 1998; Shatil, Share, & Levin, 2000), and these problems permeate into adulthood (Bruck, 1998). Thus, the broad goal of the current study is to consider how the ways we provide support to young children shape their development.

1.1. Supporting learning with technology

Many children are exposed to technology at an early age, and exposure to mobile devices in particular is growing across the world. For example, access to mobile devices in the homes of US families with young children is increasing—mobile device usage increased by 23% from 52% in 2011 to 75% in 2013, and specifically tablet computer usage increased by 32% from 8% in 2011 to 40% in 2013 (Rideout, 2013). Moreover, as reported by Rideout (2013), children were using mobile devices for longer periods of time (45 min a day in 2011 to 67 min a day in 2013). Children have similar access to technology in schools—81% of US PreK–12 teachers reported using personal computers or laptops in their classroom, 58% using interactive whiteboards, and 52% using tablet computers (PBS LearningMedia, 2015). Given the pervasiveness of technology in young children's lives, we are particularly interested in how technology can support young children's development—and more specifically, emergent writing.

Prior research on technology benefits in preschool classrooms in the US, Australia, and Greece has demonstrated that computers can be used to improve a variety of skills, including early literacy skills and early mathematical skills (Moxley, Warash, Coffman, Brinton, & Concannon, 1997; Shute & Miksad, 1997; Vernadakis, 2005). These benefits have been attributed to several features afforded by technology, including computer animations, immediate and targeted feedback, increased locus of control, and increased engagement with the instructional material (R. Shute & Miksad, 1997).

With the introduction of Apple's iPad in 2010, the popularity of tablet computers in educational institutions has increased in many countries including, the US, United Kingdom, Australia, New Zealand, and South Korea (W. Clark & Luckin, 2013; Heinrich, 2012; Henderson & Yeow, 2012; Johnson, Adams Becker, Estrada, & Freeman, 2015; Neumann & Neumann, 2013, 2015; Plumb, Kautz, & Tootell, 2013; Saenz, 2011). However, as noted in these reviews, research regarding the effectiveness of tablet computers in education is limited given the novelty of the technology.

Prior research has demonstrated how tablet computers could be used in the classroom (Beschorner & Hutchison, 2013; Hutchison, Beschorner, & Schmidt-Crawford, 2012). For example, in Norway, preschool children used tablet computers to create digital books, and teachers used tablet computers to check the weather during their opening routine (Sandvik, Smerdal, & Osterud, 2012). Prior research also examined the usability of tablet computers with young children, finding that children from a London nursery school interacted with the technology in ways that differed from the interactions with traditional materials (Crescenzi, Jewitt, & Price, 2014). Although several gains and losses associated with tablet computers were identified, tablet computers in general promoted an increase in mark making similar to traditional materials with images (Price, Jewitt, & Crescenzi, 2015). Overall children from a primary school in the UK were able to easily execute a variety of touch-screen gestures (e.g., 'click', 'slide', 'swipe'), however they had some difficulty with others that typically involved timing, like 'select', 'long click', and 'double-click' (McKnight & Fitton, 2010). These children also experienced problems with unintentional movements and touches. Despite numerous technical issues, US children as young as preschool were not easily frustrated, and many children commented that using the tablets was easier than using traditional materials (Couse & Chen, 2010).

Surprisingly, only two studies to date have empirically tested the effectiveness of using tablet computers for instruction. In fourth through ninth grades located in the US, students with diagnosed specific learning disabilities significantly improved their handwriting, spelling, and syntax abilities after completing 36 h of writing lessons on tablet computer (Berninger, Nagy, Tanimoto, Thompson, & Abbott, 2015). In first and second grades located in the US, students showed greater improvement in both reading and math when tablet computers were incorporated into their lessons (McKenna, 2012).

Although these initial results look promising, more research is needed to determine if and how tablet computers support learning. In the current study, we explore two types of feedback that are likely to support learning to write letters with tablet computers: 1) scaffolding and extrinsic feedback and 2) intrinsic feedback. Furthermore, we consider the importance of task similarity for transfer to other classroom activities.

1.2. Scaffolding & extrinsic feedback

Scaffolding and feedback are often seen as critical components to the learning process (Chi & Wylie, 2014; Hattie & Timperley, 2007; Kluger & DeNisi, 1996; Koedinger, Corbett, & Perfetti, 2012; Nelson & Schunn, 2009; Shute, 2008; VanLehn, 2011; Wood, Bruner, & Ross, 1976). Despite the importance of scaffolding, this one-on-one instruction is often impractical in classroom settings. Rather than adjusting the level of scaffolding to match an individual child, the teacher must try to meet the needs of multiple children simultaneously. For example, preschool teachers tended to utilize low support strategies that were less suitable for children who struggle with a task (Pentimonti & Justice, 2009).

Provided the continual advancements in technology, researchers have been investigating how technology in general can be used in the classroom to support learning and deliver more individualized, one-on-one instruction (for a recent review, see

Download English Version:

<https://daneshyari.com/en/article/6834836>

Download Persian Version:

<https://daneshyari.com/article/6834836>

[Daneshyari.com](https://daneshyari.com)