Computers & Education 77 (2014) 13–28

Contents lists available at ScienceDirect

Computers & Education

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

Exploring young students' talk in iPad-supported collaborative learning environments

Garry Falloon [a,*], Elaine Khoo [b,1]

[a] The Faculty of Education, University of Waikato, Hillcrest Rd, Hamilton, New Zealand
[b] The Wilf Malcolm Institute for Educational Research, University of Waikato, Hamilton, New Zealand

ARTICLE INFO

Article history:
Received 14 January 2014
Received in revised form
8 April 2014
Accepted 8 April 2014
Available online 24 April 2014

Keywords:
iPad
Collaborative
Learning
Talk
Interaction

ABSTRACT

In the few years since its release, Apple's iPad has generated much discussion about its potential to support student learning at all levels of the education system. Much of this has focused on its physical and technical attributes, such as portability, touch-display, connectivity, and large array of apps. However, a few studies have begun to explore possible advantages of iPads being used as public work spaces, enabling students to interact more collaboratively when creating learning outputs. These studies point to other affordances such as the iPad's ability to lay flat on a desk or be propped at a convenient angle, its wide viewing range and multi-user accessible interface, as being particularly relevant in supporting collaboration.

Between June and November 2013, researchers from the University of Waikato used a specifically developed 'observeware' app to capture display and audio data while young students (5 year olds) were using iPads in pairs for developing numeracy, literacy and problem-solving/decision-making skills. The study used Mercer's (1994) talk types framework to explore the nature of talk students engaged in while they were using the iPads and interacting with each other and their teacher, and also how features of the device may have influenced this.

Results indicated exceptionally high levels of on-task talk, but that this was mostly of an affirming and non-critical nature and unsupportive of outcome improvement or refinement. While the iPad offered unique potential as a shared, public learning device, the pedagogical role of the teacher in realising this by helping students learn appropriate 'ground rules' to raise talk quality, was critical. This article details the methodology used and the results of the study. It discusses the important role teachers play in helping young students build oral-interaction strategies to capitalise on high levels of learning engagement, and the unique features of these devices.

1. Introduction

1.1. iPads and student learning

Since their launch in early 2010, the iPad has stimulated much interest at all levels of education as a breakthrough or "game changer" (Geist, 2011, p. 758) learning device. Unique features such as its touch screen interface, light and compact form factor, ubiquitous wireless connectivity and wide array of apps, have been cited as offering unique affordances particularly suited to educational use (Dhir, Gahwaji, & Nyman, 2013). While much early commentary took the form of promotional hype or teacher and newspaper stories, recent studies have emerged of a more substantial nature, illustrating outcomes from iPad use in different learning contexts ranging from special education (e.g., Miller, Krockover, & Doughty, 2013) through to tertiary settings (e.g., Cochrane, Narayan, & Oldfield, 2013; Geist, 2011). Other studies have explored their use for particular purposes such as promoting early years literacy (e.g., Falloon, 2013a; Getting & Swainey, 2012; Hutchison,

* Corresponding author. Tel.: +64 7 838 4466x6553.
E-mail addresses: falloong@waikato.ac.nz (G. Falloon), ekhoo@waikato.ac.nz (E. Khoo).
1 Tel.: +64 7 858 5171x6260.

http://dx.doi.org/10.1016/j.compedu.2014.04.008
0360-1315/

Beschorner, & Schmidt-Crawford, 2012; McClanahan, Williams, Kennedy, & Tate, 2012), written language (e.g., Falloon, 2013b) and STEM concepts (e.g., Aronin & Floyd, 2013).

Recently, attention has focused on an observed 'engagement factor' when students use the devices, and how they appear better capable than other technologies such as laptops and desktop computers, to promote learner collaboration. An interesting study undertaken by Fisher, Lucas, and Galstyan (2013) compared using iPads and laptops with student pairs for teaching business calculus. Their observational study of students using both devices revealed significant benefits from using iPads, if learner collaboration is a goal. They determined one of the main advantages was the iPad's ability to support "transition back and forth from private to public work spaces" (p. 165). That is, their design (portability, large screen, multiple viewing angles, ability to be manipulated by more than one person etc.) enabled the device to act both as a private work space and as a "public centre of communication" (Fisher et al., 2013, p. 176). They concluded this supported collaboration throughout a learning task. Laptops, on the other hand, tended to be used more privately, the screen and keyboard in particular acting as barriers to collaboration, leading to the "sharing of information only at the conclusion of a problem" (p. 176). However, they acknowledged limitations to their study in terms of its reliance on observed actions. They suggested that additional research was needed that explored the nature of student dialogue associated with collaborative action, to better determine how device interaction impacts upon the way students discuss mathematics.

Some studies have pointed to perceptions of enhanced learner on-task engagement when using iPads (e.g., Henderson & Yeow, 2012; Manuguerra & Petocz, 2011). Others have offered a contesting view, claiming that the device distracted students from intended learning due to challenges involving unrelated apps and websites (Rossing, Miller, Cecil, & Stamper, 2012), or pop up advertisements (Falloon, 2013a). A recent study by Hoffman (2013) undertaken in a 1:1 iPad classroom explored students' engagement with learning tasks using iPads, and specifically, whether or not their perceptions of levels of engagement (defined as on/off task behaviour) matched observational data. Data for her study of 55 English class students aged 14 and 15 were collected using classroom observation (on/off-task tallies and field notes) and whole class discussion (prompted dialogue on the 1:1 programme and any affect on learning behaviour). Her findings were mixed, and suggested that while students observationally demonstrated high levels of on-task response, this was due more to the perceived importance of the task, the extent to which the task was engaging, and the teaching style of the teacher. Students rated highly personalising the device and the ability to set it up according to individual preferences. They linked this with effectiveness and efficiency by reducing the need to adjust settings or adapt to multiple organisational systems, as was often the case when devices are shared. Countering these, negative comments were made that it was easy to disguise non-learning activity such as messaging or social networking, due to the ease with which apps could be shuffled. Other comments highlighted student difficulties in learning using a visual display – that is, they perceived they learnt better when they needed to "physically write the words out, instead of just pressing buttons" (Hoffman, 2013, p. 15).

Apart from these studies, very little research has been undertaken exploring how device affordances such as those mentioned by Fisher et al. (2013) and Hoffman (2013) may affect the way young students learn when using iPads in pairs or small groups. However, considerable empirical evidence exists demonstrating how learning with and through technology can help develop skills such as student collaboration, interactivity, communication and negotiation, when engaged in socioculturally-based learning tasks (e.g., Goodfellow, 2001; Hollan & Stornetta, 1992; Roschelle et al., 2010; Staarman, 2009; Zurita & Nussbaum, 2004).

1.2. Using talk to analyse student interaction and collaboration

Neil Mercer's early research exploring student group talk while engaged in computer-based learning provided some insights into the nature of their collaboration, and how language they used assisted them (or not) to construct knowledge needed to solve learning problems. In the SLANT project (Spoken Language and New Technology), Mercer (1994) explored "the quality of talk in computer-assisted collaborative activity" (p. 24) to evaluate its nature, and "better understand the role of the teacher in supporting computer-based talk activities" (p. 25). He was also interested in learning more about software design, and its influence on children's talk.

Groups of primary school students were videoed working on a range of curriculum-related computer learning tasks, and an analysis of their conversations was carried out to identify the nature of talk they engaged in. Mercer identified three distinct 'talk types' that he classified as *disputational, cumulative* and *exploratory*. Disputational talk was 'argumentative' in nature, where students offered challenge to each other's ideas, but without justification or offering alternatives. Cumulative talk was more conciliatory, and typically represented agreement or continuance without the argumentative elements of disputational talk. Exploratory talk supported reasoning, and displayed student capacity to interact with "the reasoned arguments of others when drawing conclusions, making decisions, and so on" (Mercer, 1994, p. 27). Mercer cautioned against judging one talk-type as being inherently better than the other, as each had its place in the appropriate context. However, he speculated that computer-supported activities designed to promote exploratory talk were the most desirable, given broader educational goals of developing critical thinking and reasoning capabilities.

Mercer also identified four variables that strongly influenced the quality and nature of student talk. These were the physical attributes and design of the hardware, layout and organisation of the equipment, design and content of software, and the nature of the learning task. He commented that it was difficult to extract individual *levels of influence* of each of these variables on student interaction, as each in some way affected the others and stimulated different types of talk. However, an interesting finding relevant to this study was the powerful role of software design in promoting talk of an exploratory nature. Mercer determined that software of an *open design* – that is, requiring students to generate their own content or negotiate solutions to open-ended puzzles or challenges, prompted the most exploratory discussion; whereas software of a closed, highly-structured design (such as games and drills) generated "very little extended, continuous discussion of any kind" (p. 29).

Building on his earlier research (Edwards & Mercer, 1987; Mercer & Edwards, 1981), Mercer (1996) strongly argued that teachers should assist students to develop understanding of 'ground rules' that encourage talk supportive of solving intellectual problems, and the joint construction of knowledge. He described these as "explicit norms and expectations that it is necessary to take into account to participate successfully in educational discourse" (p. 363). Far from being a common sense consideration, Mercer claims understanding how group computer-supported learning (CSL) tasks are carried out, and the oral skills best suited to achieving successful outcomes, need to be made clear, and if necessary, taught, modelled and practised with students. His research revealed that often students involved in CSL appeared to be "operating disparate sets of ground rules for talking and collaborating" (p. 371). He found little evidence of talk suggesting thoughtful