An ecology of mobile screens: iPads meet XOs in a desert school

Mark Pegrum & Grace Oakley
The University of Western Australia
35 Stirling Hwy, Crawley
Western Australia 6009.
mark.pegrum@uwa.edu.au
grace.oakley@uwa.edu.au

Jan Clarke
The Association of Independent
Schools of Western Australia
PO Box 1817, Osborne Park,
Western Australia 6916.
jclarke@ais.wa.edu.au

Jim Sligar
Deputy Principal
Desert Lake School
jimsligar@gmail.com

ABSTRACT

We increasingly operate in a multi-screen ecology, choosing the most appropriate devices for different purposes at different times. When educational institutions invest in mobile technologies, they often spend a great deal of time evaluating a range of devices. However, the devices themselves may matter less than their educational uses. This paper explores the case of an Aboriginal desert school in Western Australia which has adopted a mixture of XO laptops and, more recently, iPads. The background to the XO and iPad programmes is briefly outlined and the relative advantages and disadvantages of each device are indicated. It is demonstrated that, rather than the devices being in competition with each other, they are in many ways complementary. Teachers and students are able to work with both types of devices, as appropriate, to improve literacy, numeracy and other skills within a digital learning ecology.

Author Keywords

mobile, XO laptops, iPads, OLPC, literacy, numeracy, Indigenous

INTRODUCTION

High levels of literacy and numeracy are recognised in Australia as key to ensuring competitiveness in a global economy, as well as being essential in facilitating effective participation in society by all. Literacy and numeracy have been highlighted as areas of special focus in education as the subjects of a national testing agenda, namely the National Assessment Plan – Literacy and Numeracy (NAPLAN). Indeed, the Melbourne Declaration on Educational Goals for Young Australians states that literacy and numeracy are cornerstones of schooling (MCEETYA, 2008). Recently, however, there have been concerns that Australia is performing less well in international tests such as the OECD's Programme for International Student Assessment (PISA) in literacy and the Trends in International Mathematics and Science Study (TIMSS) in numeracy. Concerns are intensified in the case of Aboriginal and Torres Strait Islander (ATSI) students, who tend to lag behind in literacy and numeracy achievement for a number of reasons, including geographical remoteness, lack of resources and cultural differences. The Australian government is committed to 'closing the gap' in this area and the use of Information and Communication Technologies (ICTs) is one potential means of reaching and motivating ATSI students (Wallace, 2008). UNESCO (2011) has affirmed that ICTs can be used in culturally responsive ways to support the education of indigenous peoples throughout the world, although much research still needs to be done in this area. In this paper, we show how the use of ICTs is supporting the literacy and numeracy learning of children in one remote Aboriginal desert school in Australia.

CONTEXT

Desert Lake School (a pseudonym) is a small community school in the Great Sandy Desert region of Western Australia. It has approximately 75 children enrolled, from Kindergarten to Year 10, who belong to the Martu people. The school's aim is to equip children for life, whether they choose to enter the wider community or remain in the small township. In school, children use their native language, Manyjilyjarra, as well as English. Non-Aboriginal teachers, along with Aboriginal Education Workers, provide two-way teaching; that is, teaching in two languages. School policies state that it is important for the children to learn about their traditional culture, language, stories and songs, as well as acquiring 21st century skills.

The school is well-equipped, with several classrooms, a computer room, a language room, an art room and library, and a café, which is used for hospitality training. ICTs are viewed as important in the school, since they enable students to connect with the outside world and see aspects of life that they have never experienced firsthand. In addition to the mobile devices, namely the XO laptops and iPads which are the focus of this study, the school has 18 laptop computers which were provided under the Australian National Secondary School Computer Fund in 2011. The school has more recently bought iMacs for video editing, and staff use MacBook Air or MacBook Pro laptops. Desert Lake School has now upgraded its internet bandwidth under the Australian National Broadband Network scheme, which has allowed students to access resources which had been unavailable due to the poor satellite connection.

RESEARCH

The research reported in this paper was initially conducted under the auspices of a project entitled *Exploring the Pedagogical Applications of Mobile Technologies for Teaching Literacy,* funded by the Association of Independent Schools of Western Australia (AISWA) and carried out in 2011-2012. The aim was to explore the use of mobile handheld technologies in the teaching of literacy, both in the English learning area and across the curriculum, in Western Australian independent schools. Researchers from The University of Western Australia (UWA), with the collaboration of AISWA staff, identified 13 schools which had adopted mobile technologies and whose principals were happy to be involved in the research. Researchers visited these schools on multiple occasions, observed classes, and interviewed staff, including principals, vice principals, technology coordinators and teachers. This largely qualitative data was written up in Oakley, Pegrum, Faulkner & Striepe (2012). One of the schools, Desert Lake School, proved to be a particularly interesting case, given its usage of XO laptops in combination with iPads, as these are devices which in some ways seem to belong to opposite ends of the mobile spectrum. Further interviews were conducted with the principal and staff in order to elucidate the uses of XO laptops, and develop an understanding of how they compared to, and were integrated with, iPads. This research is reported in this paper.

XO LAPTOPS

XOs, produced by the One Laptop Per Child (OLPC) organisation, are small laptops which function as borderline mobile/portable devices. They do not have the greater mobility of smaller smartphones or tablets but they are robust, low-power, and their benefits include larger screens and full-size keyboards (Hourcade, Beitler, Cormenzana & Flores, 2009). Unlike most smart devices, they have not been repurposed for education but are designed specifically to support learning (Pegrum, in press). Thanks to preloaded apps and peer-to-peer connections, students can work on these devices even when an internet connection is unavailable. Rather than providing consumption or tutorial apps, XO laptops are equipped with productive or generic apps that allow teachers and students to collaboratively create content, with students often working together on tasks. Australian teachers have described using XO laptops to support students in the learning of Aboriginal languages as well as English as an additional language, and have used the devices for everything from consolidating spelling to "tak[ing] narrative writing to another level" (*One News*).

While OLPC is an international movement, there is no overarching organisation, which has allowed OLPC Australia to forge its own pathway. XO laptops (and more recently, XO-duos, which are hybrid laptop-tablet devices) have been made available to Australian schools classified as disadvantaged (including National Partnership schools and those with lower rankings on the Index of Community Socio-Educational Advantage, or ICSEA). Desert Lake School was one of the first in Australia to participate in the OLPC project, starting with the XO-1 laptop in 2009 and introducing the XO-1.5 laptop in 2010. The school now has around 60 XO-1.5 devices. Despite some technical and repair difficulties, and demands on teacher time to keep the devices organised and charged, they have been used to great effect in the school.

With the XOs, teachers experienced their first real opportunity to integrate technology in a purposeful way throughout the curriculum, and they also took the opportunity to teach students about personal responsibility with the devices. As one teacher noted, "Students enjoy having their own XOs; this pride of ownership has reduced the likelihood of them getting damaged". The XOs provided students with their first introduction to simple collaboration, networking, and different learning spaces. Younger children are not permitted to take the devices outside but they often move them around the classroom – they may sit on a beanbag or in a corner to use them, although a table is still most commonly used. For older children, the XOs have provided a greater extension of their learning spaces; for example, they have worked with them in the kitchen garden, in the school grounds, and even outside the school grounds on excursions under teacher supervision. The robustness of the devices has made it particularly easy to explore alternative learning spaces at quite some distance from the school. One teacher observed of the XOs: "They are fantastic to take on excursions into the desert and into [the largest town in the region]. Their tough construction is certainly a bonus".

The laptops have been used mainly to improve literacy, though they have also been used in maths and other areas. For younger children, applications for explicit teaching and practising of basic skills are often used. For older children, word processing and searching the internet for information are common activities, although explicit teaching of literacy is still important for these children (Nakata, 2004). Successes have included improvements in a range of areas from alphabetic literacy to computer literacy. From the start, teachers reported that students were more engaged and better focused thanks to the introduction of the XOs, with a reduction in behaviour management issues. It was also noted that students were able to work more independently, as well as being willing to work more collaboratively. Older children had the chance to experience mobile learning outside the classroom and to begin to draw the wider real-world context into their learning, which is particularly important for Australian Indigenous students (Harris, 1984).

IPADS

iPads, produced by Apple, are now in their fourth iteration. These multi-purpose, touch-sensitive tablet devices with much of the functionality of smartphones have proven extremely popular with consumers. Initial educational trials found

that iPads are "effective, durable, reliable and achieve their educational aims of going further, faster and with more fun" (Jennings, Anderson, Dorset & Mitchell, 2010, p.4). While there has been concern that they are oriented more towards consumption than production, with apps typically based on pedagogically traditional content transmission or behaviourist drills (Murray & Olcese, 2011), some studies have found that, used appropriately, iPads can fit well with social constructivist approaches (Cochrane, Narayan & Oldfield, 2011; Pegrum, Oakley & Faulkner, 2012).

In the second phase of the *Exploring the Pedagogical Applications of Mobile Technologies for Teaching Literacy* study, AISWA loaned class sets of iPad 2 devices to schools which would otherwise not have had access to them. Thus, in Term 2, 2012, a set of 13 iPads arrived at Desert Lake School for a period of 9 weeks. Thirty-three apps, recommended by researchers on the basis of a study of early adopter schools in the first phase of the project, had been preloaded onto the iPads, although teachers were free to download additional apps if they wished. Seventeen of the apps were free and 16 were paid (all are listed on the *MLearnWA* wiki).

Initially, staff and students were encouraged to simply 'play' with the preloaded apps. It has been suggested that many Australian Aboriginal children learn better through 'doing' and 'trial and error' as opposed to listening to verbal instruction (Harris, 1984), meaning that this strategy was highly applicable for these students. As the staff built their familiarity, they began to use particular apps for particular tasks. They also began to download additional free apps. The iPads were used to promote literacy, both within the English learning area and across the curriculum; numeracy, including the language of mathematics; and science, for example through documenting the growth cycle of plants in the school vegetable garden via photographs and writing. It was found that the iPads supported student autonomy, as the teacher who leads K-10 literacy teaching pointed out:

> One of the concerns I did have is that the apps wouldn't be accessible to the students because of their low literacy levels. Teaching out here, there is little room for independent work for the students because they can't read instructional sentences so everything has been teacher-directed ... Having the iPads ... that hasn't been teacher-directed. Somehow [the children] have figured out how to use them without those high levels of literacy.

The iPads were used both as consumption and production devices. Some of the more pedagogically traditional apps helped students consolidate the skills they had been learning in class (for example, the alphabet, phonics, and sight words). More generic apps allowed for greater student autonomy and creativity, with students using the iPads to photograph their town, for instance, and integrating these images with text to produce multimodal digital stories. According to the school principal, future plans include the students producing visual dictionaries in their own language, Manyjilyjarra.

Without dedicated IT support, there were some technological and connectivity issues, including issues with saving, printing and sharing files, though these were resolved in time. iPads served to reduce behaviour management issues and increase the amount of time spent on task, with students' greater engagement resulting in enhanced learning opportunities. As the early childhood teacher put it: "It's a good and effective behaviour management tool … once they are on the iPad, they are so engaged". This had the added benefit of freeing teachers up to work with students who needed one-on-one support. Teachers reported that successes included changed classroom dynamics and interactions, which facilitated the implementation of more contemporary, student-centred pedagogical approaches. With the use of apps, whether pedagogically traditional or more creative, it was noted that younger students' interactions with each other were qualitatively different – involving much more sharing and discussing – when using iPads, suggesting their value as collaborative devices: "There's a lot of interaction", as the early childhood teacher noted. The K-10 literacy teacher also highlighted the collaborative exploration of apps by students:

> A student might find one particular app … and then for a week or two every kid in the class will be playing that app. The kids will get tired of playing that app but, by then, another kid will have discovered another one and then all of a sudden they will play with that. So, the apps they … played with at the beginning of the term will not be ones they will be playing with now.

It was clear, too, that when teachers and students learned about iPads together, in a collaborative spirit, it could be very empowering for students. As the middle school literacy teacher put it: "It turns the tables on who owns the knowledge in the classroom and that gives students a sense of empowerment". Teachers were also able to extend the work done with XO laptops to experiment further with new learning spaces, such as informal spaces within the classroom, and other learning spaces within the wider community.

In sum, the iPads brought many benefits even if, especially at higher levels, it was found that they were best used in combination with a range of other learning technologies, including the XO laptops and other computers. At the end of the

9-week trial, the teachers were convinced that the iPads could improve learning outcomes. The school has now purchased a set of 30 iPads, and has obtained funding to purchase a further 30 devices.

IPADS MEET XOS

Initially, the XOs were technologically more familiar to children, but they didn't take long to work out how to use the iPads. It was reported that 4-year-old kindergarten children could get started with the iPads in around 5 minutes, working with intuitive gestures like tapping and swiping. Many younger children had not yet developed the fine motor skills which are needed to use a keyboard and a mouse with the XOs, and they took time to get used to more standard computer software features like drop-down menus. Singletasking on iPads – having only one window open on the screen – was an advantage for some, according to teachers. By contrast, the XOs developed keyboard and mouse skills, which are important for students who will go on to use laptops. Unlike iPads, the XOs did not present problems with saving or sharing files, but in time the iPad issues in this area were solved. iPads were found to be easier to keep clean, and the absence of moving parts was seen as an advantage. However, the school found the XOs to be very robust, and their screens worked better in bright sunlight – an important consideration in desert regions.

The principal noted that new teachers arriving at the school are generally familiar with iPads, but require training on the XOs. The fact that the XOs arrived with preloaded apps initially made them easier to manage, with the selecting, downloading and updating of apps on iPads being time-consuming. There are fewer apps available for the XOs, and most of them are generic tools, while iPads offer both generic apps and apps directed at particular ages and learning areas. The many free apps on the iPad presented both positives and negatives from the point of view of teachers; there was always something new for children to explore, but teachers found it difficult to source and evaluate relevant educational apps. Furthermore, there are few apps available that suit the specific needs and interests of Australian Indigenous people. The XOs had the advantage of allowing teachers and students to access Adobe Flash activities, which are not normally supported on Apple's mobile devices.

The touchscreens and small size of the iPads appeared to give them the edge over XOs for younger children, who enjoyed the tactile and visual activities they could undertake with them. More on-task talk and collaborative behaviour occurred around the iPads, especially when they were not used in a 1:1 model. On the other hand, it was found that students preferred to use a keyboard for any significant amount of text entry, and the older children in particular found the XOs more useful for word processing. However, teachers reported that the students were getting more used to error correction and editing on the iPads, which is an issue especially for students who are less accomplished in literacy, given the number of corrections that might be needed. It was found to be easier to capture multiple media on the iPads, though video editing was more difficult. The iPads were also easier to personalise, which teachers considered to be important for the engagement and self-expression of the older students.

CONCLUSIONS

It can be seen that despite their differences, XO laptops and iPads have a number of similarities in their "mobility and connectivity" (Hourcade et al., 2009, p.229). Technological and connectivity problems can occur with both, but can be overcome. Both XOs and iPads allow greater integration of technology into teaching, and can simultaneously lead to greater student engagement, focus and autonomy. Pedagogically, the XO laptops are designed to promote creation and interaction around generic apps; and generic apps allow the same approach with iPads. A great deal of collaboration around tasks is possible, including collaboration between teachers and students. A new sense of learning spaces can open up as these devices are taken outside the classroom and the real-world context is drawn into learning.

Yet there are some differences between the affordances of these devices, which may make one or the other more suitable for particular students with particular purposes in particular contexts. For instance, iPads are more useful for young children's tactile activities, while XOs are more useful for older children's text composition; and iPads are ideal for capturing multiple media, but XOs are better for manipulating them. For this reason, these devices can function in complementary ways within an overall ecology of mobile and non-mobile technologies which, at Desert Lake School, also includes laptop and desktop computers. For the principal and teachers, it is not a question of choosing between XOs and iPads, or indeed between fixed and mobile technologies, but rather choosing which device best serves their needs at a given moment. As one teacher put it: "The XOs have allowed my students to do different types of activities compared to the iPads. Students enjoy the variety of IT devices". Taken together, these devices have much to contribute to supporting students' learning, and specifically the literacy learning of Australian Indigenous students in this desert school.

REFERENCES

Cochrane, T., Narayan, V., & Oldfield, J. (2011). iPadagogy: Appropriating the iPad within pedagogical contexts. In *10th World Conference on Mobile and Contextual Learning, 18-21 October 2011, Beijing, China: mLearn2011 Conference Proceedings* (pp.146-154). Beijing: Beijing Normal University. http://mlearn.bnu.edu.cn/source/Conference_Procedings.pdf

Harris, S. (1984). Aboriginal learning styles and formal schooling. *Aboriginal Child at School, 12*(4), 3-23.

Hourcade, J.P., Beitler, D., Cormenzana, F., & Flores, P. (2009). Early OLPC experiences in a rural Uruguayan school. In A. Druin (Ed.), *Mobile technology for children: Designing for interaction and learning* (pp.227-243). Burlington, MA: Morgan Kaufmann.

Jennings, G., Anderson, T., Dorset, M., & Mitchell, J. (2010). *Report on the Step Forward iPad Pilot Project*. Melbourne: Trinity College, University of Melbourne. http://goo.gl/UuwXG

MCEETYA. (2008). *Melbourne declaration on educational goals for young Australians.* Melbourne: Ministerial Council on Education, Employment, Training & Youth Affairs. http://goo.gl/fi7P8

MLearn WA Wiki. http://mlearnwa.wikispaces.com/

Murray, O.T., & Olcese, N.R. (2011). Teaching and learning with iPads, ready or not? *TechTrends, 55*(6), 42-48.

Nakata, M. (2004). Some thoughts on literacy issues in Indigenous contexts. *Australian Journal of Indigenous Education, 31*, 7-15.

Oakley, G., Pegrum, M., Faulkner, R., & Striepe, M. (2012). *Exploring the pedagogical applications of mobile technologies for teaching literacy.* Report for AISWA. http://www.education.uwa.edu.au/research/?a=2195652

One Laptop Per Child, Australia. http://www.laptop.org.au/

One News. http://www.one-news.org/

Pegrum, M. (in press). *Mobile learning: Languages, literacies and cultures.* London: Palgrave Macmillan.

Pegrum, M., Oakley, G., & Faulkner, R. (2013). Schools going mobile: A study of the adoption of mobile handheld technologies in Western Australian independent schools. *Australasian Journal of Educational Technology, 29*(1), 66-81. http://ascilite.org.au/ajet/submission/index.php/AJET/article/view/64/25

UNESCO. (2011). *ICTs and indigenous people.* Policy brief. Moscow: UNESCO Institute. http://iite.unesco.org/files/policy_briefs/pdf/en/indigenous_people.pdf

Wallace, R. (2008). *Engaging remote and very remote Indigenous students with education using Information and Communication Technologies (ICTs).* Final report. Darwin, NT: Charles Darwin University. http://goo.gl/KfMrd