Connections, diversity, coherence: Three vignettes exploring learning with iPads in primary schools

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Abstract

In New Zealand, there are growing numbers of schools which are investing in iPad deployment, ranging from schools who have made a strong commitment to iPads through to those who have purchased a small number for student groups to use. Recent studies have comprehensively reflected the kinds of affordances that iPads offer, such as mobility, flexibility, ease of use, and range of applications. It is timely to begin to consider the type of education that might be afforded by such technologies. Using three future-focused themes—diversity, connectedness and coherence (Bolstad, Gilbert, McDowall, Bull, Boyd, & Hipkins, 2012)—as lenses for analysis, this paper presents three vignettes from junior classes that reflect the way iPads might afford deep, personalised approaches to learning to support young people effectively as they move through their school years. The analysis suggests that, where educators adopt a learner-centred pedagogy as part of a whole school systematic vision for learning, iPads can offer a powerful tool for engagement.

Keywords: iPads, mobile technology, diversity, connectedness, coherence, New Zealand

Introduction

> "A future building school is a space through which students and communities can rethink their assumptions about what is possible and what is impossible" (Facer, 2011, p. 107).

In 2013, UNESCO hosted the "High-level Policy Forum on ICT and Education for All: Achievements and the Way Forward" in which it was acknowledged that technology is likely to "holistically transform the education sector" (UNESCO, 2013). The New Media Horizon Report for K-12 (Johnson, Adams-Becker, Cummins, Estrada, Freeman, & Ludgate, 2013) suggested that mobile technology would be thoroughly in the mainstream of education in under a year, propelled largely by the plethora of productivity and educational apps available.

Recent studies exploring the way mobile technologies might enable and amplify socio-constructivist pedagogical processes align well with the spirit and direction of the New Zealand curriculum (Ministry of Education, 2007). While it is debatable as to whether mobile technologies afford a pedagogy peculiar to their particular characteristics, studies suggest that such technologies can support increasing personalisation based on students' prior knowledge, contexts and cultures, provide opportunities to explore conceptual knowledge from a variety of viewpoints, and situate learning more authentically in time, place and context (Alyahya & Gall, 2012; Clark & Luckin, 2013; DEECD, 2011; Herrington, Mantei, Herrington, Olney & Ferry, 2008; Melhuish & Falloon, 2010; Traxler, 2010).

A market success in the field of mobile technologies is Apple's iPad, which sold 58.23 million in 2012, an increase of 81% on the previous year (Etherington, 2012). Across the globe, there have been wholesale purchases of iPads for schools, even for regions and states. In the "iPads for Learning" trial in Victoria, Australia (DEECD, 2011), 700 were deployed across a range of schools, while two years later in Los Angeles $30 million was spent, providing 31,000 iPads across the district (Weiss, 2013).

The reasons for this dominance in the competitive mobile field may be partly owing to polished marketing and design, and partly to the range of affordances purportedly offered by such technology. The iPad, as a mobile technology, offers the single user effortless touch screen access to 40,000 cloud-based applications and access to a host of in-house applications via the iTunes store (Apple Inc., 2013b). In addition, recent years have seen the industry develop supporting devices such as Apple TV and multi-user configuration that support large groups of individuals working with several devices at a

time. What these components afford is a highly tailored user experience supported by ubiquitous access to rich cloud-based applications from any location with web (and/or 3G) availability.

However, this global shift towards the use of such devices is not without challenge and there is no doubt that questions still abound in relation to both the technology and the context of its use. Examples such as the somewhat ill-fated roll-out of iPads across Los Angeles (Dobuzinskis, 2013) have highlighted that the introduction of technologies does not, in itself, lead to enhanced learning and achievement. Introduction of technology without supporting professional learning can undermine the best of intentions. The challenge for educators is to establish how they might harness such affordances in ways that support those effective pedagogical approaches that learning theory suggests will make positive impact on students.

In New Zealand, there are growing numbers of examples of iPad deployment across the spectrum, ranging from schools that have made a strong commitment to iPads (Tasman-Jones, 2012) through to those who purchase a small number of devices to complement other devices already on site. In the Virtual Learning Network Groups (www.vln.school.nz), an educators' social network, the largest group (with 1108 members) is dedicated to understanding how to use iPads effectively (Ministry of Education, 2013). The expense, the support required and the particular emphasis on single-user modality offer some constraint to educators who might choose to introduce them to school. Arguably, however, it is this single-user focus that offers potential for personalised, strength-based learning design (Apple Inc., 2013b; DEECD, 2011; Melhuish & Falloon, 2010). The central value proposition for educational pedagogy is the potential to extend the user experience into personalised contexts for education, in combination with clear curriculum learning intentions and appropriate pedagogical design (Herrington et al., 2008; Mishra & Koehler; 2006; Northrop & Killeen, 2013).

Prevailing dialogue related to notions of effective learning has been evolving over the last decade. The social web makes the creation and use of information readily available and mobile technologies can afford new ways to design learning that is increasingly personalised. Research into future-focused notions of education posit that, going

forward, schools need to have coherent systems and structures in place to support connected learning, driven by community relationships, and with the diversity of learners' needs at their centre (Bolstad et al., 2012; Facer, 2011). It is widely accepted that technology can play a crucial role in enabling and enhancing this approach to learning (Clark & Luckin, 2013; DEECD, 2011; Northrop & Killen, 2013). It is, therefore, perhaps timely to begin to consider the type of education that might be afforded by such technologies.

Three future-focused themes

A 2012 paper from Bolstad et al. offers a thematic framework for thinking about the nature of learning and education in the 21st century. Of relevance to this paper are three key pedagogical concepts that offer a tentative synthesis of approaches for a future enhanced by technologies.

First, the importance of *diversity* is noted; that is, the value of designing learning that takes into account learners' differences, needs and strengths through personalisation. This also includes educating *for* diversity through pedagogies that support connection and collaboration. Studies into iPads indicate that educators feel increasingly enabled to differentiate learning more easily given a clear focus on curriculum and pedagogy (Clark & Luckin, 2013; Fagan & Coutts, 2012).

Second, the concept of *connectedness* highlights the value of relating learning across traditional spaces to explore concepts critically and creatively. iPads may enable cross-disciplinary approaches to content creation in ways that might have been too unmanageable before. They may also enable connection over time/space and to a wider authentic audience such as family and whānau, or in a collaborative partnership with the teacher (Brice, 2011; Facer, 2011; Clark & Luckin, 2013; Fagan & Coutts, 2012; Sullivan, 2013). This connectedness may be more easily enabled using mobile technologies.

Third, the value of a *coherent* system is emphasised, in which components across school and community systems are aligned and complementary. The use of iPads, when planned for as part of a whole school vision and integrated with complementary services

such as cloud-computing, might begin to support coherent approaches to assessment over time and the realisation of a community vision for education.

It is assumed that effective learning with iPads should focus on clearly articulated learning intentions, driven by evidence of student progress and informed by needs and strengths in relation to their curriculum (Mishra & Koehler, 2006; Robinson, Hohepa, & Lloyd, 2009). The challenge now is for schools to consider how their vision for education and learning is evolving to take into account the changing world, and, at the same time, to ensure that learning design gives effect to that vision. If one views the effective use of iPads through the lens of a future-focused framework, one might begin to move from analysis of classroom activity to taking a tentative longer term view of how such technologies might play a part in education in years to come.

This paper presents three vignettes that reflect the way iPads might begin to be woven into a pedagogy that affords the kind of deep, personalised approach to learning design that might be required to support young people effectively as they move through their school years.

Methodology

These vignettes, by their nature, present only snapshots of what might be possible on a wider scale in the future. The vignettes were gathered within the context of professional learning initiatives, rather than within a formalised research study, and focus on perceived benefits from the point of view of the schools participating. All schools, educators and individuals gave informed consent to sharing their experiences in this paper in order to make a contribution to the wider debate. Data was gathered through observation of learning, dialogue and facilitated discussion and tracking of impact on student achievement within the context of facilitated professional learning support. Coding and analysing of the data from the schools involved methodical organisation, categorisation and explanation, in terms of the participants' own explanations, and inducing or ascribing categories to notice themes and patterns (Cohen, Manion, & Morrison, 2007). Following the provision of the vignette accounts, a content analysis approach was used to identify aspects of the vignettes that might align to the future-focused themes (Brenner, Brown, & Canter, 1985).

The next section presents the three vignettes, and these will be followed by a discussion of how, when taken together, effective integration of technologies such as iPads might play a role in a future-focused learning design.

Vignette 1: Sharing mathematical thinking

This vignette focuses on a year 5–6 class at a primary school in the north of New Zealand. The learners were exploring mathematical strategies in groups, supported by specific iPad apps.

In 2013 the teaching team and students at a primary school in the north of New Zealand began a journey using iPads to support the learning in their classrooms. An iPad was purchased for every teacher, and a total of 32 other iPads within the school were shared amongst the classrooms. The introduction of iPads followed a specific e-learning review undertaken by the leadership team and board of trustees where they spent time developing their e-learning vision and strategic plan for the future-focused classrooms and learners. This team understood the importance of professional development for their teachers and invested resources in employing an e-learning facilitator on the basis of one half-day session per week to support teachers and students.

Sharing maths strategies

There was excitement in the year 5–6 classroom as students worked in pairs, collaborating on their mathematics problems. The groups were organised by the teacher based on the students' specific needs, determined by previous analysis of achievement data. Teamwork was apparent as the students described their thinking to each other around the strategy they would use to solve the problem. As individuals, they recorded their thinking and played it back, editing as they went to ensure they had got it "right". The students were excited to come back together and share their strategies with their whole maths group, giving each other feedback and advice.

Growing leaders and connecting beyond the classroom

The integration of iPads into the mathematics environment has provided students, teachers and whānau with new opportunities. The app being used in this case was

ShowMe (Learnbat Inc., 2013), a free app that turns the iPad screen into a recordable interactive whiteboard. The whiteboard allows students to add images, text and drawings, and record one's voice.

This app also provides teachers with the opportunity to record themselves explaining the maths strategy students are focusing on, and this recording can be easily uploaded from the iPad to the class blog, creating a "rewindable teacher". Students and parents have direct access to this online tutorial and are able to watch as many times as required to support their understanding. Feedback from parents has been positive as they are now able to provide their children with guidance following the same strategies that the teacher is using.

Learners within the classroom can also take a leadership role in creating the tutorials and being the experts for their peers:

> We have found this very powerful for students who don't have the confidence to stand up in front of a group of students to explain their thinking but are happy with recording their tutorial [and] uploading it to an online space, therefore giving others access to this. This app also gives them the ability to share via email. (Teacher comment)

In addition, the portability of the iPad allows students to work anywhere. With the built-in camera they can take a photo of the problem, add this to their recording and head out to their chosen working space to work on the problem. They can choose to work as an individual or within a group.

The teacher is able to set up a class account that allows access to all saved ShowMe videos. Teachers are noticing they are able to utilise these recordings at a later date to assess where individual students are with their maths learning. These recordings have also been used as part of three-way conferencing, allowing students to share their maths understanding with parents and talk about their next steps.

Pedagogically, the use of the iPad in this context reflects contemporary teaching and learning practices, as outlined in the New Zealand curriculum (Ministry of Education,

2007). Through this learning process of utilising the iPad as a support tool, the teacher facilitated shared learning, allowed the students opportunities to make connections to prior learning and experiences, and encouraged reflective thought and action. The greatest potential of the iPad in this situation was the ability to personalise the learning for students. In this vignette, the impact on learning is in the way the students were able to reflect on their own thinking as well as provide feedback for their peers. One clear advantage was the ease with which they could now record and share their work. The same app can be utilised for other learning areas: students are currently exploring recording their book reviews and uploading these to an online space for others to hear.

Other teachers within the school are also beginning to use this app to support learning. The bonus of having a facilitator spending time in each classroom is that it allows the cross-pollination of ideas on a regular basis. Teachers are also sharing their successes through their class blogs. A parent evening was held recently where the students were able to demonstrate their achievements and clearly articulate how the iPad was supporting their learning across the curriculum areas. During this meeting, parents were positive in their feedback, noting that the use of this app for maths on the iPad gave them more opportunities to support their child's learning as they now had a "window" into the classroom and a sense of involvement.

The community at this school is excited by the journey during 2013 and is offering students the opportunity to bring their own device during 2014.

Vignette 2: Capturing the history of our community

This vignette focuses on learners from year 2–8 classes at a school in Wellington. The students combined a range of iPad apps as they documented their school's history for a wider audience.

Preparing to launch

At the beginning of 2013, a full primary school in Wellington introduced two iPads per classroom as part of their larger vision for creating a modern learning environment. The iPads were purchased at the end of 2012 so that teachers could take one to use over the Christmas holidays. During this time, the teachers were able to download apps using

their personal iTunes accounts, use the camera and experiment with possibilities. For safety, each device was reset to factory default settings prior to going into the classroom. Having this time to explore enabled the teachers to become familiar with the iPads' functionality and capability before introducing these devices to their class.

Students as "Tech Angels"

During the course of this year, the teachers as well as the students have been developing their skills and expertise on these devices as well as learning ways to use them within the curriculum. Part of building experience within the student group has been the formation of a "Tech Angel" programme, an idea originally developed at Wellington Girls' College (Bolstad & Gilbert, 2006). Two students from each year 2 to year 8 class participated so they can share responsibility for the classroom maintenance of the iPads as well as assist their peers if needed.

Capturing school history

Rather than design a Tech Angels programme around specific iPad use, the teachers chose a holistic approach to enable the building of skills through the students' interest in storytelling. As a beginning project, the Tech Angels created movies with a focus on aspects of school life as a way of documenting the school's history. Cross-curricular links were made including values (inquiry and curiosity), learning areas (e.g. arts, English, social sciences, technology) and the key competencies of managing self, relating to others, and thinking. The two Tech Angels from each year 2–8 class worked together to plan, record and edit their original documentary. When fully completed these movies will be shared with the community on the school website.

This initial process saw a number of different tools employed as the students planned their documentary. Paper, pen, discussion and collaboration were part of the planning process along with iPads apps, such as Popplet Lite (Notion Inc., 2010) for brainstorming and recording ideas. Once the documentary was storyboarded, the portability of the iPad enabled students to move around the school capturing photos, taking movies and recording interviews all from the one device. Using iMovie (Apple Inc., 2013a), students edited their work including manipulating footage, adding text,

background music and narration. Being able to complete this all on the one device reduced the equipment required and made the movie-making process more straightforward for the students.

Woven throughout the experience was discussion around safe handling of the iPads, charging and understanding app functionality as a way of strengthening the Tech Angels' knowledge. Furthermore, the students also drew on and further developed a range of skills as they researched, interviewed, created and collaborated on their documentaries. The pedagogical approach adopted here allowed students to build on their prior knowledge, develop thinking within collaborative contexts and create new content using repeated opportunities to refine thinking.

Vignette 3: Building blended learning with juniors

This vignette focuses on students from a year 1 class at a Nelson school who improved the quality of letter formation through the strategic use of iPad apps.

This year 1 teacher's class in a South Island school has a purposeful atmosphere. The teacher co-teaches in a collaborative way with her colleague in a neighbouring class. Learners are intently working, moving between the rooms as necessary, involved in a rich selection of activities to support their learning. The teacher has five iPads to call on in her class to support the junior school learning programme, and her use of the iPads always starts with a learning goal in mind.

One very simple lesson sequence has led to a dramatic improvement in fine motor handwriting skills. Traditionally all children would practise the "letter of the day" with multiple repetitions of letters, with the teacher able to keep an eye on only one or two children at a time as they attempted acceptable letter formations, while the other, unobserved children formed their letters any which way. Without watching children as they form letters, it is often impossible to tell where they need guidance.

The teacher realised that with the use of the iPads she could easily alter this sequence and improve outcomes for students in an engaging and supportive way.

Personalising the process

The teacher started by asking children to write the letters of the alphabet using the free iPad app ShowMe. Individually children made a screen recording saying their name and writing the letters of the alphabet with a prompt card as a scaffold if they needed it. She then took the recordings home and analysed those letters children needed to practise, noting letter formation as well as shape.

She then noted the incorrectly formed letters into each child's handwriting book as a record of the letters that child needed to practice. Children now had a personalised resource to call on to practise their handwriting.

As shown in Figure 1, children formed the letters with a triangular barreled stylus to encourage appropriate pencil grip. Working in this way, focusing on their personal goals, helped them avoid spending time with letters they already knew how to form correctly and tightened the focus on identified needs.

Figure 1. Child using Letter School app.

Children used handwriting apps like Letter School (Sanoma Media Netherlands B.V, 2012) and ABC Tracer (Hetal Shah, 2012) to practise their letters. These apps ensure that children form letters correctly by not allowing them to form letters incorrectly, scaffolding and rewarding suitable formations at a pace set by the learners themselves.

> Children finish the lesson sequence in a traditional way by practising writing the letter with the pen and paper. It's important to transfer the modelled learning into

> the situation where the error was being made. The iPad is used to ensure correct formation from the onset so bad habits are being addressed. (Teacher, discussion comment)

After six weeks the teacher was able to have children repeat the recording procedure with ShowMe and noted children making dramatic improvements in their ability to form and record letters correctly.

By the end of the six-week inquiry, of the 20 children in the class, 30% had made gains of correct formation of eight letters or more and the proportion making three errors or fewer had risen to 55% from 10% by the end of the inquiry. Pedagogically, it appeared that the ability to repeat and refine the process for themselves, combined with tailored feedback, offered another avenue to support early literacy in this context. The issue here, however, is not whether iPads accelerate learning, but the extent to which they support the creation of a more inclusive and responsive learning design.

Discussion: Themes from across the vignettes

In this section we provide an overview of the main themes that emerge from the vignettes when using the three future-focused themes from Bolstad et al. (2012) as a lens for analysis. We were interested in how iPads might enable educators to personalise learning, support inclusive practices, encourage learners to develop knowledge and grow connections with the wider community. When taken together, these three vignettes might be seen to give effect to the future-focused themes that are characteristic of contemporary learning design.

Diversity

Each vignette described how the combination of purposeful learning design and iPad functionalities supported a student-led pedagogy driven by learners' strengths and needs. At the school in the north (vignette 1) the recording of thinking related to maths strategies was managed through the identification of specific needs and how the combination of apps enabled students to manage and show their understanding through a strength-based personalisation model. Vignette 2 highlighted the way a blend of apps can support active participation in multi-media creation and the role of the Tech Angels

offered opportunities for a "co-producing relationship" (Bolstad & Gilbert, 2012, p. 65) to evolve. Vignette 3 was strongly focused on maximising the use of letter formation apps to better focus the teacher's support for the specific needs of each child. iPad-enabled capture and review of learning progress highlighted shifts and needs in individual student performance in ways that were more nuanced and precise than had been managed before when the teacher's own notes and observations were the sole means of tracking data.

Connectedness

The use of iPads enabled the students and teachers to connect learning using cloud-based spaces and increasingly afforded the design of learning that connected traditionally separated people, knowledge and ideas. This technologically enabled connection of information across time and place should not be underestimated in the way the iPads allowed flexible, blended approaches to learning to occur. All three vignettes showed how information could be captured on the fly in and beyond the classroom, such as filming the school history (vignette 2), and accessed at other times by students, teacher and, crucially, whānau, as in vignette 1. In addition, vignette 3 illustrated the way the teacher and students were able to review letter formation over time to monitor progress and adjust learning design. The notion of ideas and people connected for a more coherent approach to learning is reflected in the first vignette in the way learning in maths could increasingly involve students' families, as well as the notion of exploring maths using oral language and creative expression. Both vignettes 1 and 2 highlighted the way in which groups of students could choose to work together. The iPads supported students in all three schools to connect a range of competencies, such as collaboration, thinking and use of language, in shared experiences.

Coherence

A challenge in presenting vignettes of *individuals'* practice is that a sense of a wider school or education system is somewhat lost or pushed into the background. E-capability growth is unlikely to be sustained through the isolated actions of a few

teachers in a school. It is vital that the integration of iPads, or similar mobile technologies, into the school curriculum is part of a strategic approach and gives effect to the vision for learning for that community. Although the vignettes capture single educator activities, it is possible to see that the actions within the classrooms are part of a coherent school-wide vision for learning. In vignette l, for example, the use of iPads followed a school review, reflecting vision and strategic planning and supported by dedicated professional learning. In vignette 2, the whole school development of a modern learning environment led to educator-driven professional learning and the introduction of iPad-enabled inquiry-based programmes.

Conclusion

The vignettes presented in this paper offer a brief glimpse into the possibilities inherent in iPad technology. All technologies present both opportunities and challenges, depending on the context for use. This paper suggests that, where educators adopt a learner-centred pedagogy as part of a whole school systematic vision for learning, iPads can offer a powerful combination of mobility, connectivity and a host of apps that can be tailored for purpose.

The three concepts—diversity, connectedness and coherence—have offered a useful lens through which to view the ways in which iPads are currently being used in New Zealand classrooms. They have helped highlight the way in which this technology, and potentially others like it, can support active, personalised learning and forge learning-related connections between whānau and learners and across time. The importance of a coherent design for learning at class, school and system level has been emphasised by the way in which teachers' use of digital technologies in the vignettes occurs in the wider context of whole school curriculum and strategic direction. Arguably, all three themes are areas of development and growth for New Zealand schools and these vignettes can only offer a snapshot in a journey. That said, these stories of engaging and purposeful use of iPads in three schools offer a window on how we might leverage such technologies as we prepare our young people for the future.

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