Sustaining high quality pedagogy in the changing technological landscape

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What is interesting to me is that I feel like a new teacher again. I've had to think of the pedagogy every step of the way and that's refreshing. I measure every minute of the class now. Time is precious, I need to make sure that they learn something, learn it with the iPad and feel that they are going forward. It's been very rewarding seeing the students embracing the learning with me (Constanza).

Mobile technologies seem to have arrived in education, as either a panacea, a total distraction to learning, or something in between. Teachers and researchers alike fall on a continuum from being sceptical to embracing the opportunities afforded by these new technologies. As teacher educators, the authors of this article find themselves in different places along this continuum. Underpinning our range of sentiments is a shared concern for quality teaching and learning with a willingness to constantly adapt instructional practice to the changing technological landscape while remaining cognisant of how students learn. Importantly, research supports a move to use iPads and other mobile technologies for improving student learning (Hamilton, & Tee, 2010; Kukulska-Hulme, 2012). However, while we acknowledge this, we also note that there is little research that examines how teachers maintain a focus on the principles of good pedagogy while adapting their teaching practices to the opportunities that technology provides, particularly in respect to tertiary education settings where class sizes tend to be very large, the technological infrastructure under rapid change, and levels of technological literacy very diverse (Kim, Mims, & Holmes, 2006).

This project is part of institution-wide initiatives to promote the use of technology and also move to the use of larger interactive teaching spaces. A group of lecturers in teacher education in the Faculty of Education used a Learning Enhancement Grant as an opportunity to explore how the use of mobile technologies could make feedback about learning visible to students and lecturers. The group is committed to practicing powerful teacher education pedagogy and to documenting the process involved. Now, almost a year since starting, four of us share some of the insights we have gained from these initial stages. While the project examines mobile technologies in the widest sense, for this paper we have focussed on our use of iPads in our teaching.

As a project group, we are quite diverse in that we contribute to different programmes (viz Bachelor of Education Early Childhood; Graduate Diploma in Education (Primary); Graduate Diploma in Education (Secondary); Bachelor of Physical Education) and come from different subject specialisations (physical education, science education, and language teaching). Alan teaches physical education students and increasingly finds himself teaching in a lecture theatre setting. In an effort to utilise this space constructively he has trialled the use of the Socrative app to help facilitate interaction with the class. Dawn and Rena both teach science education and have seen a shift from workshop sessions, where theory and practical activities were closely integrated, to a combination of mass delivery of content (lectures) and large class workshops for practical work (60 students). They have used Piazza and GoSoapbox to make feedback and learning visible synchronously in the lectures; e-portfolios as a site for students to showcase their learning for assessment purposes; and PeerWise for ongoing self-assessment. Constanza teaches future teachers of international languages in primary and secondary programmes. She has explored the possibilities afforded by technology to the teaching of languages, especially because her classes, which are never greater than 30 in number, include up to eight different language specialisations.

Our overarching goals were to work with iPads as mobile technologies in teacher education situations to enhance the teaching and learning for our students. In particular, we aimed to explore how technologies increased our assessment repertoires and afforded possible theoretical and practical forms of assessment and feedback through a variety of means. Examples of these included the use of visual representations (e.g.

photo and video), technology-aided commentary (e.g. via Piazza synchronously or logs, blogs, and twitter), and/or audio recordings for self-review.

iPads, mobile learning and teacher education

Our research on using iPads helps to inform our practice in teacher education. Myers (2002) suggests that two broad approaches to teaching are dominant in teacher education. The first is based around the traditional lecture, where the pedagogy enacted is one of "telling" students the key information they are expected to learn. The second is based around modelling good practice, where the pedagogy enacted is "demonstrating" to students the key information they are expected to learn. Both approaches are often used interchangeably throughout teacher education courses. In our view, both are problematic because they are based on the assumption that teaching and learning are different activities connected through a process of transmitting knowledge from the teacher to be acquired by the student. It also assumes that the more experienced teacher educator is capable of communicating key information to novices in the profession. Teaching in this way assumes that knowledge about teaching can be distilled from the context of teaching, refined and taught to learners as though it was an object that is capable of being passed around (Britzman, 1991). This further assumes that the learner can come to know the teaching world as the teacher does.

The shift away from teaching as transmission draws on new understandings from a range of different disciplinary areas about how teachers learn and develop their teaching. For example, constructivists have stressed the importance of seeing learning as an active process of interpreting new knowledge and experience in light of learners' past experiences and recognising the influence of their existing beliefs to modify and shape learning (Tillema & Knol, 1997). Sociocultural theories have focussed attention on the situated nature of settings in which people learn and how these enable and constrain learning as a function of working competently with the practices of that setting (Greeno, 2006; Lave & Wenger, 1991; Putnam & Borko, 2000). Other studies have focussed on the experiential nature of learning to teach and on how biography, discourse and identity shape the individual trajectories students take in teacher education programmes (Atkinson, 2004; Ovens & Tinning, 2009). Collectively, the

contribution from these multiple perspectives has been to challenge the underlying assumptions of teaching as transmission and provide the rationale for rethinking the nature of teaching in teacher education from one of acquisition to one of reflective participation in meaningful communities of practice. As teachers we are challenged to examine how mobile technologies can enable student teachers to engage more meaningfully, authentically and reflectively in these communities of practice.

The use of mobile technologies, such as iPads, does not alone ensure teachers move away from transmission style teaching. However, their use can provide a catalyst for significant, powerful shifts in classroom climate, pedagogy and learning (Davis, 2003). Specifically, they afford the potential to engage and retain learners (de Jong, Specht & Koper, 2008; Wang, Liang, Liu, Ko, & Chan, 2001), improve communication (Shim & Shim, 2001; Jones, Connolly, Gera, & Read, 2001), increase student participation and motivation (Roschelle, 2003; Jones, *et al.,* 2001), create community atmosphere in the classroom (Davis, 2003) and support the sharing of alternative points of view (Scardamalia & Bereiter, 2006). In this way, they create a mechanism through which the lesson can be restructured and alternative forms of pedagogy emerge to be explored.

Methodology

In this research project we have used a collaborative inquiry approach to "describe, interpret and discover" (Cochran-Smith, 2008, p. 275) our pedagogies. Such an approach can raise concerns that those doing the research are the same as those being researched. Concerns of this nature typically centre on issues of objectivity and the generalisability of findings. To address these concerns we situate ourselves as teacher-researchers, endeavouring to meet the dual demands of producing knowledge and informing "the complex and ever-changing nature of teaching" (Gitlin, Peck, Aposhian, Hadley, & Porter, 2002, p. 313). As teacher-researchers we take an inquiry stance towards our own teaching, deriving research questions from our own practice and taking responsibility for implementing new understandings. By working together as a collective, our actions as teachers can be shared with others in the group.

Over the first year of the project, in addition to meeting regularly, we have kept journals and sought feedback, through questionnaires and focus group interviews, from the

students involved. Since most of the meetings have been for organisational purposes and the focus group interviews with students are still ongoing, we felt there was a need to provoke and concentrate our tacit knowledge of the project to this point. To this end, we decided to each write a "survival memo" that could be collectively shared in a group meeting (Brookfield, 1995). Each person was instructed to write for no more than 30 minutes as honestly as they could, imagining the following scenario:

> This is your last day in your current job. Your replacement is coming in tomorrow to begin work, but you will have left the building by the time she arrives. You want as much as possible to help your replacement avoid the pain and stress you endured as you learned your practice. So you decide to write a memo to your successor outlining your most essential survival advice [about using mobile technology]. This memo contains your best take on what a teacher needs to know [about mobile technology] to survive in this job, what she needs to be able to do [with mobile technology] to stay afloat, what you know now that you wish someone had told you as you began work [with mobile technology] in this position and, things your successor must make sure she avoids thinking, doing or assuming [about using mobile technology] (ibid pp 78–79).

As a group we shared our survival memos, comparing and contrasting what was written, often acknowledging or laughing at the clichés and metaphors used to convey our insights framed as advice. The recall of our experiences in this way has captured traces of our perceptions in relation to teaching with technology. We have discussed these stories; examined how events were narrated; challenged and offered alternative interpretations of these; and thus reframed our experiences with technology through these self-study conversations (Placier, Pinnegar, Hamilton & Guilfoyle, 2005). This approach enabled our experiences, memos and discussions, to be read, written, and thought of differently as research data, becoming a "montage" in which "several different images are superimposed onto one another" (Denzin & Lincoln, 2003, p. 6). In this way, our dialogue acted as a basis for "checking ideas, developing evidence, and creating an authoritative space from which to make claims for assertions for action or understanding" (Placier, et al, 2005, p. 61).

In the following discussion, we draw on our survival memos, and the subsequent discussion, link these to the wider literature, and in so doing, make key aspects of our pedagogy explicit and available for critique. We present an analysis of the frustrations and possibilities that the use of iPads has provided us as lecturers in the first iteration of this project.

Initial frustrations

Writing a "survival memo" helped us focus on the practical, immediate advice for the incoming teacher to succeed teaching with iPads. As Kukulska-Hulme (2012) suggests, it is common for those beginning to use mobile technologies in their teaching to see it as a daunting and frustrating proposition. While this has been similar for us, writing memos as "advice" was a productive way of making the normally tacit and hidden learnings associated with starting to use iPads more visible. For example, in response to what the teacher would need to know starting the journey prompted some of us to make the following comments:

> The key thing you need to know is how unreliable and frustrating it [teaching with iPads] is. Our infrastructure seems to be built in an ad hoc way, largely quick solutions built on quick solutions. Consequently, there is not a good coverage, coherence of systems or support.

> Don't ever assume that you are going to be able to connect wirelessly to the internet, wherever you are teaching!

> The infrastructure in the Faculty is inadequate and is <u>one</u> of the biggest barriers to adopting technology.

> There seems to be very few resources and support available to assist you, and what systems that are available, are not designed to make them easy to access.

> It is ridiculously complicated and cumbersome to get 30 iPads from one end of the campus to the other for an 8.30am lecture.

Shim and Shim (2001) similarly found that the elements that caused the most frustration, and the most commonly cited barrier in their study, was inadequate facilities and connectivity, followed by lack of student exposure, training and background, difficulty in developing curricula and lack of faculty exposure, training and background. As our discussions revealed, issues to do with connectivity, accessibility, support, and proficiency where not just issues that caused frustration, but were situations that we learnt to deal with or work around.

For some members of the project team, these issues were addressed by having access to newly refurbished "large interactive teaching spaces" which were designed to ensure good connectivity. However, as we found, even in well-equipped rooms you could not assume that the students had the technological skills and literacy to use the iPads effectively. This led to more insights:

> Using mobile technology then adds another "ability" that you need to cope with in your mixed ability class

> Unless you can differentiate the instruction to accommodate the various competencies, you will lose a lot of instructional time

> Don't expect the students will be digital natives, that they will be more competent than you or that they will even care to use technology as much as we are telling them they need to.

> I noticed that most of them have smartphones and sometimes prefer to use them because they are more familiar with them (to take pictures, for example)

We found that students started each course with a range of competencies and experience with iPads. In some cases, students owned iPads and were able to assist others. However, surveying students' digital skills at the start of courses revealed that most needed some support when working with iPads. Cochrane (2010) found similar results, with few students using mobile tools at home in the same manner that they would be expected to use them in the classroom. This meant that many students were unfamiliar with how to use them to facilitate their learning. We also had students who used other

platforms and expressed dislike for having to work with the iPad. All these compounding levels of ability and use of the technology made us aware of the need to provide support for the students outside of class so that valuable course time was not used in instructing students in the basics of technology.

We also recognised our own proficiency with iPads and technology in general played a key role in how we planned for and used technology in our classrooms. What became important was not just having the iPads available in the class, but being able to do a myriad of additional tasks such as being able to log in to wireless or LAN systems, being able to assist students to log on, being able to push information to different displays and to switch between presentation formats. As Constanza noted in her memo to the incoming teacher,

> Minimal tech requirements to know: how to take pictures and videos and send them, email them and upload them to different places including YouTube. You will need to register to a lot of sites so I recommend that you create a dummy gmail only for this. I encourage students to be savvy and safe about it using a pseudonym and names that they'll remember (sensible names as future teachers). I also suggest having storage in the cloud via Google or Dropbox. Tools to provide feedback to me are Padlets, Voice memos, Socrative, Piazza. Tools to teach lessons to themselves: Educreations, Google Docs, Voicethread. Tools to develop interactive language lessons (besides the previous ones): Edmodo, Voki, Glogster.

A level of proficiency also helps build the confidence and flexibility required to problem solve and integrate iPads into teaching. The list of advice from the rest of the group included:

> You need to be able to use, with confidence and ease, any technology that you try with a class.

> You need to have used the program, platform, app, sufficiently that you will be familiar with, and able to resolve, the kinds of problems the students are likely to encounter. If this level of familiarity is not possible in the time you have, you need

to have someone else in the room (or available via email if the task is an out of class task) to support any student who needs it.

You need to be totally familiar with and competent in using the set-up in the room you are teaching in.

You need to be able to problem solve your way through technology you don't fully understand.

You need to be able to ask for help.

Along with time invested to learn how to use the iPad, developing this level of proficiency required time as did planning for optimal integration of technology into teaching:

It will take much longer than you think to become adept and confident in using the technology. It will be a steep learning curve – no matter where you are on the curve at the moment.

The planning required to deliver the content taking full advantage of the iPads was enormous. I clearly underestimated it and needed a lot of time before I felt the lesson was ready.

Such advice seems to be supported in other research. For example, the greatest barrier to use amongst the teaching population at The Open University in the UK was reported as being the amount of time and effort required to become savvy in the use of mobile technologies (Kukulska-Hulme, 2012). In a related study of academic experience with mobile technologies, the major barrier in the uptake and integration of mobile technologies was a lack of personal experience with mobile learning (Kukulska-Hulme & Pettit, 2008). This lack of personal experience was echoed by lecturers at Victoria University in Wellington who felt that they did not have time to become familiar with new technologies (Cochrane, 2012), while others felt that the effort required to introduce and then maintain mobile learning activities was too great (Traxler, 2005).

When addressing this concern, our discussions revealed two important solutions. Firstly, it was seen as important to "play" with the iPads in your own time to build up your knowledge of how they can be used, and practice solving the various issues that inevitably arise. Secondly, and probably reflecting the experience of the group as teachers, each of us described the necessity of always having a back-up plan:

> Sometimes using technology is more trouble than it is worth. If you can always have a back-up plan that doesn't rely on technology you will sleep better at night

> Always have a back-up plan because if anything can go wrong it will go wrong when you are in front of a lecture theatre and the students are all watching you make a right fool of yourself trying to get a program to load.

> You always need to have a plan B that does not require technology – there are likely to be times when the systems are down or when what you intended to do simply does not work as you intended it to.

> You need to be flexible, but be fully prepared.

Embracing possibilities

Generally, research shows that teachers feel positive about the prospect of introducing mobile technologies into their classrooms (Kukulska-Hulme, 2012). They begin to explore how technology can support their teaching. Certainly, 90% of teachers in a study of 100 Palm-equipped classrooms reported handhelds were effective instructional tools with potential to impact student learning positively across curricular topics and instructional activities (Vahey & Crawford, 2002). Underpinning this is a belief that learning could be enhanced through the introduction of mobile technology due to the commonalities between mobile devices and the nature of learning itself (Nyiri, 2002). Indeed in our practice the technology was used to enhance reflective practice and gather evidence.

Perhaps the strongest message coming through from our discussions is that while iPads afford opportunities for enhancing students' learning, we need to acknowledge that

technologies need to be viewed as a tool. In other words, our aim in using iPads was not to teach students how to use them to connect, make presentations or network, but to use them to facilitate each individual student's journey of learning how to teach. Our memos contain many comments to this effect:

> Always start with a goal and then see what technology can best augment, modify or fundamentally redesign the learning experiences to meet this goal.

> Pedagogy must always remain first and foremost, with technology as the tools for learning

> The goal is not to have students learn about technology, but to have them using technology to learn something.

> Take small steps confidently and know the direction you want your teaching to go, and where the learners might go… you can't control the learning that will take place but you can set up signposts to help direct the direction you think it might go.

> It's better to concentrate on what the tool does and how it may help you achieve your goal.

Our conversation demonstrates that one of our implicit goals is to teach students to be versatile, up to date, flexible, open to trying things, adaptable and most importantly critical about what to use, when to use it and understand **why** they are using technology. We want them to see that technology brings a lot to teaching and learning through enhancing interactivity, collaboration, possibility to access resources in the target age group and subject area. The bottom line though is that it is not about the technology, but about using the technology to meet your goals as a teacher. As Rena said:

> You need to be able to confidently answer the question, "Why am I doing this?" Technology for its own sake, if it does not fulfil a specific purpose in your teaching, can be futile and disruptive. If the technology is simply substituting or modifying an existing task, it may well take longer and be less effective than "what you have

always done" (for example, doing a brainstorm on an iPad rather than with pen and paper). If the students can just as easily, or more easily, achieve the task without the technology, it is probably not worth using. However, if your use of technology is allowing you to modify or redesign a task completely, in a way that is not possible without the technology, the cognitive and affective benefits can be significant and make it all worthwhile.

A variety of benefits have been noted for using iPads and other mobile technologies. For example, when 98 faculty members at a large private university in the northeast of the United States were asked for their opinion on the introduction of mobile learning in their tertiary institution, the majority felt that the greatest gain to be made was in improved communication (Shim & Shim, 2001). In fact, they believed that mobile technology use would improve student–teacher communication more than it would improve student learning or faculty teaching. However, in our case, iPads were introduced as a teaching tool and their benefits to teaching and learning became increasingly apparent over the duration of the semester. In a very real sense, teaching with iPads has made each of us rethink how we teach. This is consistent with the theme of a culture of continuous learning for teachers which emerged in the report by Bolstad et al. (2012) on supporting future-oriented learning and teaching. At this stage, these reflections have not unduly changed our teaching philosophies, but have challenged us to rethink the way we structure the class, the learning tasks that students undertake and the possibilities for assessing what they know. As Constanza commented:

> If I think of other classes where I don't have the iPads, this class looks different because of the iPads. It may be because of the physical layout (long classroom with tables set for group work and rolling chairs) or because of my millimetric planning, but I feel it to be less teacher-centred and more active. However, I've noticed that students have a harder time attending to different things at the same time. The iPads are definitely distracting especially at the beginning, but they also provide opportunities for having a lot of immediate information and resources.

We have become more deliberate in everything we do during the lecture, more conscious of the time and more aware of the importance of instructions (ironic given

that this is the same message we teach to student teachers). We have had to relearn this deliberation through experience, not just because there are new and different technologies but also because technologies afford new learning opportunities. An example of this was shared by Alan from his journal:

> During a tutorial with the second-year students I divided the class into groups and gave each group a task of discussing a component of the vision statement of the NZ curriculum. Realising that I had one group left over, I gave them the task of critiquing the whole statement and commenting on what may be missing. When this group reported back … what really impressed me were: firstly, that they had gone onto the Ministry of Ed website and found the full vision statement. Secondly, they had then compared this to the vision for the England Curriculum (recognising that this would have been written by another group of people involved in long discussions). By being able to contrast the two, they were able to highlight the differences and possible missing aspects. Their summary was very well informed. As a bonus, [the reporter for the group] said that she had compiled all this on a page and had uploaded it to the class Facebook page. I was really impressed with how well they had done this task, the critical thinking involved and resourcefulness to access the information to help with the task.

Conclusions

This preliminary analysis of our use of mobile technology in a tertiary institution has highlighted that the journey we are on has taken a similar path to others as reported in the literature. Furthermore, our journeys have shared many commonalities with each other's, regardless of the context, programme and physical teaching spaces. We have noted our frustrations when the infrastructure is inadequate to support optimal access and use of technology, a typical barrier that early adopters of technology face in their everyday practice, yet one over which they have minimal control.

Developing the resilience and flexibility to integrate technology into pedagogical practices is an often overlooked aspect of the learning involved for teachers. In our experience, it depends on feeling confident of our use of the technology; particularly in the sense of being able to solve the various technological problems before taking

advantage of the possible learning opportunities it affords. As experienced teachers we suggest this only comes through spending many hours "playing" with the technology outside of normal teaching time and always having a plan B. Both of these demand extra time of us as teachers – even, for some of us, taking two and three times as long to prepare a session as it is to teach it. However, in line with our commitment to practice powerful pedagogies, we have little option but to invest this time at this stage.

Importantly, what this early work has revealed to us is the ongoing challenge to integrate new technologies while not limiting the potential of what can be achieved by focussing too much on the tool itself. After all, Clandinin (2010) observes: "Our work is not to create spaces that educate us for fixed identities, fixed stories to live by. It is to create education spaces in which teachers can compose stories to live by that allow them to shift who they are, and are becoming …" (p. 281). We are, first and foremost, teaching about teaching. Teaching in the 21st century will almost definitely become more and more dependent on technology yet expert teachers will always be defined by their expertise in the teaching role rather than technical prowess. At the moment it is important to see that teaching co-evolves with the technological infrastructure and mobile tools available. While we may be initially frustrated by our inability to upskill ourselves in the available technology, the key challenge will remain as the need to constantly adapt and evolve our pedagogies to ensure that high quality learning remains the key outcome.

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