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Mobilising teacher education: A study of a professional learning community.

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ABSTRACT

This paper reports on a study of a community of university educators that investigated the introduction of mobile technologies into their learning and teaching. The study was conducted by a subgroup of that community. Given the ubiquity of mobile devices, members of the community felt we needed to develop expertise in mobile learning so that we could incorporate it into our teaching. We studied our own learning, supported by a critical friend who evaluated the community's functioning and activities, providing valuable feedback. Activities of this group were informed by and focused on: development of awareness of the potential of mobile devices for learning; construction of action plans within the community; and implementation of these plans. They also included investigating best practice approaches by interviewing experts in the field, exploring the literature on mobile learning and then initiating and testing some mobile learning pedagogies in the context of our own teacher education subjects. The community met regularly to discuss emerging issues and applications. The paper shares some of the findings gained from studying the community, and discusses the challenges and constraints that were experienced. We conclude with recommendations for professional learning communities aiming to learn about technology-mediated teaching practices.

KEYWORDS

Mobile learning, community of practice, teacher education, higher education, community of learners, teacher learning, professional learning community.

Background

Mobile devices have been evolving and expanding rapidly with increasing numbers of features being added over the past few years. They are now able to be used for a variety of purposes previously the domain of powerful computers. As a result, mobile learning appears to offer numerous opportunities as well as challenges in higher and teacher education.

Given the ubiquity of mobile devices, an imperative has arisen for teacher educators, and higher educators more generally, to familiarise themselves with the affordances of mobile technologies for learning so that they are able to capitalise on their students' usage of these devices. In particular, teacher educators need to be aware of the potential of mobile devices as learning tools in schools. Teacher educators need to be familiar with possible uses of mobile

technologies for learning, be ready to evaluate and critique the learning activities made possible with these devices, and then model effective teaching with such devices to their students.

Mobile learning literature

Mobile devices have evolved rapidly in recent years to the point where they are now the "next form of portable computer" (Johnson, Levine, and Smith 2009). They are considerably smaller and less expensive than laptops, yet have powerful multimedia, social networking, communication and geo-location capabilities and are becoming increasingly embedded, ubiquitous and networked (Johnson, Levine, and Smith 2009; Naismith, Lonsdale, Vavoula and Sharples 2004). Educators all over the world are investigating the affordances of these devices and ways to use mobile technologies that will "transform learning into a seamless part of daily life, to the point where it is not recognized as learning at all" (Naismith et al., 2004, p5).

Like other recent technological developments, there is considerable interest in exploiting the huge appeal and availability of mobile devices for their pedagogical use. The uses can range from a simple transmission of information model (e.g. from teacher to student) to more complex, specific uses as cognitive tools in authentic learning environments. (Aubusson, Schuck, and Burden 2009)

Mobile uses in higher education

Universities are constantly looking for innovative ways to improve student learning experiences. In the context of higher education, the purpose of initiating teaching innovations has been to 'increase the quality of learning, the productivity of learning, while at the same time increasing access to learning' (Alexander, 2006, p.22). Mobile technologies have the potential to be

employed innovatively as powerful learning tools in higher education. Their personal and portable nature would appear to be enabling of learning that is integrated with everyday life.

Some examples of the ways that various universities across the world are exploring the use of mobile technologies in innovative ways include mobile broadband applications used across various disciplines such as engineering and social sciences to enhance teaching, learning and creative expression (NMC & Educause, 2008). Motiwalla (2007) notes several projects implemented in higher education, such as use of SMS for collaborative student projects or for communication on remote field trips. Motiwalla makes a case for the value of mobile devices for enhancing learning and cites studies by Zhu and Kaplan (2002) and Palloff and Pratt (2001) which indicate the way mobile technologies are suited for learner-centred instruction and for convenience in place and time for learning. Kearney, Schuck, Burden and Aubusson (2012) indicate that there are several features of m-learning that make it especially valuable for teaching. These include the ability to develop authentic tasks, to learn in a variety of spaces, and the immediacy and connectivity available through mobile devices. Motiwalla (2007) argues that given the popularity and support for such devices amongst students in higher education, it would be foolish not to exploit their potential for learning.

Mobile technologies have become an integral component of several learning activities that are project-based involving blogging, polling, and video podcasts, as in the case of Montclair State University in the US (NMC and Educause 2008). Similarly, mobile phones can be used as data collection devices for fieldwork in the case of social sciences and related disciplines. The photographs captured allows for rich information to be stored and shared and even sent directly to the course instructor for feedback. Another example concerns two university faculties who developed a program that enables ‘classroom-bound students to take virtual field

trips' leading to learning and discussion (www.pocketvirtualworlds.com as cited in NMC and Educause, 2008).

Engaging students and instant feedback during lectures has become popular through the use of SMS (short messaging service) applications with mobile phones (for example, Scornavacca, Huff and Marshall 2009). Mobile technology also provides opportunities for university students to undertake joint projects with the local community. An example of this can be found at the University of Oregon where students use 'mobile devices to collaborate on projects with the community to work and develop suitable resources which are beneficial to the community members' (NMC and Educause, 2008). Many universities are also undertaking research projects in collaboration with companies to better understand how technology can be effectively used to improve student learning and experience. For example, two Australian universities used handheld technologies to explore and develop innovative applications for these technologies in education (Watson and White 2006, p.27). In the US, Rutgers University in a bid to enhance student learning through the use of handheld computing devices, provides links to recommended hardware and software and engages in research projects on handheld computing (p.15). Students at Duke university have been using the iPod device to 'catch quotes, record and review lectures, record and analyze news events, speed up data collection in labs, assist in language learning and to illustrate engineering principles through the use of iTunes' (p.24). A pan-European m-learning project developed prototype products and services that targeted young adults and focused on learning themes and 'bite-sized' modules to assist them in the development of lifelong learning objectives (p.23). When academics integrate multiple uses of podcasting into their practice, this has been shown to have benefits for the learning of students (Abdous, Camarena and Facer 2009).

Given the value that mobile learning has for higher education students, it becomes critical for educators to become aware of the learning potential of mobile devices and to learn how to incorporate such technologies into their teaching. It is crucial for academics to be able to develop pedagogically sound mobile learning environments (Singh 2011).This becomes even more important for teacher educators, charged with the responsibility of preparing teachers for future school classes. Historically, teachers appear to be reluctant to embrace new technologies in their teaching (Cuban, Kirkpatrick, and Peck 2001; Ertmer 2005). Teacher education programs, therefore, have an important role to play in supporting beginning teachers to use new technologies as appropriate. However, for teacher educators to be able to assume such roles, they themselves need to be competent and confident with emerging technologies and know how to use these appropriately in their teacher education classes. Therefore, it is useful to consider how best to support teacher educators to embrace new technologies in their teaching where this will enhance their students' learning.

While mobile devices appear to have been used in a variety of ways, as indicated in the examples discussed above, it is clear that higher educators need support in identifying the most effective technologies for use in their teaching; and for managing the overwhelming amount of information that exists about learning with emerging technologies (Ingerman, Yang, and Educause 2010). Academic units created to instruct academics in the use of new technologies often play an important role in this. However, there are few discussions of how higher educators can develop their own understanding of these devices for learning and teaching, as they strive to evaluate and incorporate these devices into their teaching in higher education. This paper discusses the learning that occurred in a community of higher educators, which was endeavouring to investigate the affordances of mobile devices for learning and teaching.

Learning collaboratively in a community

One way of supporting educators to introduce appropriate use of new technologies into their teaching would appear to be through membership of a professional learning community (PLC). A PLC is similar to a community of practice (CoP) in that it is formed to investigate and learn collaboratively. A professional learning community needs to have a shared perspective and a focus on professional growth (Little 2002). These characteristics are similar to those embedded in a CoP. Wenger, White and Smith (2009) propose that a community of practice has three fundamental dimensions. These are the domain of inquiry, in which a central focus on a particular topic is shared in the community. The second is practice; communities engage in activities that develop a shared practice. Third is the community dimension, in which the members participate together in meaningful learning, and in which the elements of trust, mutual engagement and a sharing of roles occur. The first two dimensions are similar to those identified by Little, but the third element identifies a valuable aspect of the CoP; the community aspect with its relational elements.

Bielaczyc and Collins (1999) identify the essential aspect of a PLC as the collaborative pursuit of learning. They suggest four aspects of a PLC, three of which align with Wenger et al.'s dimensions. It is noteworthy that they include diversity as an important aspect of the community. The four aspects Bielaczyc and Collins suggest are: (1) diversity of expertise among the PLC's members, (2) a shared objective of collectively advancing the community's knowledge and skills, (3) an emphasis on learning and how to learn, and (4) mechanisms for sharing what is learned.

The focus of this study is a PLC which was formed as part of a project with the purpose of supporting teacher educators and other higher educators to understand the potential of mobile learning, assess its appropriateness for their contexts and trial some teaching activities which use mobile devices. This project became known as 'Mobagogy'. This term was used to capture the dual interests of the community in mobile technologies and pedagogy. The project was funded by a university teaching and learning grant which required a community of educators to work together to develop innovative technology-based practices for teaching. This paper focuses on the role of the PLC in supporting the educators' development of practice, with regard to their learning about pedagogy with mobile devices. A critical friend was invited to observe the activity of the PLC and critique the process. The critical friend provided the PLC with feedback from a 'trusted other', as someone able to see aspects of practice that might not have been immediately evident to the members of the PLC (Schuck and Russell 2005). It was anticipated that the PLC would afford support for professional learning in ways similar to those previously reported (Poyas and Smith 2007) in an education CoP. In particular, members expected to learn through conversations with colleagues regarding a common challenge as they shared actions, ideas and feelings arising from their experiences.

Improving student experiences through technology use

It is important that use of new learning technologies in education settings is critiqued and evaluated and that these ICTs are used only if they enhance learning (Watson 2001). Consequently, teacher educators need to be aware of the different affordances for learning of various technologies so they can support their students' understanding of how best to teach with

these tools. Teacher educators have the responsibility to model good practice using ICTs, and to discuss appropriate use of new and emerging technologies with their students.

As with other recent technological developments, there is considerable interest in exploiting the huge appeal and availability of mobile devices for their pedagogical use. However, adoption and implementation of emerging educational technologies by education faculty is not unproblematic. There is some literature on teacher educators learning about and with technology within a community of practice (for example, Dourneen and Matthewman 2009). However, while mobile devices appear to have been used in a variety of ways in higher education as indicated earlier in the paper, there are few discussions about how teacher educators can develop their own understanding of mobile learning as they strive to evaluate and incorporate these devices into their teaching. Even fewer studies discuss the development of understanding about mobile learning through a community of practice or a professional learning community. This article reports on an initial study of a professional learning community of educators who are investigating mobile devices in their teaching. The main research question was: how does a PLC support its members' learning about pedagogy that employs mobile technologies?

Methodology

This section discusses the study's broad methodological approach of design based research (DBR), and details the participants, data collection methods and analysis. The usefulness and applicability of DBR research to study teaching practice has previously been argued (Aubusson, Griffin and Steele 2010). DBR allows us to inquire into complex, authentic systems by testing a theory or conjecture that is manifested in an intervention (Design-Based Research Collective

2003). Accordingly the conjectures to be tested in this study and the intervention in which they were tested are now discussed.

It should be noted that DBR was chosen because the intervention was to be tested and modified, in an authentic setting (Brown 1992), in this case teacher and higher education at an Australian university. Furthermore, in DBR, ongoing data collection provides evidence to inform and improve the process while it is implemented (Design-based Research Collective 2003). Given the exploratory nature of this work where participants were initially uncertain about how, when and where to engage with and use mobile technologies this was considered desirable.

In this study, there were two underpinning conjectures:

- that participation in a professional learning community (PLC) contributes to an enriched understanding of teaching with new technologies (in our case, mobile learning technologies);
- that mobile technologies have potential to make a worthwhile contribution to our teaching.

These conjectures gave rise to the establishment of the intervention: a PLC, which was formed to support teaching and learning with mobile technologies. To investigate the first conjecture, the PLC was studied as indicated below. To investigate the second conjecture, the members of the PLC trialled a variety of mobile technologies in their teaching practices (see section: The Intervention).

The nature of the PLC

Ways of enacting effective professional development and professional learning are diverse and often contested (Prestridge 2009). Mishra and Koehler (2006) suggest that professional learning of teachers with respect to integration of new technologies is a complex task, and therefore needs sustained inquiry. The development of a PLC seems appropriate to support this sustained inquiry. The characteristics of a shared impetus to learn, the collegiality of a community of learners, and the focus of mobile learning would be expected to lead to successful learning outcomes.

Participants in the PLC

The PLC comprised seven teacher educators and, initially, two adult educators at an Australian university. Table 1 below summarises the membership of the PLC.

Field of practice and position in group	**Experience with teaching with mobile technologies**
Teacher educator, Leader of the group, Author of paper	High experience, taught in elearning subjects
Teacher Educator, co-leader of group, author of paper	Low experience with mobile technologies, but high experience of teaching with other technologies and researcher in teacher learning with digital technologies
Teacher Educator, co-	Medium experience with mobile technologies, and medium

leader of group, author of paper	experience of teaching with other technologies, researcher in teacher learning with digital technologies
Teacher Educator	low experience of use of mobile and digital technologies in teaching
Teacher Educator	low experience of use of mobile technologies
Teacher Educator	medium experience of use of mobile technologies, high use of other technologies
Masters student in Teacher Education and part-time lecturer	High level of experience
Adult educator (part-time lecturer)	Very high level of use of Mobile and other technologies in teaching and researcher in learning with digital technologies
Adult educator	Low experience in use of digital technologies in teaching, but researcher in learning with digital technologies

Table 1: Participants in the PLC

A critical friend from the UK was invited to provide advice and feedback to the PLC. While being based in the UK, the critical friend had worked closely with most of the members of the PLC on other projects and has visited the university several times to work with staff. He also contributed to the analysis of the data and the writing of this paper. He was not a member of the PLC during this exploratory intervention but was invited to critique the PLC's activities towards

its conclusion. He was invited because of his expertise in supporting higher education staff to use new technologies and because he was thoroughly acquainted with the context and the members of the community. A critical friend can be most beneficial when he is trusted, deemed to have professional competence, and yet has the distance gained by being an outsider to the culture (Handal 1999). The critical friend fitted all these criteria. He interacted with the PLC through online calls, chats, collaborative document sharing and a face-to-face meeting with some of the PLC members at the conclusion of this initial intervention.

Professional associations and collaborations between many of the PLC members existed prior to the formation of this project. However, *Mobagogy* provided impetus for increased formality of community processes and the development of a social system for knowledge production and exchange. All members of the PLC had an interest in evaluating the use and benefits of mobile technologies for their teaching. The group consequently applied for support through a university fund for developing teaching using innovative technologies early in 2009 and started the project in July of that year. The funded project ran till the end of 2010, but the community continues to investigate the use of mobile devices for learning to the present day. However, this paper refers to the intervention which ran from May 2009 to November 2010. This PLC developed a program of learning activities and its functioning was studied through the design based research.

The Intervention

The PLCconducted seven types of activities:

1. Meetings: Regular meetings held every 3 or 4 weeks to plan and maintain participation in the project as well as to facilitate discussion of experiences in trial of mobile technologies in our teaching.
2. Immersion: Participation in three m-learning workshops spread throughout the duration of the project. Provision of an iPod Touch to explore the potential of the device. Participants had varied access to other mobile technologies, such as smartphones.
3. Interviews with experts at the start of the project to inform participant thinking about m-learning, its potential and opportunities relevant to current participant practices. A research assistant used an interview schedule developed by the members of the PLC to interview six experts in the field of mobile learning who are well known for their innovative teaching with mobile technologies. Their elicited views were discussed in group meetings and helped shape our collective understanding of mobile learning phenomena. The interviews informed the PLC: providing advice on the advantages of mobile learning; outlining their use in a range of contexts; and forewarning us of technical and ethical constraints.
4. Support from a 'Mobagogy buddy', in a buddy mentor system. Several buddy alliances developed informally in the PLC as members sought help from each other in using mobile devices for their teaching.
5. Individual action plans trialing the use of mobile devices in our teaching. The action plans were developed at the start of the project, after the first workshop. They are too numerous and elaborate to outline here. Examples of selected actions are summarised in Table 2.

Examples of teaching trials with mobile devices	**Details (from action plans)**

Evaluation and use of smartphone applications (‘apps’). May 2009 – March 2010)	Investigation of usable apps by teacher educators and their students. This subsequently expanded to creation of subject-specific apps.
Sharing through micro-blogging. (Sept 2009)	Trial of micro-blogging to support student teachers in their school-based practicum.
Information access via podcasts and screencasts (July 2009-November 2009)	Three members of the CoP also experimented with podcasts for use in mobile learning settings, such as the Sydney Botanical Gardens.
Digital capture of events and images. (July 2009-November 2009)	Students of one member of the PLC video recorded and photographed artefacts or activities and uploaded these to a shared website.
Class-based surveys. (July 2009-November 2009)	A number of PLC members had their students vote or provide feedback through text messages and ‘quick-response’ voting applications.

Table 2: Examples of activities implemented by Mobagogy members

6. Participation and presentation at national and international conferences in the later part of the project. Members of the group collaborated in the preparation of and delivery of a workshop for others and we presented at local and international conferences. These activities promoted both the development and clarification of an emerging theoretical

framework for mobile learning (authors 2010, 2012) as well as the identification of pedagogical affordances and constraints in different higher education contexts.

Throughout this intervention a variety of strategies were used to promote collaborative critical reflection (Ghaye and Ghaye 1998). These included reports on experiences, and shared discussions on a community blog and in face to face meetings. Ideas, reflections and 'works in progress' were shared, with invitations for responses, by means such as collaborative web-based documents and group emails.

Data collection and analysis

The authors collected data for the study that were primarily aimed at exploring both the intervention as actually enacted, and any changes in understanding that had arisen during the conduct of the study, as recommended by Hoadly (2004) for DBR studies. Data sources included:

- written materials arising from the project activities and communication such as PLC blogs, emails, meeting notes, recordings of discussions of procedural matters and collaborative reflections, individual reflections, shared documents;
- artefacts resulting from the enactment of the action plans, such as podcasts, student blogs
- discussions with the critical friend about perceptions of learning and progress in the project
- the critical friend's evaluation and critique of the project.

Data stemming from the sources in the first two dot points were analysed by the three authors of this paper who were PLC members, through thematic analysis (Bryman 2004) to identify recurring themes. We read the data, discussed the categories we had each identified and noted what they told us about the project. Differences in interpretation were resolved by negotiation among the three author-researchers, and in consultation with other members of the PLC. Data interpretations were examined by the critical friend to provide an external check. Relevant criteria for rigour and quality of the research were identified as being the dependability of the data (Merriam 1998), the credibility and trustworthiness of the research (Johnson 1997) and possibility of transferability provided by the research description (Lincoln and Guba 1985). The critical friend's examination of the analysis indicated the presence of these criteria. The data analysis by multiple researchers, member checking by members of the PLC and scrutiny of the analysis by the critical friend contributed to confidence in the verisimilitude of the interpretations.

The classification of like themes gave rise to broad categories such as types of reflection; iterative cycles (eg, action - problem or puzzling event - new perspective - new action); obstacles inhibiting progress; influences promoting progress; perceptions of m-learning; attributes of activity (eg, whether or not it involved contextualised experiences, work place locations); communication with others (eg, information access, short or long duration, sustained or brief engagement); personal and professional responses, likes and dislikes.

A second analysis of the data allowed the researchers to select from the above categories to identify those themes that provided insights about the two conjectures in this paper. Those data pertinent to the conjectures were highlighted for discussion in this paper. In the next section, outcomes related to these conjectures are presented and critiqued.

Results

Testing our conjecture about the contribution of mobile learning to our teaching

Interviewing international experts in this field was an initial activity that allowed the PLC to broaden its understandings gained from the mobile learning literature and introduce an education perspective by probing experts' practices through a set of directed questions. Interviewees referred to the following advantages of mobile learning: flexibility, convenience, user-friendliness, enhanced ability to undertake complex tasks, enhanced communication, opportunities for group learning and more sharing and interactions with local and global communities. They saw opportunities for contextualisation and personalisation of learning tasks, and support of project-based and inquiry-based learning approaches. The ubiquitous nature of mobile devices was mentioned by all respondents and one expert believed that mobile devices in general are acting as a conduit to technology use in higher education institutions.

A range of examples in both formal and informal teaching contexts was described in the interviews. As teacher educators espousing student-centric pedagogies in our classes, we became very interested in numerous examples focusing on user-generated media projects, especially learner-generated video. These included creation of digital narratives; capturing media, making a movie and celebrating it through a 'mobile phone film festival'; and video recording science phenomena and editing a presentation. Other examples involving content generation included gathering of media to create and distribute a podcast; recording an interview; capturing and uploading photos to a class wiki; (audio and text-based) note taking, concept mapping; blogging

and micro-blogging. More structured, scaffolded experiences also were mentioned, including use of mobile devices to take quizzes and opinion polls (lecture-based).

These and other suggestions were appraised by the members of the PLC and considered for our classes. Different members of the PLC responded in different ways to the expert advice. Some were keen to exploit social connectivity of mobile technologies which emphasised dialogue and information exchange. Others were prompted to trial applications of varied sophistication in their classes, with some success. There was general agreement that teacher education should develop prospective teachers' new digital literacy skills to help leverage mobile learning in education. The data from the experts provided our community with valuable insights into the affordances of mobile devices.

Our individual plans of action included a number of teaching activities informed by our community activities (see Table 2). Space only permits us to discuss one of these trials in any depth, with regard to our conjecture that mobile learning has potential to contribute to our teaching. This section describes how two members of the PLC investigated micro-blogging to support their student teachers in their school-based practicum (September 2009). Reflection on this trial within the PLC helped community members develop critical awareness of mobile learning experiences.

The micro-blogging trial was conducted by the two staff members with ten volunteer pre-service teachers. The purpose was for these student teachers to use Twitter to share their views and network with other prospective teachers and two staff from the community during their school-based practicum. Intended foci of 'tweets' included: reflections on their own professional learning as prospective teachers; sharing interesting teaching experiences or artefacts (lesson plans, student work, photos from the field etc.); sharing interesting teaching resources and asking

pertinent questions. Participants labelled their posts with a nominated group hashtag and followed all posts via this class tag. The names of their schools and the names of children and staff remained anonymous at all times.

The exercise was evaluated by the two PLC members using artefact analysis (the Twittter feed) and a 30 minute interview with a sample of three student teachers involved in the trial. Posts (or 'tweets') were generally thought-provoking and as the trial progressed, they contained interesting photographs of classroom artefacts (e.g. students' work). Students generally liked the simplicity of micro-blogging communications as well as its convenience and immediacy, compared to traditional asynchronous discussion boards. However, they were reluctant to react to others' tweets and the 140-character limit imposed by Twitter generally restricted meaningful discourse.

This trial indicated that the simplicity and networking aspects of services like Twitter make micro-blogging an interesting but not necessarily effective professional m-learning activity during field-based experiences. Students involved in this exercise were certainly engaged 'directly in the professional community' and in this way they were following a participation model of authenticity (Radinsky *et al.* 2001). Also, a 'convenience factor' became significant when the mobile devices were used in the field experience to spontaneously capture media and/or communicate via the network. However, despite these affordances, the degree of social interactivity would have been enhanced with a supplementary discussion forum (e.g. using blog or wiki-based platforms) with scope for more in-depth communications. Indeed, we felt that this particular trial emphasised the crucial role of quality dialogue in any customised mobile learning environment.

In general, this conjecture about the value of mobile learning was supported by the activities of the group, but there was a clear indication in the data, that PLC members would benefit from greater availability of mobile devices, and more pedagogical support in integrating them into their classes.

Testing our conjecture about the value of participation in a PLC

We tested our conjecture about the value of learning in the PLC in this study: we considered how well the PLC worked; what features made it successful; what features constrained its operation; and what changes were necessary for its continued functioning. The community met on a regular basis to share their activities and to reflect on where these activities fitted in our theorising about mobile learning. Many of the usual barriers and obstacles that operate in developing e-learning environments occurred in this project.

It is noteworthy that although the PLC concerned the use of mobile devices for teaching, we deliberately chose face-to-face communication for interactions in the PLC. This was partially because face-to-face access to each other was readily available and partially because some of the members were constrained by the limitations of the mobile devices they were using. However, given the shared topic of interest driving the PLC, this was a surprising outcome of the project.

Six of the nine community members were located at a suburban campus and based in teacher education. However, three members of the PLC were not at that campus: one academic was based at a campus some 18 km away from the suburban campus. Her domain of teaching was adult education (see Table 1). Two other members were part-time lecturers so were not based at either campus. The ‘core’ group of six who were together on the suburban campus had all worked together on other projects and so were used to sharing and learning together. As well,

these six members were all teacher educators so we had shared goals of wanting to examine mobile technologies' affordances for use by our students, both as pre-service teachers and when they started teaching. This 'core' group attended most or all of the meetings and all of us found the meetings to be useful in a number of ways: we gained new ideas about how to use mobile technologies in our teaching; we learned about each other's practice with the devices; we acted as sounding boards for each other; and the meetings generated enthusiasm, which sustained the project. There is little doubt that belonging to this community was a motivation and support for the professional learning outcomes we were striving to achieve. These six members had a shared perspective, originating from their shared field of endeavour of teacher education. Therefore, the characteristics of shared goals, and shared mechanisms for learning were present for these members.

However, the remaining three members of the PLC appeared to operate on the margins of the PLC. One of the part-time academics (based in adult education) was far more familiar with m-learning than the rest of the community and her role was mainly to support others by offering workshops and sharing her expertise. The other two, while willing participants initially, did not find the support and encouragement offered by the PLC as accessible as those in teacher education, and as a result, their participation decreased over time. They did not attend most of the meetings or interact much with the community, often due to time constraints. This was exacerbated by the lack of shared practice and shared goals, as they were not full-time teacher educators but worked in different domains in the university or had limited opportunities to share practice. Further, as noted earlier, because of the ease of interactions between the six on the suburban campus, the majority of interactions tended to be face-to-face. This pointed to the value of face-to-face interactions but created an additional barrier to participation from those who were

not on the suburban campus. This is perhaps unsurprising in a community where the 'core' members often saw each other in a variety of work and social settings. It highlights the value of personal, face-to-face contact in communities of practice, a surprising consideration when current technologies (ironically, including mobile technologies) enable interaction from a distance with such ease. Consequently, these three members were distanced from the three CoP dimensions (enquiry, practice and community) through their diminishing interest in the domain of mobile learning, lack of shared interest in teacher education practice and especially their positions on the fringes of the community caused by their historical and social isolation from the main group. In this sense, an initial shared goal of enhancing understanding about mobile learning was not sufficient to sustain the community in its entirety.

Those members of the community who were already using mobile technologies in their teaching were happy to share their thoughts and activities with the group. Indeed, it had been anticipated that practices trialed by members of the group would be readily adopted or adapted by others. However, the technological expertise and teaching contexts of members varied. Consequently, while the PLC promoted activity with and reflection on mobile technologies and related pedagogy, specific activities were not always directly transferred across teaching contexts. Instead, knowledge building was encouraged by a shared interest and generalisable views of mobile pedagogy developed through collaborative reflection on vicarious experience, rather than merely by transferring teaching practices from one setting to another. Thus while the community did contain the diversity of skills suggested as important by Bielaczyc and Collins (1999), the lack of a common domain of inquiry prevented that diversity from being exploited to its full potential.

Other typical problems of learning in a community were experienced during the project. Early in the project, one member of the community who was very familiar with all kinds of social networking technologies wanted the group to start a public blog in which to share their experiences. Some members of the group were reluctant to expose their learning to a public audience and requested that the blog be confined to an internal university learning management system.

Time, as always, remained a critical factor, with a number of members of the group unable to achieve the goals they had set for themselves due to competing workload commitments. All of these experiences suggest that such barriers and obstacles need to be considered to promote better learning for the whole community.

Other insights on the functionings of the PLC came from the evaluation and critique provided by our critical friend (see last dot point of the data sources). Critical aspects of this critique are provided here. He raised two central questions regarding the project, which were instructive in provoking the PLC to reframe some of its original thinking:

1. To what extent was this intention, to focus on the pedagogy and not the technology itself, made explicit by the group and how far did all members of the group actually 'buy into' the concept?
2. How far was the Mobagogy project actually focused on mobile usage of the devices, as opposed to mobile learning itself? (Author 4, critical friend evaluation, Feb 2010)

He went on to critique some aspects of the PLC intervention

The reported findings, such as the Twitter exemplar and the tentative attempt to use a public blog to share the community's learning, suggest there were still some elements

of techno-centricism at work here. If the learning, rather than the technology per se, is the primary focus of the group there needs to be a realignment of questions asked. Rather than asking how student teachers might use a mobile technology like Twitter with its limited texting capabilities, the discussion might be approached from the opposite direction, by asking students to consider a range of pedagogical objectives for their subject and then identifying the affordances of technologies like Twitter to fulfill them. In this case student teachers might consider how they could encourage pupils towards brevity and conciseness as learning objectives, in which case the character limit of Twitter (140 characters) would be a potential affordance, hence making it a useful tool in this particular context.

But even this pedagogically principled position in respect of technology use is not without problems. The pedagogical approach described above still requires the teacher (or student teacher in this case) to understand and appreciate the potential affordances of different technologies in order to be able to make the informed pedagogical judgement which is desired. Technological and pedagogical awareness are indivisible at this level of thinking and herein lies another significant challenge which appears to have affected this study group. How do you support a professional learning community focused on mobile learning when the broad levels of understanding and awareness are so disparate? Some members of this study group clearly joined the endeavour with less technological understanding, awareness and experience than others. Did this restrict the activity and effectiveness of the group as a whole and does this imply a minimum level of familiarity and expertise to be necessary before a project such as this can reasonably be expected to flourish?

> Finally, a question about the PLC itself and the claim that this represents an authentic context in which reflective study about mobile learning can take place. Is this actually realistic? How far can a group of academics working in the context of a university faculty actually experience the range of authentic contexts which mobile learning makes possible? What would need to be changed or developed in the future to make the learning more authentic? Should members of the community, for example, be required to participate in capturing media, networking, blogging and microblogging through their mobile devices, as one member of the group suggests, if this is really to replicate the authentic contexts in which student teachers find themselves? *(Critical friend, Feb 2010)*

What was learned in the PLC

The experiences arising from working as part of a PLC in our Mobagogy group have provided vital insights for us to consider when initiating new learning communities. We need to ensure that the three essential characteristics of CoPs (enquiry, practice and community) are not neglected and that members of the community have a common interest and stake in these three aspects.

One issue that has been highlighted in the study is that we need to further explore our understandings of mobile learning, as opposed to mobile usage. We need to explore in more depth the complex nature of mobile learning and its relationship with emerging learning landscapes, including new ways of organising space and time mediated by the affordances of the devices. In this study there was a tendency for some of us to seek opportunities to use mobile devices in our teaching because these devices have seductive features. This initial technocentric

approach enabled us to explore the use of mobile technologies but we need to rather clarify how we want to change the type of learning and teaching which is occurring and then ask how mobile technologies might contribute to such pedagogical change. Our critical friend raised a number of key questions for us to address as we continue our work. The PLC was different from those in which many of us have worked in the past. All of us possess extensive expertise and experience as teachers in higher education and teacher education, however, there was a wide diversity in technological pedagogical knowledge, or TPACK, (Mishra and Koehler 2006) in this PLC. In this group, the focus was on mobile learning and the range of capabilities and associated pedagogical opportunities was large. In previous PLCs in which some of us have operated, there has been sufficient expertise to move quickly through the sharing, trial and exchange of ideas. However, in this PLC it was more difficult because many of us were taking fairly tentative steps in teaching and learning with mobile technologies. In a classical Vygotskian sense we were all trying to learn together but we were operating in different zones of proximal development. Some experienced false starts and there was an uncertainty that made progress slow. Some tried to leap too quickly from familiarisation with mobile devices to more transformational 'appropriation' and 'invention' levels (Dwyer, Ringstaff, and Sandholtz 1991) of integrating technologies in our pedagogy. In these circumstances it would have been advantageous to draw more strategically on expertise beyond the PLC itself; to introduce wider trials of selected applications and practices for shared reflection; and to provide a tighter structure through use of smaller teams with common interests within the PLC.

It may be that in our enthusiasm to work with many colleagues across a large, multi-discipline faculty, we formed a PLC that was too large and diverse to operate as a cohesive team. Not all practices were shared and this quickly led to a lack of participation from the non-teacher

educators. This, combined with a smorgasbord of opportunities for innovation available in mobile technologies, resulted in us finding less common ground for shared reflection.

In current initiatives to gain greater understanding and awareness of mobile learning, we are building on the findings of this study. Furthermore, the commitment to ongoing study ought to inform our understanding of PLCs and indicate how best to further develop and progress learning in such a community.

Recommendations

Informed by our study, the authors have developed understandings of how Mobagogy and similar PLCs focusing on learning how to teach with new technologies might function well. These understandings suggest we need:

- *To immerse group members in the technology use.* Providing authentic group activities mediated by the technology quickly helps familiarise members with and critique their use of the new technology. The initial excitement elicited by these immersion experiences needs to tempered by an awareness of the dangers of being seduced by the functionality of and hype associated with new technologies.
- *To purposefully use the technologies in authentic teaching contexts.* Group members need to use the new technologies in their teaching to explore solutions to existing pedagogical problems. In this way they discover their real value and can begin to explore nuanced pedagogical variations in their technology-mediated teaching approaches. The unique requirements of different subject areas and contexts need to be acknowledged and shared with members.
- *To provide a safe environment for risk-taking.* It is essential that group activities be undertaken in a safe environment. This can be achieved in three ways:

i) *Sharing stories with the group*. Exchanging experiences of technical and pedagogical failures is as important as sharing and celebrating successes;

ii) *Creating sufficient time for group members* to engage in activities. All members need time to develop relevant technical capabilities to a level they aspire to and time to reflect on the use of the target technology in their teaching.

iii) *Providing a 'buddy system'* which allows smaller groups to work with members who have expertise in a different area and are able to support their learning.

- *To participate in scholarly conferences* to gain opportunities to present work to academics from a range of paradigms, in ways that are public and transparent and open for critique.
- *To include a critical friend* familiar with the technology to provide an external perspective on community activities and to bring fresh insights into teaching innovations and their embedding in practice.

Conclusion

The research examined conjectures: firstly, that a professional learning community would enrich understanding of teaching with mobile technologies and secondly, that these technologies would enhance teaching. The findings indicate that progress towards an enriched engagement with m-learning may be promoted by the establishment of a PLC. The existing professional relationships facilitated community formation and enhanced the sense of commitment, risk-taking, shared responsibility and purpose. Each participant progressed in his/her use of mobile devices for teaching and learning.

The findings have provided insights into the community's ongoing learning. Revised interventions began in 2011 and are continuing. The PLC has adapted in nature so that it now is

entirely comprised of teacher educators, with a shared context and broad pedagogy. The critical friend critiqued the way the group tended to initially focus on the mobile devices and their affordances. While an initial stage of familiarization is necessary, the community is now foregrounding its pedagogical aims in investigating the potential of emerging technologies.

We need to remain educationally critical in studying our practice to test proclaimed potentials of new technologies in teacher education. Our critical friend has raised important questions for further investigation as we continue on our learning journey. The opportunities for further synergy and learning offered by PLCs are numerous. As teacher educators and scholars in the field, a priority is to further explore fundamental questions about the unique nature of mobile and contextualised learning (eg, see authors, 2012).

References

Abdous, M., M. Camarena and B. Facer. 2009. MALL technology: use of academic podcasting in the foreign language classroom. ReCALL 21(1): 76–95.

Alexander, S. 2006. Dissemination of innovations: A case study. Proceedings of the 23rd Annual Ascilite Conference: Who's learning? Whose technology?

Aubusson, P, R. Ewing, and G. Hoban. 2009. *Action Learning in Schools: Reframing teachers' professional learning and development.* London: Routledge.

Aubusson, P., J. Griffin, and F. Steele. 2010. A design-based self-study of the development of student reflection in teacher education. *Studying Teacher Education* 6, no. 2: 201-216.

Aubusson, P., S. Schuck, and K. Burden. 2009. Mobile learning for teacher professional learning: Benefits, obstacles and issues. *ALT Journal* 17, no. 3: 233 — 247.

Bielaczyc, K., and A. Collins. 1999. Learning communities in classrooms: A reconceptualization of educational practice. In *Instructional-design theories and models: A new paradigm of instructional theory,* ed. C. Reigeluth, 269-292. Mahwah, NJ: Lawrence Erlbaum Associates.

Brown, A. 1992. Design Experiments: Theoretical and methodological challenges in creating complex interventions in classroom settings. *The Journal of the Learning Sciences* 2, no. 2: 141 – 178.

Bryman, A. 2004. *Social research methods.* 2nd ed. New York: Oxford University Press.

Cuban, L., H. Kirkpatrick, and C. Peck. 2001. High access and low use of technologies in high school classrooms: Explaining an apparent paradox. *American Educational Research Journal* 38, no. 4: 813--834.

Design-Based Research Collective. 2003. Design-based research: An emerging paradigm for educational inquiry. *Educational Researcher* 32, no. 1: 5-8.

Dourneen, J., and S. Matthewman. 2009. Seeing through ICT: Re-viewing student teachers' transformation of practice from university session to school placement. *Studying Teacher Education* 5, no. 1: 45-60.

Dwyer, D., C. Ringstaff, and J. Sandholtz. 1991. Changes in Teachers' Beliefs and Practices in Technology-Rich Classrooms. *Educational Leadership* 48, no. 8: 45-52.

Ertmer, P. A. 2005. Teacher pedagogical beliefs: the final frontier in our quest for technology integration? *Educational Technology Research and Development* 53, no. 4: 25–39.

Ghaye, A., and K. Ghaye. 1998. *Teaching and learning through critical reflective practice*. London: David Fulton.

Handal, G. 1999. Consultation using critical friends. *New Directions for Teaching and Learning* 79: 59-70.

Hoadly, C. M. 2004. Methodological alignment in design-based research. *Educational Psychologist* 39, no. 4: 203 – 212.

Ingerman, B., C. Yang, and 2010 EDUCAUSE current issues committee. 2010. Top-ten IT Issues, 2011. *EDCAUSE Review* 46. Retrieved March 2012 from http://www.educause.edu/EDUCAUSE+Review/EDUCAUSEReviewMagazineVolume46/TopTenITIssues2011/228654

Johnson, L., A. Levine, and R. Smith. 2009. *The 2009 Horizon Report*. Austin, Texas: The New Media Consortium.

Johnson, B. R. (1997). Examining the validity structure of qualitative research. *Education* 118, 3: 282-292.

Kearney, M., S. Schuck, K. Burden, and P. Aubusson. 2012. Viewing mobile learning from a pedagogical perspective. *Research in Learning Technology* 20: 14406 – DOI: 10.3402/rlt.v20i0/14406

Lincoln, YS. & Guba, EG. (1985). *Naturalistic Inquiry*. Newbury Park, CA: Sage Publications.

Little, J. 2002. Locating learning in teachers' communities of practice: Opening up problems of analysis in records of everyday work. *Teaching and Teacher Education* 18, no. 8: 917-946.

Mishra, P., and M.J. Koehler. 2006. Technological Pedagogical Content Knowledge: A new framework for teacher knowledge. *Teachers College Record* 108, no. 6: 1017-1054.

Merriam, S. 1998. *Qualitative research and case study applications in education.* San Francisco: Jossey-Bass.

Motiwalla, L. 2007. Mobile learning: A framework and evaluation.*Computers and Education* 49: 581-596.

Naismith, L., Lonsdale, P., Vavoula, G., & Sharples, M. 2004. Report 11: Literature review of mobile technologies in Learning: Futurelab series. Retrieved July 2009 from http://www.futurelab.org.uk/research/lit_reviews.htm

NMC & Educause. 2008. *The 2008 Horizon Report*. Ca, USA: The New Media Consortium and the Educause Learning Initiative.

Poyas, Y., and K. Smith. 2007. Becoming a community of practice – the blurred identity of clinical faculty teacher educators. *Teacher Development* 11, no. 3: 313-334.

Prestridge, S. 2009. Teachers' talk in professional development activity that supports change in their ICT pedagogical beliefs and practices. *Teacher Development* 13, no. 1: 43-55.

Radinsky, J., L. Bouillion, E. Lento, and L. Gomez. 2001. Mutual benefit partnership: A curricular design for authenticity. *Journal of Curriculum Studies* 33, no. 4: 405-430.

Schuck, S., and T. Russell, T. 2005. Self-Study, Critical Friendship, and the Complexities of Teacher Education. *Studying Teacher Education* 1, no. 2: 107-121.

Scornavacca, E., S. Huff, & S. Marshall. 2009. Mobile phones in the classroom: If you can't beat them, join them. Communications of the ACM, 52 (4).

Singh, M. 2011. M-learning: A new approach to learn better. *International Journal of Education and Allied Sciences* 2, no. 2: 65-72.

Watson, D. 2001. Pedagogy before technology: Re-thinking the relationship between ICT and teaching. *Education and Information Technologies* 6, no. 4: 251-266.

Watson, H., and G. White. 2006. *mLearning in Education – A Summary*. education.au limited.

Wenger, E., N. White, and J. Smith. 2009. *Digital Habitats: Stewarding technology for communities*. Portland, USA: CPsquare.