

# IDENTIFYING AUTHENTIC MOBILE LEARNING IN TEACHER EDUCATION: A DESIGN-BASED APPROACH

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## ABSTRACT

The adoption of mobile technologies in higher education has been variable and inconsistent across the sector. Little is known about how people learn best from mobile devices such as mobile phones, personal digital assistants and portable digital audio players, and yet these are the technologies of choice of a generation of young adults who are proficient and competent in their use. This paper describes a project to explore, implement and document pedagogies that go beyond the use of mobile technologies for information delivery and communication. It describes a design-based approach to researching the use of mobile devices as cognitive tools in the completion of authentic tasks in higher education.

## KEYWORDS

Mobile learning, cognitive tools, design-based research

## 1. INTRODUCTION

While the use of mobile technologies are increasingly part of the social makeup of students entering higher education (Alexander, 2004), their use in learning and teaching remains problematic and largely unexplored. Reimann (nd) reflects this concern when he observes that:

While there is a growing body of literature and research addressing the creation of mobile learning (m-learning) applications, the pedagogy is still based on the classroom learning model and context, basically extensions of teacher-directed learning. There is a gap between the demands for active, autonomous learning in an authentic context and the availability of a technology infrastructure and suitable pedagogical model to support this type of learning. (Reimann, nd)

Experience from using earlier technologies in higher education suggests that finding a suitable pedagogical model is not an easy task, and the technology alone will not guarantee better learning (Wagner, 2005). Along with changes in technologies, conceptions of learning and teaching are also changing. This is cause for concern for many experienced teachers. Many university teachers feel inadequately prepared to deal with emerging technologies knowing that in many cases their students are more technology-competent than they are themselves—the so-called millennial learners. They are faced with students whose learning styles are complex and innovative, students who, according to Dede (2005) are: ‘fluent in multiple media and in virtual settings; experienced at communal learning involving diverse, tacit, and situated experience, with knowledge distributed across a community and a context, as well as within an individual; comfortable learning through a balance among experiential learning, guided mentoring, and collective reflection; and who express themselves through nonlinear, associational webs of representations’ (p. 1). As our understanding of the complexities of learning develops over time, and our beliefs about good teaching change (Watkins & Mortimer, 1999), there is an urgent need to identify those new, distributed pedagogies that integrate the use of mobile technologies in the context of authentic approaches and tasks.

## 2. AUTHENTIC LEARNING

The challenge for teachers in higher education is to align their teaching and learning more substantially with the way learning is achieved in real-life settings, using the preferred tools of the target group, and to base instructional methods on more authentic approaches, such as situated learning (Brown, Collins, & Duguid, 1989; Cobb & Bowers, 1999). In describing authentic learning, Herrington and Oliver (2000) identified nine design characteristics of learning environments, which included:

- authentic contexts that reflect the way the knowledge will be used in real life, that allow for the natural complexity of the real world (e.g., Brown, Collins, & Duguid, 1989)
- authentic activities that are ill-defined, which promote exploration where students find as well as solve the problems, and which allow sustained thinking by exploring topics in depth (e.g., Collins, 1988)
- access to expert performances and the modelling of processes, and which employ the social periphery (legitimate peripheral participation) (e.g., Lave & Wenger, 1991; Collins, Brown, & Newman, 1989;)
- multiple perspectives for students to investigate the learning environment from more than a single perspective, and to ‘criss cross’ the learning environment (e.g., Spiro, et al., 1991)
- reflection to enable abstractions to be formed (e.g., Boud, Keogh, & Walker, 1985; Collins et al., 1988)
- collaborative construction of knowledge (e.g., Hooper, 1992)
- articulation to enable tacit knowledge to be made explicit, and public presentation of argument to enable defence of a position (e.g., Vygotsky, 1978)
- coaching and scaffolding by the teacher at critical times, and where more able partners can support learning (e.g., Brown et al., 1989; Greenfield, 1984; Vygotsky, 1978)
- authentic assessment of learning integrated within the tasks to ensure the assessment is seamlessly integrated with the activity (e.g., Herrington & Herrington, 1998; Reeves & Okey, 1996).

Although papers in journals, conference proceedings and edited books (such as Herrington & Herrington, 2006) describe a wide range of authentic learning contexts that display these characteristics across different higher education disciplines, few of these cases reflect the use of emerging mobile technologies. Are these technologies being used to reflect characteristics of authentic learning?

## 3. MOBILE TECHNOLOGIES IN HIGHER EDUCATION

The following paragraphs present a brief glimpse of the way mobile technologies such as mobile phones, personal digital assistants, and portable digital audio players are being adopted in higher education.

### Mobile Phones

The ubiquitous nature of mobile phones has led authors such as Prensky (2004) to argue the significant, potential value of this technology for education. He argues the educational processes of ‘listening, observing, imitating, questioning, reflecting, trying, estimating, predicting, “what-if”-ing and practicing’ (p.3) can all be done with mobile phones that can be achieved through features such as:

Voice, SMS, graphics, user-controlled operating systems, downloadables, browser, camera (still and video), and geo-positioning ... optional hardware and software accessories, as both input mechanisms (thumb keyboards and styli) and optional output systems (such as plug-in screens and headphones). (pp. 3-4)

### Personal Digital Assistants (PDAs)

Carlson (2002) provides a review of the way universities are using PDAs indicating that storage and retrieval of information is the general use. Faculties such as medicine have specific uses such as peripherals that measure temperature and heart rates. Other universities require students to purchase PDAs in place of laptops to wirelessly access course information and news. It is clear from the review that universities are unsure about their use in educational contexts beyond information delivery and retrieval.

## Portable Digital Audio Players

In 2004, Duke University provided iPods to all beginning undergraduate students and staff, and provided funding for innovative implementation across disciplines. Some of the academic uses involved:

- Course content provision. Access to lectures, and relevant podcasts
- Class recording tool: lectures, class discussions, feedback
- Field recording tool: interviews, observations
- Study tool: repeat listening; and File storage and transfer: backup facility (Belanger, 2005, p.1-2.)

Belanger highlights a number of benefits, one of which was to catalyze staff discussion and debate on appropriate uses of technology in teaching and learning.

It is apparent from this brief literature review that the use of mobile technologies in higher education, where they *have* occurred, are primarily used for communication, information delivery and retrieval and to provide real time learner support and management (Corlett, Sharples, Bull, & Chan, 2005). Cases of affordances of mobile technologies in higher education, as they reflect the characteristics of authentic learning (such as described above), are few (OMalley et al., 2005).

## 4. EXPLORING MOBILE TECHNOLOGIES IN HIGHER EDUCATION

At the University of Wollongong in Australia, we are planning to implement a design-based research project to identify the affordances of mobile technologies for teaching and learning across a range of 12 semester long subjects in undergraduate teacher education. The purpose of the project is to theorise, investigate and identify design and implementation principles for a range of mobile technologies that enhance authentic learning in higher education. The project will use a design-based approach (Reeves, 2000; Reeves, Herrington & Oliver, 2005) (also known as *development research* or *design experiments*) to investigate m-learning in 12 teacher education subjects and will involve four phases that are characteristic of this approach, depicted in the diagram below (Reeves, 2000).

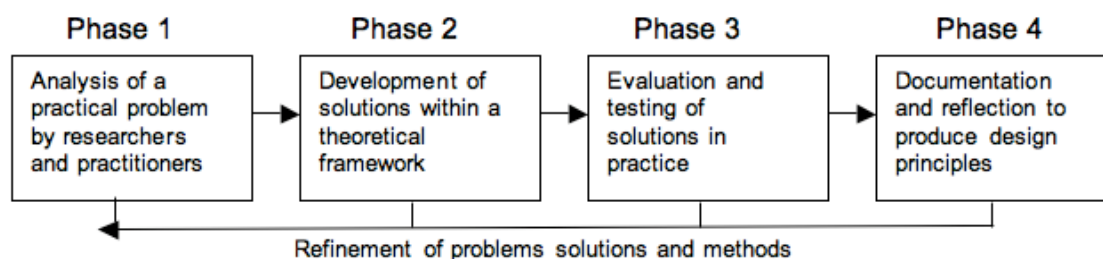


Figure 1. Design-Based Research (Reeves, 2000, p. 25)

### Phase 1: Analysis of Problem by Researchers and Practitioners

The first phase will be to explore the extent of the current use of mobile technologies, and to research the affordances offered by three m-learning devices (mobile phones, PDAs and mp3 players). This will be undertaken accessing research articles and device specifications, interviewing vendors/distributors and practitioners, and locating exemplars of best practice in higher education.

### Phase 2: Development of Solutions within a Theoretical Framework

In the second phase, twelve undergraduate and post-graduate classes in teacher education will be selected to participate in the study. Intensive workshops will be designed to assist the twelve teachers to design authentic and sustained tasks that use mobile technologies as cognitive tools in innovative and original ways (beyond information retrieval and communication).

### **Phase 3: Evaluation and Testing of Solutions in Practice**

In Phase 3, authentic tasks will be implemented and evaluated in the 12 classes over 3-4 weeks with three devices. Each case will itself be evaluated using a design-based research approach, involving a range of data collection strategies (such as focus group interviews, observations, weekly logs, reflective essays, etc.).

### **Phase 4: Documentation and Reflection to Produce Design Principles**

In the final phase of the cycle, analysis and consolidation of all findings, through seminars and a final conference of all participants, will produce design principles for appropriate pedagogies of m-learning in higher education. Each case will be written up as a chapter for a handbook, and a website to include exemplars and findings will be created.

## **5. CONCLUSION**

The enthusiastic adoption of m-learning is by no means widespread, or uniform, across the higher education sector. It appears that few examples of innovative and pedagogically sound approaches exist beyond the use of devices for information storage, retrieval or as a more convenient means of communication. This proposed project intends to explore and implement a range of authentic tasks using m-learning devices as cognitive tools, using a research approach that is likely to yield a great deal of useful, transferable and customizable knowledge about how people learn in the new millennium.

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