Mobilising authentic learning: Understanding the educational affordances of the iPad

James Oldfield
Department of Accounting and Finance
Unitec, New Zealand

Jan Herrington
School of Education
Murdoch University, Australia

A strong body of evidence exists around the power of authentic learning as a pedagogical model to support learning for the future. In recent years, with the increased understanding and focus on authentic learning theory, the educator's toolkit has continued to grow. Mobile technologies have also undergone rapid change during this time, including the emergence of a new category of mobile tablets inspired by the iPad. For teaching and learning to succeed in the future, we cannot afford to ignore technological and pedagogical change. This paper outlines the motivation and plans behind a study to augment the theory of authentic learning and develop a set of mobile authentic learning principles. The study is informed by the theories of authentic learning, cognitive tools and mobile learning supported by the educational affordances of the iPad. Design-based research methodology will be employed to ensure the rigor of the study through two iterations of experimentation with a first year tertiary information systems for business course.

Keywords: mobile learning, authentic learning, cognitive tools, iPads

Introduction

A significant body of evidence exists on the benefits of a constructivist approach to teaching and learning (Bodner, 1986; Duffy & Cunningham, 1996; Gijbels, Watering, Dochy, & Bossche, 2006; Loyens & Gijbels, 2008). Authentic learning is one such learning theory, influenced by a constructivist philosophy. Authentic learning environments are only rarely used in higher education courses, despite the evidence of their capability to promote higher order learning (Lombardi, 2007b).

Technology has significant potential to be an enabler for authentic learning (Lombardi, 2007b), in particular through its use as cognitive tools (Jonassen & Reeves, 2004). Yet, despite a willingness to create more authentic and engaging learning environments for students, there are a number of factors that inhibit the approach in higher education. Pressures to increase class sizes, and teach in tiered lecture theatres, together with restrictive assessment policies (such as mandatory examinations or limitations on group work) pose challenges to teaching in an authentic learning environment. In this paper, we describe the design of a research study into teaching and learning with technology in a business course. The study will use a design-based research method (Reeves, 2006) to investigate a more authentic approach to teaching business using iPads as cognitive tools.

The traditional business course structure provides challenges to maintaining a case for the duration of the course. Semester long (16 week) courses are often taught in conjunction with other courses, splitting a student's time and attention across several disconnected discipline areas. Students may only see the lecturer or tutor for a few short hours a week, making it difficult for them to be immersed in the learning experience. Perreault (1999) suggests that authentic activities take much more time than more traditional learning exercises. If this time is unavailable within the set class structure, then an additional mechanism is needed to support these authentic activities beyond the classroom. As suggested by Lombardi (2007b), technology has the potential to greatly expand our range of authentic activities in the classroom, and one could argue, beyond it. Mobile technology in particular could be used as a way of bridging the gap between formal class sessions and sustained and engaged learning (Barbosa & Geyer, 2005).

In 2010, the arrival of the iPad was heralded with much interest and excitement, particularly be educators who could see its potential for use in student learning. Twenty five million units of this immensely popular consumer device sold within the first fourteen months (Jobs, 2011). It has reimagined and revitalized the market for tablet computers, effecting a reduction in demand for netbook and laptop computers. Due to its success, competitors have increasingly shifted their focus toward their own tablet offerings, and now, a number of high quality and

relatively low cost tablet alternatives available. Such tablet computers have potential affordances for education that have not been explored in any great depth to date, especially in regard to their pedagogical advantages. The study described in this paper will explore current theory and practice, emerging developments and technological capabilities to investigate the pedagogical use of tablet computers, and develop a model for their use in supporting authentic learning environments.

Authentic learning

The age-old method of apprenticeship training has inspired the creation of educational pedagogies that value the importance on the context of learning. Collins (1991) suggested that in order for learning to be meaningful, it should be embedded in the same context that it will be used in later life. This is a fundamental principle of the theory of *situated cognition* or *situated learning* (Brown, Collins, & Duguid, 1989), a theory that has greatly informed the theory of *authentic learning*. Lombardi (2007a) emphasises the importance of higher order thinking and analysis that is afforded in authentic learning:

> To be competitive in a global job market, today's students must become comfortable with the complexities of ill-defined real-world problems. The greater their exposure to authentic disciplinary communities, the better prepared they will be "to deal with ambiguity" and put into practice the kind of "higher order analysis and complex communication" required of them as professionals. (p. 10)

Herrington and Oliver (cf. Herrington, Reeves, & Oliver, 2010) propose a list of nine key elements that characterise an optimal authentic learning experience. Authentic learning environments:
1. Provide authentic contexts that reflect the way the knowledge will be used in real life
2. Provide authentic activities
3. Provide access to expert performances and the modeling of processes
4. Provide multiple roles and perspectives
5. Support collaborative construction of knowledge
6. Promote reflection to enable abstractions to be formed
7. Promote articulation to enable tacit knowledge to be made explicit
8. Provide coaching and scaffolding by the teacher at critical times
9. Provide for authentic assessment of learning within the tasks (p. 18).

Such research has provided much insight into how technology can be used to promote authentic learning in higher education. However, further in-depth exploration is needed to explore how technology can be used as a cognitive tool to solve problems and create genuine artefacts within these environments.

Cognitive tools

Also referred to as *cognitive technologies* (Pea, 1985), t*echnologies of the mind* (Saloman, Perkins, & Globerson, 1991), and *mindtools* (Jonassen, 2000), *cognitive tools* have been described by Jonassen and Reeves (2004) as "technologies, tangible or intangible, that enhance the cognitive powers of human beings during thinking, problem-solving, and learning" (p. 1). Computers, smartphones, mobile tablets and the software applications they support, can all be used as cognitive tools. Viewing these devices as cognitive tools shifts the focus of the devices from being a medium for the delivery of content to a platform for the creation of knowledge. The student as the designer replaces the role of the instructional designer. The student uses the technology to access, interpret, organize, analyse and present knowledge to others.

Jonassen et al. (1998) propose that mindtools have the capability to engage learners in critical, higher-order thinking about content because:
1. The learners are the designers
2. The focus is on knowledge construction, not reproduction
3. Learning is in partnership with technology
4. They are unintelligent tools, relying on the learner to provide the intelligence
5. They distribute the cognitive processing
6. They are cost and effort beneficial. (p. 13)

Most research into cognitive tools to date has focused on computers rather than more recent mobile devices. With the arrival of the iPad in 2010, the world of mobile devices has undergone significant change. Many mobile devices now have similar processing capabilities and functionality to modern laptops and desktops, and they could be employed as powerful cognitive tools. This increased functionality could be used to support

authentic learning, as described in the next section.

Mobile learning

An ever-widening body of research exists in the area of mobile learning (also known as mLearning). As with most theoretical constructs, there are many different variations on what mLearning is and what its most critical aspects are. mLearning provides the learner with an increased ability to take their learning environment with them as they move (Barbosa & Geyer, 2005). mLearning is said to have two distinct aspects to it: the use of mobile learning devices, and the mobility of the people and the knowledge themselves (Sharples, Taylor, & Vavoula, 2007). Sharples et al. (2007) define mobile learning as: "the processes of coming to know through conversations across multiple contexts amongst people and personal interactive technologies" (p. 225).

Tablet based mobile learning

Recent advances in the world of tablet computing, as illustrated by the popularity of the iPad and other tablet devices, provide some answers and new questions to the field of mLearning. Now in its third generation, the iPad is still by far the leader (in terms of sales numbers) in the global tablet market. Over its three generations, the iPad has matured in terms of features to include two cameras, dual core processing technology, a high-resolution screen and 4G connectivity. Many educational institutions around the world are making use of the iPad through student and staff projects, distribution schemes (the Science Faculty at Adelaide University, for example, where students are provided with an iPad once enrolled) and the informal use of student owned devices.

In a comprehensive study on the use of mobile devices in higher education, Cochrane (2010) proposed five pedagogical considerations or "critical success factors" to mLearning:
1. The level of pedagogical integration of the technology into the course and assessment.
2. The level of lecturer modeling of the pedagogical use of the tools. (I think modelling is right, or did Thom use modeling?
3. The use of regular formative feedback from both lecturers and student peers.
4. Appropriate choice of mobile devices and software.
5. Technological and pedagogical support.

It is clear that tablet computers possess many affordances that could potentially enhance learning. However, as stated by Melhuish and Falloon (2010, p. 13), "A new mobile device might eventually be a catalyst for a sea-change in the way we perceive education, but the urgency and relevance of the learning need should always drive its use". The theory and literature discussed above in relation to *authentic learning, cognitive tools* and *mobile learning* will provide a theoretical framework for the enquiry.

Theoretical perspectives to frame the study

The proposed research will be informed by principles of learning and theoretical constructs developed in *authentic learning, cognitive tools* and *mobile learning theory*. With technology, they will form a new theory of Authentic Mobile Learning. A conceptual illustration of the study and its related theory is provided in Figure 1.
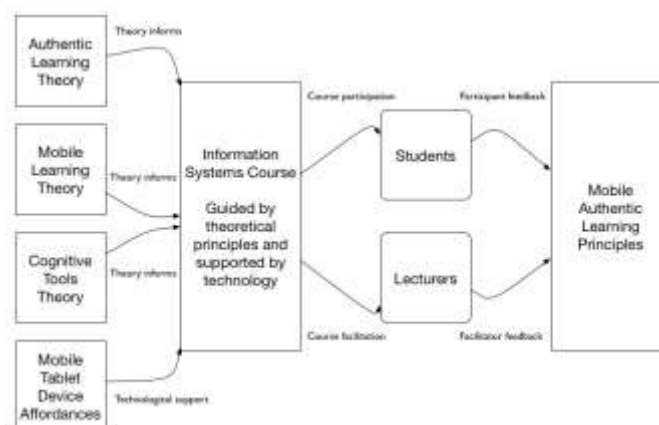

Figure 1 Mobile Authentic Learning Conceptual Framework

A design-based research approach (Reeves, 2006) will be used to develop, iteratively test and improve the design principles in an academically rigorous manner. This project will take place in two iterations over two full semesters with the design principles guiding the design of an introductory *information systems for business* course using the iPad as the cognitive tool of choice.

Investigating new technologies in education contexts is frequently conducted atheoretically, resulting in a focus on the technology itself, rather than as a pedagogical support. This study situates the study of a new and powerful technology (the iPad) within the context of the pedagogical theory of authentic learning, and with the focus on the device as a mobile cognitive tool that provides learning for the future.

References

Barbosa, D. N. F., & Geyer, C. F. R. (2005). Pervasive personal pedagogical agent: A mobile agent shall always be with a learner. *Proceedings IADIS International Conference Mobile Learning*, (pp. 281-285). Malta.

Bodner, G. M. (1986). Constructivism: A theory of knowledge. *Journal Chemical Education, 63,* 873-878.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18*(1), 32-42.

Cochrane, T. (2010). Exploring mobile learning success factors. *ALT-J, Research in Learning Technology, 18*(2), 133-148.

Collins, A. (1991). *Cognitive apprenticeship and instructional technology.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Duffy, T. M., & Cunningham, D. J. (1996). *Constructivism: Implications for the design and delivery of instruction.* New York: McMillan.

Gijbels, D., Watering, G. V. D., Dochy, F., & Bossche, P. V. D. (2006). New learning environments and constructivism: The students' perspective. *Instructional Science, 34(*3), 213-226.

Herrington, J., Reeves, T., & Oliver, R. (2010). *A guide to authentic e-learning*. New York: Routledge.

Jobs, S. (2011). *Keynote Address*. Paper presented at the WWDC.

Jonassen, D. H. (2000). *Computers as mindtools for schools : Engaging critical thinking* (2nd ed.). Upper Saddle River, N.J.: Merrill.

Jonassen, D. H., Carr, C., & Yueh, H. P. (1998). Computers as mindtools for engaging learners in critical thinking. *TechTrends, 43*(2), 24-32.

Jonassen, D. H., & Reeves, T. (2004). Learning with technology: Using computers as cognitive tools. In D. H. Jonassen (Ed.), *Handbook of Research on Educational Communications and Technology*. New York: Scholastic Press.

Lombardi, M. M. (2007a). *Approaches that work: How authentic learning is transforming higher education*. Educause Learning Initiative.

Lombardi, M. M. (2007b). *Authentic learning for the 21st Century: An Overview.* Educause Learning Initiative.

Loyens, S. M. M., & Gijbels, D. (2008). Understanding the effects of constructivist learning environments: introducing a multi-directional approach. *Instructional Science, 36*(5-6), 351-357.

Melhuish, K., & Falloon, G. (2010). Looking to the future: M-learning with the iPad. Computers in New Zealand Schools: *Learning, Leading, Technology, 22*(3), 1-16.

Pea, R. D. (1985). Beyond amplification: Using the computer to reorganize mental functioning. *Educational Psychologist, 20*(4), 167-182.

Perreault, H. R. (1999). Authentic activities for business education. *Delta Pi Epsilon Journal, 41*(1), 35-41.

Reeves, T. (2006). Design research from a technology perspective. In J. Akker, K. Gravemeijer, S. McKenney & N. Nieveen (Eds.), Educational Design Research.

Salomon, G., Perkins, D. N., & Globerson, T. (1991). Partners in cognition: Extending human intelligence with intelligent technologies. *Educational Researcher, 20*(3), 2-9.

Sharples, M., Taylor, J., & Vavoula, G. (2007). A theory of learning for the mobile age. In K. Littleton & P. Light (Eds.), *The Sage Handbook of E-learning Research* (pp. 221-247). London: Sage.

Author contact details:

James Oldfield, joldfield@unitec.ac.nz
Dr Jan Herrington, j.herrington@murdoch.edu.au