Supported by digital mobile devices and apps, mobile learning has great potential to facilitating personalised and community-based learning, and developing learner capabilities in creativity, innovative thinking, and knowledge creation. In EDUsummitIT 2013, our group aims at advancing understanding of the theory and practice of mobile learning in order to develop guidelines for designing, implementing, evaluating, and policy development of mobile learning. Our group will also attempt to generate new methods and strategies to support the merging of formal and informal learning to cater for the needs of the 21st century learners, and meet the inevitable future.

Introduction

In the 21st century there are many social, economic, and environmental challenges, and we are facing many “wicked problems” that demand innovative and creative solutions (Rieckmann, 2012). The educational community has the responsibility to formulate policies, design and develop pedagogical practices, and create new learning opportunities to increase and democratise the innovative capacity of our young people in order to generate powerful ideas and knowledge to meet these challenges. Mobile learning is future-oriented and can support learners to develop competencies to meet the demands of the 21st century.

Undoubtedly we are now living in a mobile society. The mobile industry is the fastest growing industry on the planet. According to GSMA (Groupe Speciale Mobile Association, 2012), there were more than 3.2 billion individual mobile phone subscribers worldwide in 2012, and the growth of mobile phone subscriptions in less economically advanced countries was particularly fast. For example, in Africa, there were 200 million connected mobile devices in 2006, increasing to 735 million in 2012 (UNESCO, 2012). Currently mobile technologies and apps are being developed at a rapid pace, and combined with the massive adoption of social networking platforms, are currently transforming people’s daily lives. For example, they connect people socially in new and unexpected ways and deliver information, content, and functionality to the user’s device on the go, using apps and cloud technologies...
(Khaddage & Knezek, 2013). They also change how people spend their leisure time, and how they learn and build knowledge in different settings. Mobile learning is constantly evolving and technological advancements have brought new capabilities, opportunities and complexity to the learning design process (ADL, 2012). The educational community is grappling with how best to utilize mobile technologies and apps for teaching and learning.

The TWG2 in EDUsummIT 2011 focused on “student technology experiences in formal and informal learning”, and issued a call to action to “better understand the concept of mobile learning and how mobile technologies can be used to bridge formal and informal learning” (Knezek, Lai, Khaddage, & Baker, 2011; Lai, Khaddage, & Knezek, 2013). In EDUsummIT 2013, we will continue the discussion aiming to understand deeper the theory and practice of mobile learning in order to develop methods, strategies, and guidelines on some of the issues and challenges in the design, implementation, evaluation, and policy development of mobile learning. We will also attempt to generate new methods and strategies to support the merging of formal and informal learning to cater for the needs of the 21st century learners.

Background

Learning is a continuous process that does not stop when a student leaves the formal school setting. The learning experiences will continue, especially with the emergence of high access to mobile technologies and devices that are being used for many educational and communicative purposes. Many researchers have discussed how outside-the-classroom learning activities such as experiments, unintentional discoveries, events and various experiences can be classified as informal learning (Falk & Dierking, 1998; Hull & Schultz, 2001; Khaddage & Knezek, 2013). These can influence the overall learning experiences among students, hence creating new learning opportunities. Mobile technologies and apps can play an important role in the informal learning environment as they can be used for communication, collaboration, gathering and sharing of information (Khaddage & Lattemann, 2013). Students can make use of their surroundings and interactions with others as part of the informal learning process. This may offer them the opportunity to reflect and share and get instant feedback on their progress via their mobile devices. Well-designed and effective feedback and progress indicators can offer guidance and encouragement to students and make learning exciting and fun (Gaved, Kukulska-Hulme, Jones, Scanlon, Dunwell, Lameras, & Akiki, 2013). Barron (2006) described a learning ecology as “the set of contexts found in physical or virtual spaces that provides opportunities for learning” (p.195). The physical space is when a student is learning in a physical environment in a classroom setting and can be classified as formal, while virtual is when the learning occurs outside a formal classroom setting, can take place via a mobile device outside a classroom, and can be classified as informal. Therefore students who are engaged in this learning process switch between different methods of learning, and actively participate in hands on experiences when students are involved in the task (learning by doing), and learning by analysing, discussing, reporting, recording and managing information using their mobile device outside the classroom. This could be accomplished via community sharing and knowledge building and may become the inspiration and motivation for further learning in new methods and techniques that are capable of merging formal and informal learning. Therefore advancing
mobile learning across formal and informal contexts is empowering for the overall learning ecology.

However, while the outlook of mobile learning is promising, we should note that there is yet no consensus on how mobile learning should be defined. Winter (2006) has summarised four main perspectives of mobile learning: (a) technocentric – mobile learning is primarily seen as learning supported by mobile devices, and the focus is on the technology; (b) mobile learning is seen as an extension or a subset of e-learning, and mobile learning research is primarily part of e-learning research; (c) mobile devices are used just to complement and augment formal education; and (d) mobile learning is student-centred and it is about mobility and context. We see a gradual shift of understanding of the theory and practice of mobile learning in the last ten years, from a technocentric perspective focusing on the attributes and affordances of the technology, to a learner-centred perspective focusing on the mobility of the learner (not just space and time, but also access to people and resources) and contexts (Kukulska-Hulme & Sharples, 2009). One example of such a perspective is provided by Sharples, Taylor and Vavoula (2007), who define mobile learning as “the process of coming to know through conversations across multiple contexts among people and personal interactive technologies” (p.255). As pointed out by Pachler (2009), Sharples at al.’s (2007) definition emphasises the cognitive and social (the communicative) aspects of mobile learning, but not the technical aspect or how mobile devices are used for delivery of content. Mobile learning is also understood as closely linked to informal learning, which is characterised by “personal ownership of codified knowledge, user-generated ideas, user-constructed contexts...personal and contextualised, and controlled by the learner” (Laurillard, 2009, p. x). Learner control and agency is thus at the heart of mobile learning and both personalised and collaborative learning opportunities can be afforded by mobile technologies. We begin to see development of theories of mobile learning (e.g., Sharples, Taylor, & Vavoula, 2007; Laurillard, 2007). It should be noted that how policy makers and researchers conceptualise mobile learning would affect how mobile devices are used in educational settings and how mobile learning is designed and supported.

There has been a proliferation of mobile learning projects (particularly European projects) in the school and tertiary sectors in the last ten years. For example, a recent review conducted by Frohberg, Goth, and Schwabe (2009) has identified 102 mobile learning projects. The reviewers concluded that mobile learning was at its best in providing support for learning in context, rather than being used to deliver content. The characteristics of mobile learning have been extensively researched (Kukulska-Hulme & Sharples, 2009; Looi, Zhang, Chen, Seow, Chia, Norris, & Soloway, 2010; Pachler, 2009; Sharples, Arnedillo-Sanchez, Milrad, & Vavoula, 2009), and research begins to document the relationship between motivation and mobile learning (Ciampa, 2013), and self-regulation (Sha, Looi, Chen & Zhang, 2011). Trends of research in mobile learning have been reviewed by Hwang and Tsai (2011) and Wu at al. (2012). While we see exemplary case studies of mobile learning practices (e.g. Naismith, Lonsdale, Vavoula, & Sharples, 2004), there is a lack of large-scale projects to document the use of mobile technologies to support learning activities in different learning areas in formal learning. There is also a lack of mobile learning research in informal contexts (Looi, Seow, Zhang, So, & Chen, 2010; Wright & Parchoma, 2011). It is recognised that there are inherent difficulties in evaluating technology-enhanced learning (Livingston, 2012; Wellington, 2005) and researchers are currently developing new evaluation methods to assess learning.
outcomes of mobile learning (e.g., Sharples, 2009). Despite this rapid development there are still very few guidelines for developing mobile learning for a variety of scenarios that address both formal and informal learning contexts.

Currently the Advanced Distributed Learning (ADL) initiative is leading a project that will develop an instructional design framework with best practices and design guidelines to better support mobile learning design (ADL, 2012). The OECD and UNESCO have also initiated projects and published reports on mobile learning. For example, UNESCO has recently published a working paper series on mobile learning in 2012/2013 to provide examples of global initiatives in mobile learning and also policy guidelines for implementation (http://www.unesco.org/new/en/unesco/themes/icts/m4ed/mobile-learning-resources/unescomobilelearningseries/).

**Issues/unresolved questions/concerns**

As an evolving new field of study, naturally there are many unresolved issues and challenges in mobile learning. Some of these issues will be discussed in our group.

1. Shared understanding of mobile learning: What makes mobile learning unique? For example, currently educational institutions are unintentionally applying e-learning standards to mobile learning (ADL, 2012).
2. Design and pedagogical issues: Do we know what learning and pedagogical theories/strategies work best with mobile learning? What are the key design principles of mobile learning environments? Is there a general framework for all to follow and fit within their own model? What is currently missing from our instructional strategies for mobile learning?
3. Mobile literacy skills: What skills are needed for learners to participate successfully in mobile learning (Jenkins, 2006)? How best can these skills be developed? There are issues of how skills that learners have developed in informal contexts can be readily transferred to formal contexts (Crook, 2012).
4. Policy issues: The need to develop policy guidelines for: equitable access, privacy, intellectual property, e-waste, and health and safety, and other issues (Lai, Kaddage, & Knezek, 2013), at the local, national, and international levels.
5. Evaluation: Mobile learning is about agency and learner control, and it is very much situated and context-based. As such, there are challenges in how mobile learning outcomes can be evaluated, particularly in informal contexts. ADL is in the process of developing a mobile version of SCORM that will integrate the tracking and assessment features for mobile learning.
6. Bridging formal and informal learning across contexts: People still see a sharp distinction between formal and informal learning, and using mobile technologies to support informal learning is not yet widely recognised. There is a tension between traditional classroom learning and open access to knowledge. There is also a tension between the personalised nature of mobile learning and the collaborative/community aspect of learning that mobile technologies can support. We need to understand more deeply the nature of informal learning (self-directed, self-monitored and self-managed) so as to connect learning between formal and informal contexts (Lai, Khaddag, & Knezek, 2013; Looi, et al., 2010). We also need to
develop methods and strategies to generate examples of how to relate and link learning across contexts. Identifying barriers that inhibit bridging formal and informal learning through mobile technologies is a first step toward resolving the current sharp distinctions. Instruments for measuring mobile learning attitudes and beliefs (e.g., Khaddage & Knezek, 2013) are beginning to emerge that provide mechanisms for addressing the psychological teaching-learning barriers that may need to be overcome.

**Recommended additional readings**


GSMA (2010). GSMA announces new global research that highlights significant growth opportunity for the mobile industry. Available at http://www.gsma.com/newsroom/gsma-announces-new-global-research-that-highlights-significant-growth-opportunity-for-the-mobile-industry


Khaddage, F., & Lattemann, C. (2013). iTeach We Learn Via Mobile Apps "a Case Study in a Business Course". In R. McBride & M. Searson (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference 2013* (pp. 3225-3233). Chesapeake, VA: AACE. Available at: http://www.editlib.org/p/48591


