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Special Section "Mobile Learning Applications in Higher Education"

INTRODUCTION

What is the future of mobile learning in education?

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Abstract

The evolution of wireless technologies and the development of applications for mobile devices in higher education have been spectacular. For many educators, mobile technology in the field of teaching and learning has recently become one of the most important areas of research. Today, mobile learning is a strategic topic for many organizations concerned with education. In the future, more research should be conducted to transform education using mobile learning. The advent of new types of devices is disruptive to education, no matter what educators and education institutions do. Therefore, a thorough analysis, from a pedagogical and technological perspective, is key to ensuring appropriate usage and implementation of mobile learning.

This Special Section of RUSC. Universities and Knowledge Society Journal presents a general overview of successful mobile learning experiences in higher education. Its aim is to share best practices and create new opportunities in universities. These mobile applications will add another layer to the learning and teaching processes.

Keywords

mobile learning, future of mobile learning, mobile applications, higher education, mobile age

¿Cuál es el futuro del aprendizaje móvil en la educación?

Resumen

Las tecnologías inalámbricas y las aplicaciones para dispositivos móviles en la educación superior han experimentado un crecimiento espectacular. Para muchos educadores, la tecnología móvil en el campo de la enseñanza y el *aprendizaje se ha convertido en uno de los principales ámbitos de investigación. Hoy, el aprendizaje móvil es un ámbito estratégico para muchas organizaciones que tienen competencias educativas. En el futuro, habrá que intensificar las investigaciones para transformar la educación mediante el aprendizaje móvil. La aparición de nuevos tipos de dispositivos plantea problemas para la educación, independientemente de lo que hagan el personal docente y las instituciones educativas. Por lo tanto, es esencial llevar a cabo un análisis, desde una perspectiva tecnológica y pedagógica, para garantizar el uso y la implementación apropiados. Esta sección especial de RUSC. Revista de* Universidad *y Sociedad del Conocimiento presenta una visión general de experiencias exitosas de aprendizaje móvil en la educación superior. El objetivo es compartir buenas prácticas y crear nuevas oportunidades en las universidades. Estas aplicaciones móviles añadirán un nuevo estrato a los procesos de aprendizaje y enseñanza.*

Palabras clave

aprendizaje móvil, futuro del aprendizaje móvil, aplicaciones móviles, educación superior, época móvil

1. Introduction

Think back 15 years ago. It was hard to imagine that today people would be using mobile technology to learn, to socialize, and to conduct everyday business. Many sectors of society have adapted to use mobile technology to deliver services to customers. In the financial sector, customers now have access to banking services using mobile technology – "in the pocket banking" (The Economist, 2007). Libraries are being digitized and information formatted for access using mobile technology – "a

library in everyone's pocket" (Ally & Needham, 2010). The healthcare system is also employing mobile technologies to deliver training to healthcare professionals and services to patients (Kenny et al., 2012; Taylor et al., 2010). With communication technology, learners can use mobile technology anywhere and anytime to access educational resources (Ally & Tsinakos, 2014; Hassan et al., 2012; Roberts, 2013).

As more individuals around the world are using mobile technology to learn and to do everyday tasks, the question is "What is the future of mobile learning in education?" In the future, mobile devices will look completely different from today's; hence, higher education must plan to deliver education to meet the demands of new generations of students. We are in the first generation of mobile learning, since it is in its early stage of development. Nevertheless, there are billions of mobile devices being used around the world (ITU, 2013). The next generation of mobile learning will be more ubiquitous; there will be smart systems everywhere that learners can learn from, and learners themselves will be mobile. Learners will learn from multiple sources rather than using one device. Also, the next generation of mobile technology will be virtual, with virtual input and output capabilities.

The use of mobile technology allows for cloud teaching where access to people, resources and information will float freely regardless of location (Sutch, 2010). Learners in different time zones and locations will be able to access tutors when needed. According to a Futurelab report (Daanen & Facer, 2007), by 2020, digital technology will be embedded and distributed in most objects. Personal artefacts such as keys, clothes, shoes, notebooks and newspapers will have devices embedded within them, which can communicate with each other (Daanen & Facer, 2007). This will make learning more ubiquitous and pervasive.

II. Mobile technology in higher education

Many higher education organizations are implementing mobile learning to provide flexibility in learning (Tsinakos & Ally, 2013). Using mobile technology to reach students will benefit higher education by increasing enrolment and having a broader student population, since students in different age groups will be able to access course materials anywhere and anytime (Lowenthal, 2010). Mobile learning facilitates equal opportunities for all by allowing learning to be accessible across time zones, thus making location and distance irrelevant to the learner. Wireless mobile devices are small enough to be portable, which allow learners to use them anywhere and anytime to interact with other learners everywhere to share information and expertise, complete a task or work collaboratively on a project. Workers in organizations can use mobile devices to learn on the job so that they can transfer what they learn in the school system to the job. One example is the use of mobile devices to train workers to improve their communication skills in the workplace so that they can be productive on the job (Ally & Samaka, 2013)[2]. Learners can use the wireless capability of their mobile devices to access up-to-date and relevant educational resources from the web and to communicate with

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experts in the field of their studies. Situated learning, which is the application of knowledge and skills to specific contexts, is facilitated, since learners can complete courses while working on the job or in their own space, and apply what they learn at the same time.

The use of mobile technologies is changing the way we live and how we access education. One clear development is a blurring of our social, business, learning and educational lives as the pattern of our communication and interaction across time and space changes (Demsey, 2008). Countries around the world are starting to see that Internet access anywhere and anytime is a human right for citizens and have set goals to establish the infrastructure to allow access by all, which will facilitate the use of mobile technology in education (BBC News, July 2010). There is great potential for mobile learning in developing countries, but careful planning is required for mobile learning to be successful (Muir, 2013; Traxler, 2013).

Mobile learning is not about the technology, it is about the learner. The learner is mobile and is at the centre of the learning, and the technology allows the learner to learn in any context. Vavoula and Sharples (2009) state that mobile learning is a social rather than technical phenomenon of people on the move, constructing spontaneous learning contexts and advancing through everyday life by negotiating knowledge and meanings through interactions with settings, people and technology.

Future mobile learning will shrink the global virtual space. Mobile technology can be used to connect students from different parts of the world to create and share information with each other. Students can use the mobile telecommunication system to show where they are so that students from other parts of the world can learn about those locations. Botha, Vosloo, Kuner, and van der Berg (2009) conducted a study that examined global learning with students from different cultures using mobile technology. They found that the process of creating, sharing and negotiating provided an opportunity for students to foster relationships and to contextualize their lives to develop shared understandings. The process used to create and share information with different cultures resulted in the development of intercultural competencies and skills to communicate between cultures.

III. Designing mobile learning for the future

In this fast changing world, different stakeholders will have to work together to develop new educational models to cater for new generations of learners who will be using mobile technologies that do not exist as yet. Educators need to re-conceptualize education and make the shift from education at certain ages to lifelong learning (Brown, 2005). The current educational model is outdated because it was developed before the advent of information and communication technologies. The current model, based on classroom-based face-to-face delivery, is geared towards educating a certain segment of the population. Also, teachers are being trained for the current model of education, and will therefore continue using the model when they become teachers. Teacher training must be re-invented to prepare teachers for the technology-enhanced educational system. Education must examine the way educational resources are designed and delivered and take into consideration the needs and characteristics of current and new generations of students. For example,

in technology-enhanced delivery, what is the ideal length of a course and what support is required? The current generation of students use 'always-on' technology such as mobile devices, where they need information and feedback 'now' rather than 'later'. Because of the flexibility of using mobile devices in learning, students prefer them to personal computers, despite the time needed to get started using mobile devices (Stockwell, 2010).

Mobile learning can transform pedagogy to cater for new generations of learners because it offers the opportunity to use active learning strategies and for learners to learn in their own context, which will result in higher-level learning (Cochrane, 2013; Stoerger, 2013). With mobile technology, a group of learners can access content from electronic repositories or create their own content, validate the content, and help each other regardless of location. Learner-generated content can then be used by other learners (Traxler, 2009). Mobile learning benefits learners because they can use mobile devices to learn in their own learning community, where situated learning, authentic learning, context-aware learning, contingent learning, augmented reality mobile learning and personalized learning are encouraged (Quinn, 2013; Traxler, 2010). Learning will move more and more outside of the classroom and into the learners' environments, both real and virtual, thus becoming more situated, personal, collaborative and lifelong (Naismith et al., 2006). Mobile technology allows learners from different cultures to express themselves more readily compared to face-to-face situations (Wang et al., 2009). Also, learners can use the technology to develop communities of learners, where learners can tutor and help each other in the learning process, thus resulting in high-level learning.

IV. Contributions to the Special Section

This Special Section of *RUSC. Universities and Knowledge Society Journal* contains five articles. Selected after a blind peer-review process, they report on specific mobile learning applications in higher education. Brief introductions to the selected articles are given below.

In "Mobile learning in the field of Architecture and Building Construction. A case study analysis" by Ernest Redondo et al., the authors present four case studies in the field of Architecture and Building Construction in order to evaluate the integration of augmented reality (AR) technology into mobile devices. These case studies were conducted on several bachelor's and master's degree course subjects at the Universitat Politècnica de Catalunya. BarcelonaTech (UPC), Spain. The AR mobile learning applications are based on optical image recognition and GPS positioning to create 3D georeferencing models that allow information to be displayed, adjusted and evaluated on site.

The article "Mobile learning: a collaborative experience using QR codes" by Meritxell Monguillot et al. highlighted the potential of using mobile learning and QR codes to foster interaction in a face-to-face education classroom. The experience enabled students to do more physical activity in a collaborative way through the use of QR codes. The experience was based on qualitative educational research and had a multiple case-study design. The results show the potential of mobile learning as an emergent educational tool that is capable of facilitating and fostering the teaching-learning process.

In "Student projects empowering mobile learning in higher education", Àngels Rius et al. analyzed the Open University of Catalonia (UOC), Spain, as a case study and presented several examples of tools developed by students as part of their final year projects. These projects explored different technologies and provided useful information to guide institutional investment in the development of m-learning tools. Akin to the collaborative development model in the field of open source software, this paradigm therefore allows the sustainability of m-learning in educational institutions to be assured.

The article "M-learning patterns in the virtual classroom" by Fernando López et al. reported on a study whose aim was to assess the penetration of mobile devices for learning purposes in higher education and to identify the main usage patterns. The results were conclusive: 25% of accesses to the learning management system (LMS) were made from mobile devices. The authors have asserted that the findings of the study could have significant implications not only for researchers and lecturers, but also for institutions intending to implement this teaching/learning methodology.

In "A comparative study of computer and mobile phone-mediated collaboration: the case of university students in Japan", Gibran Alejandro Garcia compared how two types of media influence the participation, interaction and collaboration of students. It inquired into the students' collaboration experiences, opinions, and difficulties they encountered during the online discussions. Then it explored the impact that these two types of media had on the students' final outcome. The study concluded that mobile phones had great potential to enhance interaction in online collaboration.

V. Conclusion

Because of the availability of mobile technology globally, this is the first time in history that educators have had the opportunity to allow individuals from around the world to access educational resources to enable education for all. This is facilitated by many initiatives that are making educational resources available as open educational resources. The increasing availability of open educational resources for mobile technology is making access to learning more affordable for anyone who wants to learn.

Mobile technologies are becoming more personal with the introduction of gesture-based interaction and affective computing. Devices can interpret gestures made by learners and respond appropriately based on the gesture. When a learner holds a mobile device, the device will read the physiological state of the learning to detect the learner's emotions. Based on the emotion of the learner, the device will decide on what the learner should do next. Because of the computing power and multimedia capabilities of mobile technologies, educational resources must be more game-like to motivate learners to learn.

In the future, more research should be conducted to transform education using mobile learning. Koszalka and Ntloedibe-Kuswani (2010) suggested that there is a need for more rigorous research on the use of mobile technology in learning to enhance the use of mobile learning in education. Also, there is a need for more extensive quantitative and qualitative research studies on mobile learning to advance the implementation of mobile learning in the 21st century (Ali & Irvine, 2009). There should

be more research on how to design and deliver learning to reach the masses, taking into consideration learners' cultures, values, and local contexts. Education must take advantage of this abundance of mobile technology to deliver education to students anywhere and anytime (López Cruz & Gutiérrez Cortés, 2012). Education has to be transformed in the digital age to deliver education using mobile technology and to meet the needs of learners in the 21st century (Ally & Tsinakos, 2014; Gerstein, 2013).

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