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TO WHOM IT MAY CONCERN

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Mobile learning at the Ekurhuleni Campus of the Vaal University of Technology: a pipe dream or a way forward?

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Abstract

The objective of this research project is to establish whether m-learning can be implemented successfully at the Ekurhuleni Campus of the Vaal University of Technology (EC of VUT) as an effective teaching tool. A literature survey was conducted to establish what m-learning entails. M-learning is defined in relation to this study, and the reasoning behind selecting m-learning as a new teaching and learning tool is explained. The benefits of m-learning over other forms of learning, such as traditional and e-learning, are discussed. A survey was conducted to determine the status of learners' technology and Internet access and to determine whether it will be feasible to implement an m-learning project. The survey clearly showed that the learners at the EC of VUT will have more access to mobile learning than, for example, e-learning, as there is a significant difference between the number of learners that have access to a computer and the Internet and those who have access to mobile phones. It also showed the willingness of learners to work with new technology. Different features of mobile phones that can be used in an m-learning environment are discussed to identify the most advantageous features for the EC of VUT. A system is finally proposed for the use of m-learning at the EC of VUT.

Keywords: Mobile learning, m-learning, mobile technology, mobile phones in education.

1. Introduction

The Ekurhuleni Campus of the Vaal University of Technology (EC of VUT) was established in 1995 in Kempton Park as a delivery site for the VUT. The demand for the diploma and degree courses in Information and Communication Technology (ICT) at the campus has increased so much that the campus was mandated with an ICT focus. To fulfil this mandate we constantly have to investigate not only new technologies but also new ways of teaching and learning. We therefore decided to investigate the combining of technology and learning in such a way as to encourage our learners to make use of new, yet affordable, technologies. One way of doing this is to explore mobile learning (m-learning) as a mode of learning.

The objective of this research project is therefore to establish whether m-learning could be successfully implemented at the EC of VUT as an effective teaching tool.

Firstly, we want to establish what m-learning entails by means of a literature survey. Some believe that a socially and educationally responsible definition (of mobile learning) must view the learner as the one being mobile and not his/her devices (Laouris & Eteokleous, 2005 & Alexander, 2004), while others feel that m-learning is only an extension of e-learning (Huang, et al., 2008:1206; Muyinda, 2007:97; Parsons & Ryu, 2006 and Najima & Rachida, 2008). As many views exist of what m-learning is, a definition of m-learning is established in Section 2 for the purposes of this project.

In Section 3 the reasoning behind selecting m-learning as a new teaching and learning tool is explained.

According to Parsons & Ryu (2006), portable communication devices are central to m-learning environments, giving access to the learning content. In a survey of 600 public and private colleges and universities (Green, 2004), it was found that laptops used in higher education settings outnumbered desktop and laboratory computers, and were ranked as the most important hardware devices, followed closely by mobile phones. A similar survey was conducted at the EC of the VUT and in Section 4 we present the survey results. The survey considered issues such as the number of learners who possess mobile phones, compared to laptops, and how much access learners have to the Internet. The survey also addressed the average amount of time spent using mobile phones for purposes other than social activities such as gaming, downloading of music and communicating through voice and text. In Section 5 we defend our focus on the use of mobile phones in our m-learning environment.

Finally, in Section 6 the results of the research are used to propose a concept environment for m-learning at the EC of VUT. The proposed environment will be implemented and tested as part of a Masters degree in Technology at the EC of VUT.

2. Defining m-learning

Defining the term m-learning is not a straightforward process as many different opinions and meanings are associated with the term. Different communities each have a unique viewpoint on what m-learning involves.

A thorough study of m-learning definitions enabled us to suggest the following definition for our study: M-learning is a method of learning that allows learners to go beyond the boundaries of the classroom (Winters, 2007:7; Sharples, Taylor & Vavoula, 2005; Najima & Rachida, 2008:12, Kukulska-Hulme & Traxler, 2005) and disciplines (Nyiri, 2002), allowing them to learn anywhere and anytime (Najima & Rachida, 2008:12; Milrad, 2007:29; Sharples, Taylor & Vavoula, 2005; Parsons & Ryu, 2006) making use of a number of available mobile devices (Winters, 2007:7; Kukulska-Hulme & Traxler, 2005) with or without wireless connections (Alexander, 2004:29).

This definition forms the basis from which we motivate our selection of m-learning as an alternative mode of learning.

3. Why m-learning?

In this section we briefly explain the reasons for selecting m-learning, and the benefits m-

learning has over other forms of learning such as traditional and e-learning.

The reasons for using m-learning can be categorised as follows:

- Connectivity in Africa.
- Learners are digital natives.
- Available resources.

3.1 Reasons for selecting m-learning

3.1.1 Connectivity in Africa

According to Diso (2008:40) m-learning technologies are still a relatively new feature for the learning environment of Africa. Mobile technologies remain substantially unfamiliar and unused, especially in the more traditional communities of Africa and South Africa and their capabilities and possibilities are still being explored.

3.1.2 Learners are digital natives

The learners of today are digital natives because they grew up with technology – especially mobile technology. These digital natives are now bringing such technologies into schools (Selwyn, 2003:134). As educators we must make use of the changes being experienced by young people in general as a result of using mobile technologies. Maenpaa (2001), for example, suggests a range of social implications, including the intensification and expansion of interaction, the blending of work and play, autonomous life management and the development of common but asynchronous rhythms of life among users. If we examine these issues in relation to young people, then the potential social significance of technologies such as the mobile phone quickly becomes apparent (Selwyn, 2003:135).

3.1.3 Available resources

Due to infrastructure and financial constraints the EC of VUT cannot facilitate a sufficient number of Internet connected computers to allow each learner 24 hour access. We can also not make it mandatory for learners to have a computer with Internet access, as many of them are not in the financial position to do so. Mobile phones on the other hand are cheaper to buy and most of the students already own one (see section 4). Most of the new generation mobile phones have Internet connectivity.

The benefits of m-learning are discussed in the next section.

3.2 Benefits of m-learning

In this section we list a number of benefits that can be attributed uniquely to m-learning. They are:

- Learners can communicate interactively with classmates or the lecturer, access rich informational contents via the Internet, search for knowledge using keywords, and participate in learning activities at anytime, wherever they are. (Chang, 2003). O'Malley, et al. (2003) labels it a "ubiquitous" benefit. This is especially beneficial for our campus as we do not have residences for the learners and some have to travel great distances to attend classes.
- M-learning activities are suited to both indoor and outdoor environments (Chang, 2003). O'Malley, et al. (2003) labels it a "portability" benefit.
- A single learner or a group of learners can participate in the learning activity (Chang, 2003).
- M-learning is an extremely fast moving field that is both specialised and interwoven with daily work. (Kukulska-Hulme, 2005:4). O'Malley, et al. (2003) labels it "pervasiveness".
- M-learning can be utilized on different scales. One environment may utilise m-learning as a single component of a single topic, while another environment may be dedicated to using m-learning as the only means for learning. In either case the technology applied will be mobile. (Caudill, 2007)
- Perhaps most notably, mobile devices provide users with an interface to their content that is both personalised and secure (Petrova, 2005). Because there are multiple users for each public machine, individuals are often unable to set up personal profiles for things as simple as *Post Office Protocol* (POP) or *Internet Message Access Protocol* (IMAP) access to email accounts or bookmarks in browsers. While this may seem to be a minor inconvenience it can quickly add up to large quantities of wasted time. The time required logging in and finding specific pages or accessing e-mail through a Web interface may even reduce the frequency of a person's access to the learning environment. Lack of, or time consuming, access can therefore adversely influence a learner's experience in the environment. With mobile devices these issues are minimised. By carrying a personalised device, the user has media access tailored to best fit his or her personal preferences. This being the case, the user can quickly and easily access the resources needed, which may result in a higher frequency of access (Caudill, 2007). O'Malley, et al. (2003) also labels this as "portability".

4. Analysis of survey conducted

A survey was conducted at the EC of VUT to determine the status of learners' technology and Internet access and to see if it will be feasible to implement an m-learning project. The learners that participated are all ICT diploma students and 72 responded to the questionnaire. The questions asked included biographical data such as gender, age group and nationality. The other questions focused on the learners' access to computers, laptops and mobile phones as well as Internet access and the use of that access. Questions were also asked to determine the learners' attitude towards the use of the Internet and mobile technology. The results of the questionnaire are as follows:

- 62% of the respondents were male and 38% female (this corresponds more or less with the gender division in the diploma course)
- All respondents were aged between 18 and 30 years with 54% younger than 21.
- On the question whether the learner had access to a computer at home 83% answered that they have, while 17% indicated that they possess a laptop.
- Only 20% have access to the Internet at home.

- On the question whether the learner possesses a mobile phone 93% indicated that they have, of which 72% indicated that their mobile phones have Internet access and 71% make use of that facility.
- 55% indicated that they had heard of m-learning before.
- 57% indicated that they would like using a mobile phone to write tests and 79% said that they would use revision material accessible through the Internet. Only 38% currently download and use podcasts.
- 96% indicated that they would like access to online courses through mobile devices.
- 90% indicated that they are comfortable with using computer and mobile technology and 94% indicated that they like working with new technology.
- 69% of all the respondents felt that they cannot function without a mobile phone.
- On the question of how much time the learner spent on the Internet on campus 47% said less than a hour, 44% between one and five hours and 8% more than five hours a week.
- On the question of how much time the learner spent on the Internet at home 60% could not respond due to the fact that they do not have a computer or access to the Internet, 7% said less than a hour, 26% between one and five hours and 7% more than five hours a week.
- On the question of how much time the learner spent on the Internet using their mobile phones 49% said less than a hour, 28% between one and five hours, 15% between 6 and 10 hours and 5% more than ten hours a week.
- The survey shows that 3% of the learners use the Internet to do shopping, 10% for playing games, 21% to download music or videos, 36% to do e-reading, 40% for chatrooms/Facebook/blogging and 68% to find information.
- The respondents were asked what their preferred revision method would be and 7% said podcasts, 15% videos, 24% online notes, 28% own notes and 39% textbook material.

The following conclusions can be reached from the results:

1. Although 83% of learners have a computer only 20% have access to the Internet. In contrast to this 94% possess a mobile phone and 76% of those with a mobile phone can access the Internet using the mobile phone.
2. The learners have not had much exposure to learning through technology and their Internet use is limited to information finding.
3. These learners are keen to experiment with new technologies and the use thereof. Mobile learning will thus be a challenge they would take to.

5. Proposed system for EC of VUT

From the conclusions drawn in section 4 we decided to implement m-learning at the EC of VUT using mobile phones as a trial medium.

Muyinda (2007:98) suggests that a mobile phone is no longer a device for showing off one's prowess in terms of his/her richness, but that it is a necessary device of life. Mobile phone subscriptions throughout the world have quadrupled in the last seven years, from 1 billion in 2002 to 4.1 billion by December 2008 (Fermoso, 2009). This huge growth in mobile phone use shows that higher speed web access for mobile phones is growing at a faster rate than regular high speed access for, for example, business and home computers, which means that the

device people would most likely use and rely on in the future will be the mobile phone (Fermoso, 2009).

Mobile phones have several advantages, but also some constraints that should be considered. Notwithstanding what some may consider limitations, learners are already inventing ways to use their mobile phones to acquire knowledge (Prensky, 2005). According to Prensky (2005) there are concerns about limited screen and button sizes of mobile phones, but it is exactly the combination of miniaturisation, mobility and power that is attractive to today's digital natives. They visualise a small screen as a window to an infinite space and quickly train themselves to navigate the mobile phone features using their thumbs.

Educators should bear in mind that mobile phones can be used for context as well as content. Fully featured mobile phones are powerful enough to be a learning tool, which would allow our learners' to use it as an interface to a variety of computing devices in a similar way as they control their entertainment devices (Prensky, 2005).

Mobile phones are equipped with a variety of features such as short messaging service (SMS), address books and calendars, and can include cameras and video and audio recording functions. In addition to SMS capabilities more advanced mobile phones include a multimedia messaging service (MMS) which is an extension of the SMS that enables other types of media, such as photographs, video and sound files to be sent (Kukulka-Hulme, 2005).

On many models, one can display documents, write notes, view pictures, do word searches, play games, do voice recordings, listen to sound files, view pictures and video clips, and take photographs. Computing power that in the past was only available on a desktop machine is now available in these pocket- sized mobile phones. Figure 1 gives a summary of the more popular features available on mobile phones.

Figure 1 Feature available on mobile phones



These features can be used in a variety of ways. Andronico, et al (2003:3) suggest three ways to use mobile phones in the m-learning environment:

- An enhanced organiser: By exchanging data with the central system to align, periodically or on demand, the agenda of the user (lecturer, learner, or other roleplayers in the system) with the academic agenda on the central system.
- Interaction with newsgroups: This is managed by a central learning management system (LMS).
- Browsing LMS web pages: With the possibility of downloading the educational material and consult it with specific viewers (currently those related with the Office suite and with Acrobat PDF format).

A fourth feature of mobile phones that can be utilised in m-learning is the use of SMS messaging. SMS allows learners to access text information, and swap messages and information, via their mobile phones. This provides the learner access to the learning environment anywhere they can receive a mobile phone signal and utilises a device that they will likely be carrying every day, even in the absence of an m-learning requirement to do so. Mellow (2005:5) cited the advantages of SMS as being true flexibility to control the time, place, and pace of their learning, content distinctness, tutor constructed study aids designed for 'challenge to learn' concepts, using technology that is engaging and totally comfortable for the learner, non-threatening, and private availability of on-demand study support. There are three possible models of learning information exchange via SMS:

- The educational institution sends out information on its agenda.
- The learners request information as they need it.
- The learner is involved interactively with the surroundings.

The most evident difference between the SMS and LMS models is that a set of available information is not resident on a server for learners to access on-demand; a process must be initiated to transmit the information to a recipient. Messages regarding class changes, reminders of upcoming deadlines, or questions and responses involving specific course material are excellent SMS candidates. Because of the constant presence of a mobile phone, all participants in the system are likely to receive and respond to SMS messages more quickly and possibly more reliably than they are to e-mail. Again, the application of technology to the m-learning environment is facilitating all the time, everywhere learning.

Quality learning environments should give our learners the opportunities to interact and engage with other learners and with the lecturers; we therefore need to design SMS interactions to provide learners studying at a distance, with such opportunities. The focus should be more on how to enable learners to find, identify, manipulate and evaluate existing knowledge and to integrate this knowledge in their world of work and life to solve problems, and to communicate this knowledge to others (Viljoen, Du Preez & Cook, 2005). To achieve this, our objective is to supplement existing printed learning resources by introducing carefully crafted and strategically applied aspects of m-learning into the learning environment.

The fifth feature to consider is that the MP3 player and voice recorder. This feature store and play digital audio files that, in the case of m-learning applications, are commonly referred to as podcasts. Any device that can play MP3 files can be used to listen to podcasts. Most podcasts consist of an audio file that conveys information on a given topic, often simply a recorded lecture that is made available on-demand to learners. Recently, however, podcasts have begun to evolve in response to improved

MP3 players. Many of these devices now offer the option of displaying a slide show of static digital image files, or even playing digital video. Using this technology, podcasts can, for example, include traditional slides to accompany a lecture or a video file of the lecture where solving of sample problems or presentation of other information can be viewed simultaneously with the audio of the lecture. In a dramatically short time podcasts have advanced to a fully-developed instructional tool, utilizing not only audio, but also image and video files. For users, podcasts have become much more popular as a tool to download audio files of lectures and tutorials (Oloruntoba, 2006).

For the proposed system at the EC of VUT the features of a mobile phone to be used in the m-learning environment will include at least the following:

- SMS: This feature will be used for communication, instruction and guidance throughout the course.
- MP3 player and voice recorder: This will be used to listen to, and view podcasts of lectures and other related topics. Learners will also be required to do an oral assignment (using the voice recorder).
- Web browser: Lecture notes and assignments will be posted on a subject website. Further information searching on related topics can be conducted to complete assignments.
- Email: All assignment submissions and general communication will be conducted using this feature.
- eBooks: Course content will be made available as an eBook.

A pilot program will be conducted on a single course and results and lessons learned will be used to refine and enhance the system. This will be implemented and tested as part of a Masters degree in Technology at the EC of VUT.

6. Conclusion

In order to establish whether m-learning can be implemented successfully at the EC of VUT as an effective teaching tool, a study was undertaken to determine what m-learning involves. The results of the study enabled us to define m-learning for the purposes of this study and present the benefits of m-learning. We discuss the results of an m-learning awareness survey conducted at the EC of VUT and found that these results are in correlation with international trends. This gave us confidence in the credibility of the results of our survey and it confirmed that there is a need for an m-learning environment at the EC of the VUT. Based on our study and the results of our survey, it was therefore clear that our selection of m-learning, rather than other learning tools, is justified and supported. Consequently, we propose an m-learning system to be piloted by means of a Masters in Technology research project at the EC of VUT.

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