

ARTIGO

Mobile Learning in eHealth: Increasing Learning Options by Supporting the Mobility of Learners in Developing Contexts

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OBJECTIVE

This chapter focuses on increased options for learning in health education through supporting the mobility of learners with appropriate technologies with particular emphasis on developing contexts. The chapter does not deal with mobile student access to general administrative information for example timetables, maps and opening hours of student facilities.

The chapter has been informed by the literature on mobile learning in health education and in developing contexts, through case studies, international developments as well as a visit to seven South African universities during May and June 2011 during which the first author presented seminars on mobile learning (mLearning). The personas created to reflect the potential of mobile learning were extended based on mobile learning cases at these South African universities. A collection of key links to mobile learning resources was also created as a result of these seminars (Uys, 2011).

We have used personas to describe the increased options for student learning in health education through supporting student mobility in the following areas:

1. Accessing learning materials
2. Performing learning tasks
3. Participating in learning interactions
4. Performing assessment tasks
5. Learning work processes
6. Accessing learning support
7. Evaluating teaching.

We further highlight a number of issues related to mobile learning in general and specifically in health education in developing contexts.

We propose that mobile learning be located within a blended and flexible learning framework as yet another approach to supporting learning by appropriate educational technologies; as is the case at Charles Sturt University (2011a; 2011b). A brief discussion of the key tenets of mobile learning follows.

MATERIALS AND METHODS

Tenets of mobile learning

There have been various attempts to define mLearning. We believe that mobile learning deals with the mobility of the learner, so that learning can occur anywhere/anytime. This anywhere/anytime approach to learning is made possible due to the proliferation of mobile devices and increased access to these devices (Traxler, 2007). Mobile learning can also integrate the uses of mobile devices in a traditionally non-mobile environment such as using smartphones for polls in the classroom.

It is very difficult to define a mobile device, because of the rapid changes in the technology, but below is one attempt to highlight the new possibilities that mobile phones and tablets in particular bring to the learning context: A mobile device is typically a pocket-sized or handheld computing communication device having a display screen with touch input, keypad or keyboard. Mobile Devices are typically wireless enabled allowing access to the Internet and use Web Applications to connect and engage with more powerful computing capabilities.

Mobile learning supports personalised learning par excellence because the devices are focussed on the learner, and not the institution. It is also used by the learner to create an environment where learning can take place in a more personal and individually suited space. It further supports authentic (“real life”), situated (learning takes place in the surroundings that make learning

meaningful) and contextualised (within a real life context), and contingent learning (reacting to the environment and changing experiences).

Mobile learning also aligns with emergent learning as the mobile devices are available to learners on a near continual basis and can be used to capture unintended learning. Mobile devices have a key focus on communication with others, and mobile learning therefore supports social constructivist learning through communication and the use of social media.

Mobile learning has been occurring internationally within a rapidly changing technological environment with exponentially increased usage and provides the backdrop for, but also informs mobile learning in health education and in developing contexts.

RECENT STUDIES AND INTERNATIONAL DEVELOPMENTS

The Horizon Project is a long-running qualitative research project that seeks to identify and describe emerging technologies likely to have a large impact on teaching, learning, research, or creative expression within learning-focused organisations. For the last three years mobile learning has featured as the number one emerging technology both internationally and in Australasia (Horizon, 2011; Horizon Australian and New Zealand, 2011).

With growing levels of mobile ownership right across the globe many Universities are developing mobile projects to try and capture this trend. Mobile has massive potential in higher education because of its ubiquity in the student population. This is especially the case in developing contexts like Africa where, for example, 99% of the students at the Catholic University of Mozambique have a mobile phone, while less than 10% have computers (Henzinger, 2011). While mobile devices in developing contexts are often the primary device, these devices are often secondary devices in developed contexts. The

technology is here in both developing and developed contexts, ready, available and in wide spread use.

Abilene Christian University have been running the largest and longest mobile program in the world. They have 100% saturation of mobile devices across the entire student and staff population. Findings from a longitudinal survey conducted from 2008 to 2010 demonstrate that the total percentage of positive student responses to questions regarding use of mobile devices as a positive and helpful part of their college experience were above 80% during the first 4 surveys and this has increased to over 90% (Abilene Christian University, 2009).

After a recent iPad trial at Oklahoma State University reported 75% of students agreed or strongly agreed with the statement, "I think the iPad enhanced the learning experience of this course." (Oklahoma State University, 2011).

The report from a pilot program at the University of Notre Dame stated that students feel that mobile technology encourages exploration of additional course topics, helps manage time, provides new functions/tools, increases learning, and makes courses more interesting (University of Notre Dame, 2011). A number of other Mobile Pilots include:

- University of California Irvine – www.imeded.uci.edu
- Stanford University - <http://med.stanford.edu/ism/2010/august/ipad.html>
- Duke University - <http://dukedigitalinitiative.duke.edu/page/technologies-1#ipad>
- Seton Hill University - <http://www.ipadonthehill.com/>
- Trinity College University of Melbourne - <http://www.trinity.unimelb.edu.au/Media/docs/iPadPilotReport2011-1b1e1a52-79af-4c76-b5b6-e45f92f2c9e9-o.pdf>
- University of Adelaide - <http://www.adelaide.edu.au/news/news41241.html>

The range of mobile devices (such as Phones, smartphones, PDA's, Tablets, Netbooks and Portable Gaming Platforms) is more common and we are seeing an increase in usage of these devices by staff, community members and students. Many of these are Internet capable and are able to connect via a wireless connection or a 3G mobile network. In the 3 years (2006-2009) mobile web traffic on the AT&T network in the USA increased 50 times, up 4,932% (Morgan Stanley Research, 2009).

According to the UN Telecommunications Agency (www.itu.int) 77% of the world's population now has a mobile device – 5.2 billion people. In the final quarter of 2010 Fortune reported that Smartphones outsold PCs for the first time – a full two years before the prediction by Morgan Stanley. This tremendous growth is expected to continue with the number of new mobile devices, specifically tablets, expected over the next few years. Gartner predicts worldwide rollout of 54.8 million tablet units in 2011, 103.4 million in 2012 and 154.2 million in 2013 on top of the 11 million sold in 2010 (Fenton, 2010).

A typical Smartphone has not only a wireless internet connection but a GPS, accelerometer, compass and multi-touch interface which can be developed to create a much more personal experience where content can be delivered, created and contextualized by a student's physical location (Lukew Ideration and Design, 2010).

At the March 2011 introduction of iPad 2, Apple CEO Steve Jobs shared recent numbers on Apple's "post-PC" sales and market share.

- Apple recently shipped their 100 millionth iPhone.
- Apple has sold 15 million iPads - that's more than every tablet PC ever sold.
- There are 65,000 apps specifically developed for the iPad.
- There are more 350,000 apps available on the iPhone.
- More than 10 Billion Apps have been downloaded from the App Store (Apple, 2011).

In the fourth quarter of 2010 Amazon had sold more eBooks than printed books for the first time in its history (Amazon.com, 2011).

Mobile learning in health education and in developing contexts

The case for mobile telecommunication integration into developing contexts has been well documented. The reasons for such rapid implementation comprise of a mixture of internal and external factors. Most notably, according to Krull (2005) is the lack of telecommunications infrastructure within the region due to under development of vital ICT cabling and node services. This view is also held by Brown (2004), Traxler and Leach (2006) and Nigini et al (2002) who believes that higher urban density ICT infrastructure compared to the low level of infrastructure in rural areas have resulted in a rise of mobile networks to fill the void left by underdevelopment. Nigini et al labels this phenomenon as “teledensity” (p. 331) and believes it was a fundamental precursor to allow market expansion in an area of apparent need.

Liberal regulatory environments and global market penetration have allowed for the rapid expansion of mobile telecommunications in developing contexts with a pre-mentioned history of under developed infrastructure. A report in 2008 by the International Telecommunications Union stated that Africa has become the world’s fastest mobile phone market highlighting that The Democratic Republic of Congo, population 60 million, has 10,000 fixed telephones but more than a million mobile phone subscribers (p. 2). Aker and Mibiti (2010) claim that the increase in mobile telecommunications can be largely attributed to stronger internal market competition. They conclude that countries with regulation deterring market competition (citing Angola and Mozambique as examples) are not experiencing the same level of mobile telecommunication growth.

Strong liberal regulatory environments and the introduction of competitive markets in newly democratically exposed developing, and in particular African states have enabled mobile communication technology to fill the void that has been left from the underdevelopment of ICT infrastructure. The subsequent introduction of mobile communications technology in the region has introduced a range of new learning environments, which seek equality and a bridge to the digital divide.

Examples of mobile learning in developing contexts are gradually increasing, as more countries see the apparent benefits. Studies by Traxler and Leach (2006), Aderinoye et al (2007) and Ford and Botha (2007) all highlight varied examples of early mobile learning projects in a developing setting. Traxler and Leach (2006) showcase two examples of in-service teacher training initiatives and find that in both cases, the inclusion of mobile learning was seen to be ‘very useful’ (p.99). Aderinoye et al (2007) analysed the advantages of integrating mobile learning into Nomadic Education programs in Nigeria. They found that “Procuring mobile phones for these nomadic groups of learners will not only motivate them and in still positive attitudes towards learning, it will also help to sustain their interest in gaining literacy skills, especially through the distance learning approach” (P. 1). While Ford and Botha (2007) looked at a three year international collaborative project aimed at creating meaningful learning environments using mobile phone technologies and services. The study, which consisted of exploratory research in the use of mobile phones in schools in South Africa, found that appropriate contextual models of mobile learning yield successful learning outcomes and a bridging of the digital divide.

Whilst the integration of mobile learning within developing contexts is relatively new, a series of issues have already begun to immerge. Firstly, while greater liberal regulatory markets are indeed a precursor to mobile telecom-

munications infusion, developing contexts with more democratic regimes seem to have lower diffusion rates. Rouvinen (2006) speculates that - “the variable is also standing in for other things, such as political instability or the communication need of military supporting an authoritarian regime” (P. 62). Second, mobile learning environments are still in their infancy. As Brown (2003) states - “The challenge is to design and develop relevant learning environments, based on sound didactic principles that will ensure the optimising of learning in the m-learning environment (p. 198) And finally, the rapid speed of technology development could have a detrimental effect on developing contexts. The series of literature documented only focuses on simple SMS or PDA forms of mobile technology. With the advent of smartphones (Google, iPhone and Windows) and tablet computing, current literature is still limited on the impact of these technologies.

Literature on mobile learning in developing contexts is expanding. What it does highlight is an apparent ‘leap frogging’ of traditional technology due to poor regional infrastructure and emerging liberal marketing deregulation. This leap frogging of traditional telephony communications has laid the groundwork for an integration of mobile technology and thus, a subsequent mobile learning platform. Initial indicators suggest that mobile learning in developing contexts will yield positive results, especially in the areas of digital equity and educational access. Issues regarding adequate mobile learning models, the advent of smartphones and tablets and regional bandwidth issues need more analysis before more consensus on issues can be achieved. We can assert, however, that the technology is available in both developing and developed contexts, ready, and in wide spread use.

Studies into the use of mobile devices in clinical health studies are beginning to emerge as institutions and organisations begin to see the benefits of widespread implementation. In a recent literature review, Orwat, Graefe and Faulwasser (2008) provided an overview of recent developments and imple-

mentations of pervasive computing systems in health care. The literature review found that 57% of the systems identified were intended for use in the home and mobile settings (as cited in Vyas et al, 2010 p. 214). Walton, Childs and Blenkinsopp (2005) conducted a project that explored the potential for mobile technologies to give health students in the community access to learning resources. The study found that at a theoretical level, mobile technologies can help overcome barriers towards gaining effective access to learning resources in a local community (p. 57). Expanding on the beneficial notion of mobile learning technology, Scott, Kitching, Burn, Koulias, Campbell & Phelps in 2010 found that in a study based on student evaluation of case-based learning scenarios, mobile devices demonstrated their potential to enhance bedside learning (p.889). In 2007, Palmer and Devitt surveyed fifty 5th year medical students as to their affordances of using iPods as a learning device. The survey found that almost half the students (47%) felt that they would like access to interactive learning material to download to an iPod and 55% believed they would use an iPod to learn whilst travelling (P.7).

The research firmly indicates that there have been some giant leaps in the implementation of mobile devices within health education. However, widespread realisation of the potential affordances of mobile technology is still in its infancy and requires further research.

Mobile learning at Charles Sturt University

Charles Sturt University (CSU) is keenly interested in mobile learning given international and national developments. It conducted an investigation in 2010 to identify related needs and options (Charles Sturt University, 2010) and built the initial personas that were altered based on the South African experiences, the literature on health education and presented in this chapter. The investigation lead to a proposal that was accepted for the following activities to be carried out in 2011 to 2013:

- Mobile Interact (working with others in the Sakai community to “mobilise” the Sakai Open Academic Environment; Interact is CSU’s local name for Sakai)

- Conducting a number of mobile device trials
- Prepare rich media learning materials primarily for distance students in mobile accessible formats
- Making the subject evaluation at the end of each session available to be completed from mobile devices.

In July 2010 (very shortly after the iPad was launched in Australia) an educational technology survey was conducted among its students (approximately 38000 with 4000 responding). A large majority (87%) of students indicated that they wanted to revisit work from lectures on their handheld/mobile device. Students were evenly split among those who wish to access on campus information; subject information; subject readings; assessments or notifications on a handheld/mobile device. At that stage only 42% of our students had Internet enabled mobile phones (“smartphones”). The School of Communication have surveyed their first year students since 2005 about a range of technology/media issues. Of the 207 surveyed in 2010 94% owned a portable media player (e.g. iPod) and 80% used iTunes at least weekly.

The Online Learning Management System at CSU based on Sakai (and referred to as Interact) has a podcasting tool that is already being used for mobile learning. The ePortfolio/Personal Learning System (Pebblepad) have apps for iPhones, iPods and iPads as well as a mobile web (Charles Sturt University, 2011c). CSU Replay (Echo360) which caters for lesson recording and Vodcasts is linked to iTunesU in the second half of 2011.

Currently general mobile access is available to bus timetables, contacts, library, maps, opening hours via a mobile web targeting iPhones and android phones (Charles Sturt University, 2011d). These services will be extended later in 2011 to include campus maps; contacts; student news; and a centralised messaging centre.

RESULTS

Below follows a description of personas of mobile learning that have been informed by the literature review, work at Charles Sturt University and the South African university context in the following areas: accessing learning materials; performing learning tasks; participating in learning interactions; performing assessment tasks; accessing learning support; and evaluating teaching.

1. ACCESSING LEARNING MATERIALS

The personas below describe the affordances for student learning in accessing learning materials provided by supporting the mobility of the learner through mobile devices.

Learning Resources

Kevin (20) is a student waiting for public transport in a remote location. While waiting to get home he uses his tablet to download resources for his subject, including a study guide. He is then able to make use of this time to read through the content.

Vodcasts

Michael (23) is a final year nursing student. His study is based on campus but he is going to do his 3rd clinical rotation in a practice in 200km away. Phlebotomy is not his strong point and he knows this will be one of his tasks he will need to perform, so he uses his tablet to download some videos that he can review in the field during break or on the commute to the clinic.

eBooks

Martha (28) is studying occupational therapy by distance. Whilst on the train she is able to browse books and resources in an online store on her tablet.

She is able to read a few samples and chosen purchase an eBook of her prescribed texts for a number of subjects so she can avoid lugging the large volume print copies to and from work.

Podcasts

Rachel (43) has two children and is studying through distance education. She uses mobile technology mostly to complete her readings while on the move. She would like to be able to access podcasts of her lectures while she is preparing dinner using iTunesU, and on her hands free mobile phone while travelling to work and socially. [Mobile learning thus allow for reactivation and reflection (Quinn, 2011, p. 108)]

Apps

Elise (25) is studying an anatomy subject. The class has been trialling the use of a new Anatomy Atlas app for tablet devices. The app shares all the same information as the traditional large format text but displays the information and diagrams in 3D. Elise can turn on and off layers, for example she can look at skeletal and muscular systems separately or together. She is also able to watch animations and videos of how various parts move and interact with each other. Her favourite feature is the ability to search and for the app to display the results like Google Maps, showing the various results with pins that she can zoom in and bookmark.

2. PERFORMING LEARNING TASKS

The personas below describe the affordances for student learning in performing learning tasks provided by supporting the mobility of the learner through mobile devices.

The Learning Management System

Andre (42) is a 4th year dentistry student on work placement in a small country town clinic. He uses a tablet to access his Learning Management System modules and communication tools. This gives him a sense of a personal and personalised experience and provides the ability to communicate with other students in the class using the chat tool and forums.

ePortfolio/Personal Learning System

Liz (24) is a final year student in Nuclear Medicine student. She is able to update her ePortfolio using her smartphone to keep a record of her experiences on her final work placement. From the day-to-day meetings, the clients she worked with and the tasks she performed. She also uses the most at hand technology, in this case an application on her smartphone, to document emergent/unintentional learning.

Mobile Capture

Mick (44) is a mature age student, family man and farmer. He is in his second year of study doing a joint agricultural/health science diploma by distance education. Out in the field, where there is no network connection, Mick is still able to use his phone to take photos of examples from his study guides that are also geo-tagged. When he is back at the homestead he is able to upload them to the forums for discussion with his peers. This supports contingent learning (reacting to the environment and changing experiences) and situated learning (learning takes place in the surroundings that make learning meaningful).

Mobile Publishing

Hannah (25) is a second year radiography student. She is doing a group assignment which is due after the Easter break when most people seem to be heading home. Before the group heads off they decided that while they are

all away they will work on their group assignment. The students have been asked to mark up and comment on x-rays provided by the lecturer and share them on the groups private blog. Using her tablet Hannah is able to download the original images and using an app annotate and comment on the images. She is then able to send these files for the group to share so the other students can comment immediately and vice-versa. The group is able to finalise their images and submit them using this method.

Educational Games

Joseph (19) is a first year medical science student. He travels regularly by train to the campus so he often accesses educational games that his lecturer created to introduce complex chemistry on his mobile phone. He enjoys the playfulness of material and enjoys this way of studying as it helps to remove the stress that he used to feel about this subject. Mobile learning thus addresses also the conative elements of learning through providing anxiety-reduction support and motivational learning support (Quinn, 2011, p. 25)]

Note taking/making

Phillip (34) uses his mobile phone to take notes during his anatomy lectures and some of his classmates use their tablets. Using a cloud application the class is able to share their notes that improves the classes ability to work as a team. These shared notes are then available for review by the class regardless of device or location.

3. PARTICIPATING IN LEARNING INTERACTIONS

The personas below describe the affordances for student learning in participating in learning interactions provided by supporting the mobility of the learner through mobile devices.

Classroom Interaction

Tiffany (18) is a school leaver and full time first year student living on-campus in student accommodation. She is studying a Nutrition subject and during a class, Tiffany is asked to respond to a poll on nutritional issues covered on television. She is able to answer using her smartphone while others in the class use their laptops and tablet computers. The next slide shows the results of the poll, which leads into a conversation over how health issues are covered in the news. Tiffany feels engaged with the class that is animated and lively.

Chat

Robert (35) is a 4th year student on work placement in a small country town. He uses a tablet to access his Learning Management System modules and communicates with other students in the class using the chat tool. In addition, he belongs to a study group setup on Facebook where he also participates actively in chats. He is also interested in broader topics and participates in a number of Twitter discussions.

Online Forums

George (22) is on work placement for his nursing subject. He uses his smartphone to access the online forums to see how his peers are going and to share his experiences. During his rounds he has had to deal with a particularly difficult patient and during his break post how he and his supervisor dealt with the situation. This stimulates a long thread of other students sharing anonymised stories of and techniques that they have picked up. He also loads it up to his blog. Other students are able to read these and feel more prepared if they are placed in similar circumstances. This supports authentic learning (meaningful learning tasks are related to immediate learning goals).

Messaging System – Organic/Social

Matt (19) is from Sydney and is new student on campus having moved away from his hometown. He is into music, videos, online gaming and footy and quite a sociable person. Matt is able to contact and make new friends with his peers from a number of different subjects through a Facebook group that was setup for first year students. They are able to keep in touch about their study as well as share information about the area, where to go and what to do, using his mobile phone via SMS. He has also joined a couple of other groups since and even set one up to get together for one of the difficult chemistry subjects so they can plan to meet and test each other before the exam.

Messaging System - Learning Management System

Pete (41) is an academic teaching a distance education cohort in the deep Karoo, with only two residential schools per session per year. His students in the region have intermittent Internet access at best and the mobile networks are far more robust. Pete sends the learning management system to send out notifications to students using SMS regarding the availability of new Internet resources as they are posted so students know when they need to get online.

Communication and Consultation

Liz (44) is a coordinator for students doing work placements scattered across the country. Liz is able to contact all her students via Skype on the tablets provided by the university to students going out on work placement. She is able to arrange meetings with all the students and their supervisors via video while they are on work placement. She has also setup consultation times so that students can call her if they have questions or any issues. The tablets use both Wi-Fi and 3G so are able to connect almost everywhere so students are not as affected by the facilities available at their location. Liz can also ask students to send her short recordings of their work so she can provide feedback.

4. PERFORMING ASSESSMENT TASKS

The personas below describe the affordances for student learning in performing assessment tasks provided by supporting the mobility of the learner through mobile devices.

Self-Assessment Tools

James (29) is studying a health science degree. James is about to undertake a multiple-choice test on the train as part of his subject revision. To access this, James uses his tablet and an app specifically designed for mobile use. Once complete, James will get instantaneous feedback from the test and see where he may need to focus his studies for the exam.

Individual and Group assessment

Leslie (36) is an academic who has uploaded blood test results from a range of test patients with a variety of conditions into the Learning Management System. The students are then requested to comment on the results and develop diagnosis. They can access these tests from their mobile devices as well as their desktops and laptops and submit their comments for feedback by other students and the academic. Students are able to comment individually or work as a group to identify more challenging conditions.

Online Assignment Submission

Sam (28) is a trainee nurse completing a Bachelor of Nursing. Sam is struggling to connect to the Internet because of his very remote location. Sam struggles with a poor Internet connection at home but is able to get mobile reception in some locations with higher elevation. Sam is able to take a tablet computer and submit his assessments using his 3G connection saving a long trek into town. Mobile learning thus addresses geographical or spatial distance.

5. LEARNING WORK SKILLS

The persona below describe the affordances for students to use a mobile device to develop skills applicable to their clinical practice.

Patient Interaction

Lynn (23) is a medical imaging student and on her work placement she is required to discuss the scans performed with patients. Using a tablet and an app provided she is able to display the scans and discuss them with the patient in a more relaxed environment in the office. Away from the clinical environment the patient feels more relaxed and feels able to discuss and ask questions. This supports context aware learning (learning is informed by the surroundings and environment of the learner).

6. ACCESSING LEARNING SUPPORT

The personas below describe the affordances for student learning in accessing learning support provided by supporting the mobility of the learner through mobile devices.

Subject Outline/Syllabus

Patrick (37) is a part time post-grad student that works in the city with a 45-minute commute each way. During his commute he remembers that one of his assessments is due next week but can't remember the exact date. Using his smartphone he logs into the Learning Management System, checks his subject outline and then marks it into his calendar with a reminder for the weekend.

Learning Skills Toolkit

Said (22) is an international student studying medicine. He often finds he needs to translate and get definitions of words used in his lectures. He also struggles with APA referencing having used the Harvard format previously.

By accessing the Universities Student Toolkit from his smartphone he is able to find words and meanings during the lecture and follow the lecture better. He is also able to convert his references from Harvard to APA for his assessments.

Learning Support Tools

Robyn (52) is a mature age student returning to study after 30 years in the workforce. She is struggling with the Learning Management System and with the DE materials that are so different from when she got her degree. Fortunately she is able to access a range of resources and tools to help her, including interactive tutorials so she is able to see how things work. She has to contribute to a Wiki in one of her subjects and after watching a video showing how wiki formatting is done she feels more confident. She has downloaded a cheat sheet to her mobile that lists all the codes. Robyn can refer to it quickly whenever and wherever she needs to and use it in conjunction with her laptop.

Mobile Device Library

Grace (19) is a first year undergraduate student and has just borrowed an eReader from the library. The eReader is preloaded with the textbook she needs, as well as guides to Academic writing, referencing, successful database searching, evaluating information and a campus map to help her find her way around the campus. Grace has the eReader for a two-week loan period and can take it with her on work placement if she needs to.

Personal Learning Support

Warren (45) is having difficulty using the Learning Management System. After reading through the support material he is unable to resolve his problem. He is able to SMS and ask someone from the University to call to help him out rather than wait on the phone, which would make it an expensive call from his mobile. The support team is able to call Warren and talk him through his issue and solve his problem.

7. EVALUATING TEACHING

The personas below describe the affordances for student learning in evaluating teaching provided by supporting the mobility of the learner through mobile devices.

Classroom Feedback

Leanne (31) is a first year academic and it's her first full time teaching position so she is nervous about her performance. Leanne will be in charge of reviewing and updating the subject next session and she wants to ensure that she is engaging with the students, that they are finding the subject information useful and the assessments beneficial. To do this she has deployed a range of feedback tools for her subject materials. Students can "like" sections of the online modules as well as make comments, which are recorded anonymously. Students have already commented on a number of areas that are difficult to understand and she now knows that they need further development. Students are able to update their comments simultaneously, using a their smartphone.

Clickers

Don (19) studies on-campus and is invited during the class to provide feedback to a poll. The university has rolled out a new system that allows the students to use any device with a browser to reply to polls or questions - replacing the clickers they used last year. Some students have bought their laptop but the other students are able to use their phones and tablets. The polls and question make the class more interactive, make it more open to asking questions and helps clarify some of the complex topics covered.

Mobile Subject Evaluation

Archna (23) is a third year student and she is sitting in a café when an email comes through to her smartphone that it is time to review her subject. Using her smartphone Archna is able to complete a subject evaluation quickly and

easily. She is able to complete simple survey questions, is able to provide ratings of various elements of the subject and make any personal comments. This information is fed back to the academic to assist in their professional development and planning of the subject.

ISSUES TO ADDRESS REGARDING MOBILE LEARNING

Mobile learning in health education, including in developing contexts, is not unproblematic and a number of issues are highlighted below.

Ethical issues need to be considered:

- There could be inequity across different socio-economic groups affecting the learners' ability to access the technology. This could be addressed by organisations providing equipment for instance through the library. Alternatives delivery mechanisms to mobile delivery could be provided.

- There are disputes around the association between this type of technology and cancer development and also the potential impact on fertility because of radiation. Appropriate risk reduction strategies needs to be promoted.

- Inappropriate and prolonged use of mobile devices could have a negative impact on sight and hearing.

- The appropriate use of mobile devices in class should be considered to ensure engagement of students with the learning task and to avoid distractions for other students.

- Using mobile devices in assessment contexts should be carefully monitored to preclude cheating.

- There could be privacy issues given that it is often technically possible to identify cell identification numbers.

- When use of mobile devices is encouraged to support learning in health care settings issues of client confidentiality and privacy need to be meticulously managed

Educational issues to address:

- Mobile learning should be integrated within a blended and flexible learning framework to ensure achievement of educational objectives.
- Shallow learning through quick but artificial engagement needs to be discouraged in favour of deep learning.
- Mediated communication should not replace face-to-face engagement where possible. Blended learning should be promoted.
- Varied learning preferences need to be appreciated and respected.
- Cognitive load (“head space”) should be respected and the requirement for continual learner engagement needs to be carefully evaluated.
- Multi-tasking has cognitive limitations and simultaneous interactions need to be discouraged.
- The role of the teacher/educator needs to be refined in this student-active context.
- The appropriateness of the more informal language often used with mobile devices needs to be considered.
- Netiquette and digital citizenship needs to be agreed on for mobile communications.

Technical issues to be dealt with:

- Variable access in different locations.
- Variable platforms being promoted such as IOS and Android that mitigates against generic access.

General issues to focus on:

- Determine where mobile learning might be in its maturity of application in relation to use by a teacher or institution. Gartner's Hype cycle (Gartner, 2010; Gartner, 2011) depicted in Figure 1 may assist in this process.

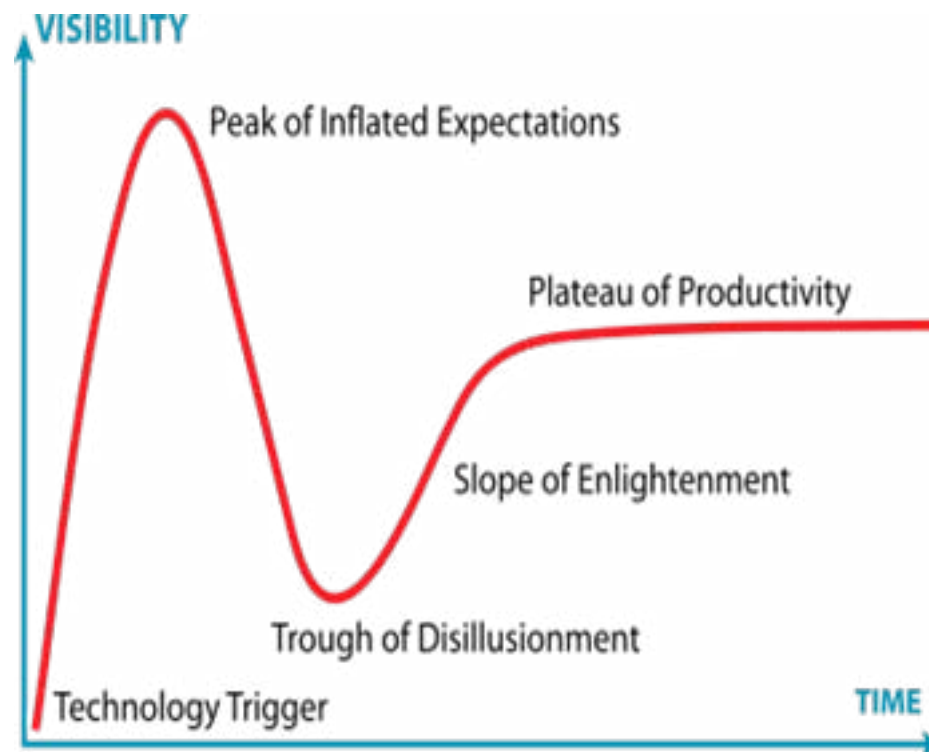


Figure 1: The Garner Hype Cycle

- Spaces are not neutral and the varied localities wherein mobile learning can take place could influence the learners' interactions. This could be particularly critical in assessment and evaluation.

- Security on public transport, especially in developing environments, might inhibit the use of mobile learning.

- Mobile learning needs to realized within an appropriate educational change management framework. As such four key change management variables Should be aligned: people; tasks; organisational structure or design; and technology (in this case mobile technology). Top down and bottom up change strategies need to work in unison as promoted in the LASO model (Uys, 2000; Uys, 2007; Uys, 2010) and shown in Figure 2.

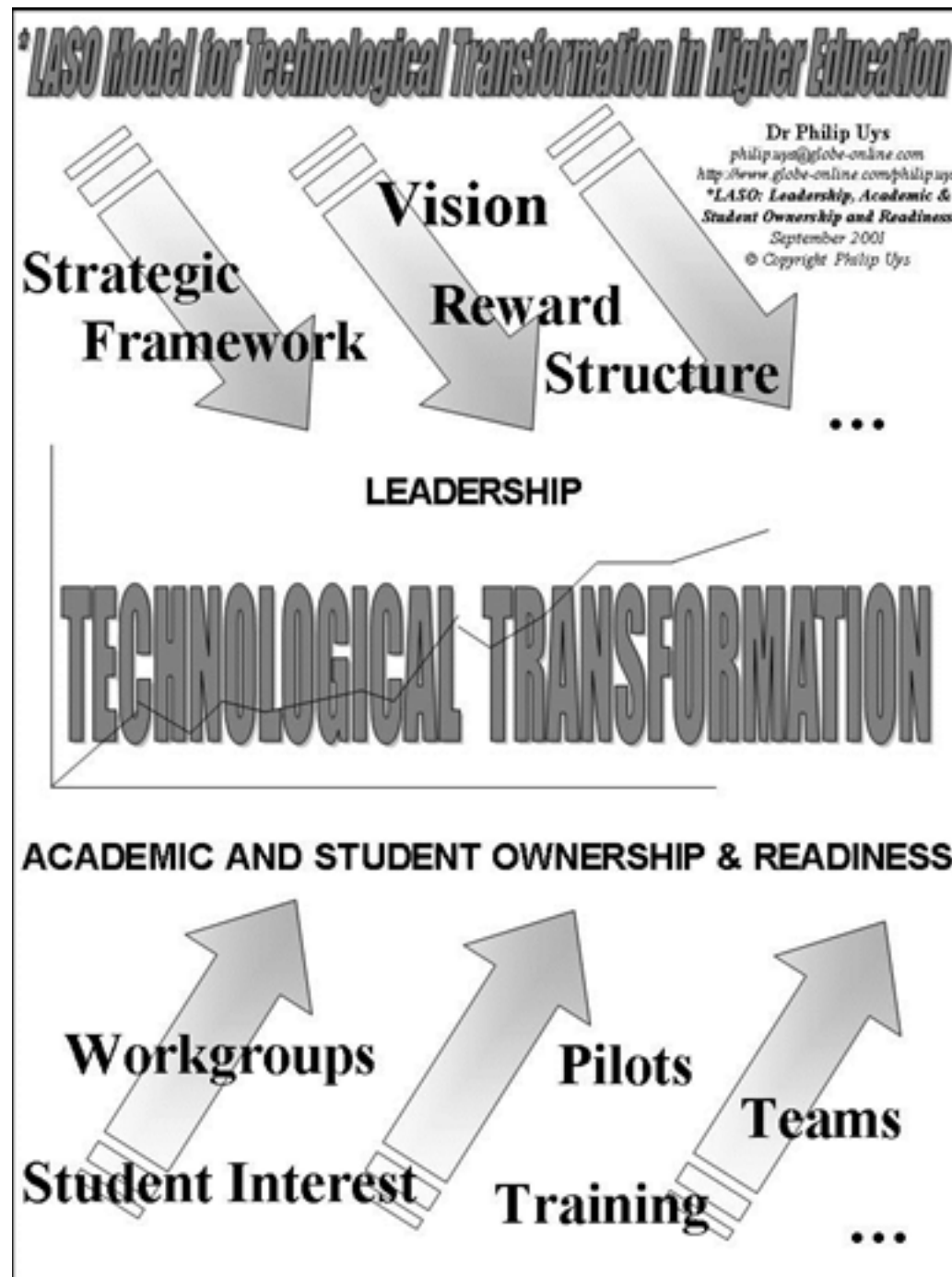


Figure 2: The LASO Model

CONCLUSION

We have described a range of increased options for student learning in eHealth particularly in developing contexts through supporting the mobility of the learner with mobile devices. It is further clear that the technology is available in both developing and developed contexts and that it is ready and in widespread use. There are a number of issues to consider when using mobile learning in developing contexts.

Educational institutions involved in eHealth in developing contexts can reap the benefits of mobile learning through continued openness to change as typified by Eric Hoffer (n.d.): “In a time of drastic change it is the learners who inherit the future. The learned usually find themselves equipped to live in a world that no longer exists.” Mobile learning developments furthermore need to be owned as Ellyard said (Hogan, 2003): “The future is not some place we are going to, but one we are creating; The paths to it are not found but made, and the activity of making them changes both the maker and the destination.”

Educational institutions in developing contexts need to continue to develop initiatives that integrate mobile learning technologies into their educational technology portfolio, to display the well-established ingenuity in developing contexts, while addressing associated issues in a responsible way.

There is great potential for mobile technologies to support health professional education. As the personas have described, these technologies can positively support learning in university and workplace settings. The ability for students to access and engage with complex learning material and form social connections while learning are valuable facilitators to help students develop the knowledge and skills required for professional practice, particularly in eHealth.

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