Final Assignment # 1

"Mobile Technologies for Medical Education: A Critical Review"

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ETEC 500 – Section 65D

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2011

Introduction

Mobile learning or 'mLearning' is the latest educational technology buzz word and it is hard to escape the noise surrounding it. Although the term may have different meaning for different communities, it certainly is a cutting edge delivery platform for teaching and learning. In higher education, the educators are posed with a challenge to leverage the communication mode of today's nomadic generation to make education delivery more efficient, personal and culturally acceptable which in turn calls for radical changes in the traditional forms of education.

Medical students are typically mobile learners who need to work at various clinical sites, community hospitals where they may not get appropriate internet access for researching evidence to answer clinical questions. During the Problem Based Learning (PBL) block in the initial years of the MD undergraduate programme, students explore wide variety of virtual learning resources including research journals, blogs, wikis, forums, podcasts, course handouts and collaborate with peers and tutors on the go. Mobile devices provide the desired personalized learning environment (PLE) that allows students to fit learning into their busy schedule.

Working as a Technical Solutions Analyst in UBC Faculty of Medicine, I am intrigued to research and leverage innovative mobile technologies for problem based learning and clinical decision making. The objective of this article is to review, summarize and critique scholarly writings supporting the use of mobile technologies in medical teaching and learning, synthesize common characteristics and build a case for piloting mLearning tools within the Faculty. For the purpose of this article, mobile learning refers to "seamless access to learning resources and social media tools anytime, anywhere". It is interesting to find that mobile technology is no longer a fad and is currently shaping the future of eLearning.

Literature Review

In an attempt to define mobile learning and applying its key concepts to learning experiences, El-Hussein & Cronje (2010) disassemble the fixed meaning of mLearning and seek to provide a comprehensive definition in the context of higher education. They break down the major components under three separate concepts –

1. Mobility of technology
2. Mobility of learner
3. Mobility of learning process.

The authors scrutinize articles in select international journals on mobile learning and segregate content under above mentioned concept areas. Their findings under technology mobility show that the 'mobility' of cellular devices makes them popular, trendy and highly desirable learning instruments among the younger generation. Further, the study proposes 'learner centric instruction design' to provide personalized learning experience and increased motivation for collaboration in communities. Finally, in order to accommodate this kind of unique learning experience, a convergence between mobile technology and instruction design is strongly suggested.

The article analyses extensive research literature and synthesizes common threads to provide valuable insight to this fascinating technology and intrigue further investigation. Their conceptual framework really helps to understand the technical, student and pedagogical dimensions and areas for further research.

Application in medical education

Exploring the trends and barriers in learning, Chatterly & Chojecki (2010) organized a quantitative study on PDA usage among 571 undergraduate medical students at University of Alberta. In February 2008, the two librarians conducted an online survey consisting of 19 questions covering topics like handheld devices students own, frequency of use and applications used. It was followed by three hour focus group sessions including 7 students where the librarians discussed the challenges in mobile usage and areas where library could provide assistance. Unfortunately, the survey received low response rate of 14%. 65% of respondents were PDA owners and from medical perspective, they primarily used it for searching drug reference (77.4%) and clinical textbooks (49%). In addition to accessing online health databases, students expressed interest in online tutorials, group interactive sessions targeted to user population. Small screen size, slower processing and typing speeds were some of the limitations prohibiting wider usage.

Reflecting on the article, it is needless to say that the results cannot be generalized due to low response rate although the promising potential for mobile learning is clearly evident. Also, with the advent of iPhones and iPads, there has been radical improvement in mobile technologies over the last couple of years and most of the technical limitations reported in the study no longer exist.

Hauser et al. (2007) conducted a quantitative study in early 2006 to evaluate the effectiveness of PDAs to access a popular medical research database, MEDLINE in clinical settings where there is no wireless access. During teaching rounds, teams consisting of resident physicians and third year students used “MD on Tap” mobile application for four consecutive

weeks to access MEDLINE and search relevant evidence for specific clinical questions. Altogether evaluators rounded 77 days recording 228 observed scenarios and 363 clinical questions out of which 68% were successfully answered. The evaluators were very pleased with the use of mobile devices for providing instant access to latest medical information required for evidence-based practice. However, the affordability of fast wireless connection, small display size and slow text entry in the devices were limiting factors for many physicians.

The article is well organized and the authors critically evaluate the results and identify the gaps in study. Due to small convenience sampling, the data cannot be generalized for all medical students although the overarching message seems credible. Also, one can possibly argue that the student interest might be due to the specific mobile application which may or may not be available for all devices.

Further, Zolfo et al. (2010) present a well written, innovative study on training health case workers in HIV/AIDS clinics in Peru using mobile devices. The 3 month training program consisted of mobile friendly 3D clinical simulation modules delivered to 20 physicians using individual smart phones (iPhone and Nokia N95). For each 2-week clinical module, the system provided access to Facebook for case discussions, Skype for tutor feedback and collaboration, Google Docs for content sharing and MLE Moodle for user tracking and outcomes assessment via MCQ based pre and post-tests.

In order to gauge user satisfaction, an anonymous questionnaire based mid-term survey with focus group discussion was conducted in December 2009. The survey results revealed positive end user experience with 86.6% liking the PLE experience and 94.4% indicating the added value of mobility while accessing educational content. Between the two devices, users had

a more favourable experience using iPhones. Three limitations acknowledged by end users include significant device and service cost, lack of interoperability and inability to generalize the findings to other programs. In spite of these challenges, it was concluded that mobile devices offer the merits of anytime, anywhere learning, ability to collaborate using social media tools while on the go and transforming the learning into permanent knowledge assets.

Although I generally agree with the survey and focus group findings, I have concerns around the sampling process and instrument accuracy that limit the ability to generalize results over a wider population. Although the study tries to bridge the gap between traditional and empirical learning, further research is required to substantiate the claim.

Limitations

Scrutinizing the mLearning landscape, Cain, Bird & Jones (2008) inspect the potential issues around implementation of mobile technologies like tablets and laptops within pharmacy education. They elicit and describe grounded issues in mobile technology adoption under four categories:

1. Planning and implementation – Specific areas to inspect include investigation of device type and model selection, purchase/ lease options, infrastructure and support costs.
2. Faculty buy-in and training – Professional development on use of technology, designing interactive, mobile friendly content and also finding strategic ways of avoiding unintended technology distraction.
3. Student expectations and attitudes – Provide mobile friendly environment for students including wireless access, sufficient power outlets and appropriate technical support.

An overarching concern for students is the proper technology integration into curriculum and appropriate instruction design of content (Cain et al., 2008).

4. Computer-aided distraction – Many educators argue against the implementation of mobile technology in classroom due to the unintended distraction they might cause leading to negative performance impact. They are concerned that students are more inclined to access Facebook, games, instant messaging and shopping in the classroom rather than concentrating on the lecture.

Cain et al. prepared an 18-item questionnaire covering these important issues and sent email invitations to academic leaders of 91 American pharmacy schools. With a 55% response rate, 24% confirmed a mandatory initiative in their schools and another 35% indicated a likelihood of adopting mobile technologies in next 5 years. Overall, there was a consensus that mobile technologies have the ability to enhance teaching and learning. The conclusions reflect that no 'one size fits all' solution exists and there are common issues regarding infrastructure, training, curriculum integration and management of computer-aided distractions'.

The article is thought provoking and raises some important questions which will have to be answered inevitably for a successful mLearning implementation. Similar to some other studies on this topic, the claims cannot be necessarily generalized although they generally seem plausible.

Conclusion

There has been a monumental jump in mobile technologies over the last couple of years and existing research confirms that mobile devices augment teaching and learning capabilities for anytime, anywhere learning. Today, the question educators are trying to address is not that

"should we get on the bandwagon?" rather they are investigating "when to get on the bandwagon" and explore ways of leveraging this student's 'preferred, ubiquitous and personalized technology' for teaching and learning.

The impact of mobile technologies has been so powerful that it is common to find students glued to their smartphones during transit, in the classroom, cafeterias and anywhere in the campus. The potential for reaching them via these devices is immense. It is imperative that the academic leadership realise the value in this technology and develop strategies to improve efficiencies in learning, develop high-order thinking skills and identify the gaps that mLearning can possible fill in.

There is ample evidence to support that mobile technologies can be used to offer generation friendly, personalized learning experience to medical students. However, further research is required if we are to consider it more than just a communication and information sharing tool. Zolfo et al. present an excellent case study on how mobile technologies can be implemented for case based collaborative learning in a clinical setting although its validity in undergraduate medical education is yet to be demonstrated. Needless to say that the practical considerations voiced by Cain et al. need to be examined and addressed appropriately for a successful mLearning implementation. Mere existence of devices does nothing to enhance learning. The need for faculty buy-in, professional development, innovative instruction design and integration into the curriculum is pivotal for overall success and adoption.

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