Adapting to Mlearning Demands in Higher Education

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Abstract

Mlearning is largely underutilized in higher education. Instructors need guidance on how to overcome challenges of implementing mlearning in a higher education setting in order to meet the growing demands of this technology. This paper will look at the numerous challenges confronting mlearning, including technical and pedagogical challenges, as well as challenges related to teacher-training and the individual learner. Suggestions for how to overcome these challenges will be presented. The effectiveness of mlearning implementation will follow, providing evidence of the importance of wide-spread adaption of mlearning technologies. The positive effects show that with proper implementation, students achieve higher learning outcomes, satisfaction, and motivation to learn.

Adapting to Mlearning Demands in Higher Education

Mobile learning, or mlearning, has become a prevalent teaching tool with the rise of personal mobile technologies. This rise is of no surprise when considering the rapid development of technology and its prevalence in daily-life. Students are no longer restricted to utilizing desktop or laptop computers to complete assignments, and instead have several technologies of various capabilities to supplement their learning experience. Instructors may assume that students will use traditional computers to communicate or complete assignments. However, they must instead adapt and create learning opportunities that rely on engaging and interactive mobile technologies.

While mobile devices largely allow for the adaption of mlearning, this learning delivery system is largely underutilized with many innovative features unused. Instructors and instructional designers (ISDs) must do what they can to maximize on this trend in order to better design for students' preferences, priorities, and needs. Current issues, including technical challenges, absence of adequate guidance, distractions, and pedagogical needs, may all contribute to the underutilization. The many intricacies that ISDs must account for with mlearning are abundant, and there is a risk of research becoming too technical, particularly when focusing on inherently technical learning platforms. Instructors must instead be provided with feasible solutions to challenges, some of which may be technical, but necessary, in order to better adapt and implement mlearning. By connecting these issues to the effectiveness of mlearning, instructors will be provided with the support and evidence needed to apply this learner-centered technology.

What is Mlearning

Differing from e-learning, mlearning includes many features of e-learning while improving and replacing many limitations (Gure, 2016). Definitions of mlearning vary across literature, with some more complex than others. The nuances in the varying definitions make it difficult to affix one definitive meaning to mlearning (El-Hussein & Cronje, 2010). What can be agreed upon is that the definition of mlearning is composed of three main parts: mobility, use of personal electronic devices, and a goal of learning.

Some researchers argue the definition of mlearning should be simplistic – any learning that takes place through a mobile device, or any learning that occurs when a learner utilizes learning opportunities provided by mobile technology (Gure, 2016). The focus on technologies is prevalent throughout definitions of mlearning. Ally, Grimus, and Ebner (2014) offer that mlearning involves the acquisition of knowledge through conversations that have taken place across multiple contexts, and through personal technologies. This mirrors that of Crompton, Muilenburg, and Berge, in which mlearning is defined as “learning across multiple contexts, through social and content interactions, using personal electronic devices” (Crompton, 2013, p. 4).

Location also becomes a factor with mlearning implying mobility of the learner. However, Brown and Mbati, by way of Daughtery and Berge (2017), point out the “misconception that mlearning is learning while mobile, represent[ing] a view of the portability of mobile devices and the notion of learning anytime and anywhere even while in motion” (p. 112). Instead, mobility should be understood to mean the ability of a learner to learn anytime, anywhere, and without the physical tether that traditional

classrooms or even some e-learning requires. Ultimately, the use of mobile devices enable access to information, without restriction on time or location (Al Murshidi, 2017).

Mlearning is not restricted to traditional education, nor is it a replacement for it (Teri, Acai, Griffith, Mahmoud, Ma, & Newton, 2013) as it may not be an effective means of delivering more complex education or training goals (Flesher, 2016). It can take place in both formal and informal contexts (Daughtery & Berge, 2017; Wang & Shen, 2012). In an informal context, mlearning could involve searching a mobile web browser to answer a question. In a formal context, mlearning can be combined with other forms of education, supplementing traditional education or e-learning. Mlearning does not necessarily seek to replace the use of computers in traditional learning, but instead can supplement with new methods and mediums (Al Murshidi, 2017).

An important distinction between traditional education and mlearning is the locus of control for learning. Learning using a mobile device is learner-centric, whereas traditional courses tend to be teacher-centric (El-Hussein & Cronje, 2010). Students hold greater control of their learning experience through mlearning. It largely allows for students to select their learning content, supporting the learning process through a learner-centric approach (Gure, 2016). Learners can focus on topics they are currently learning or want to learn. Students are able to increase the amount of time spent studying as learning becomes more convenient (Al Murshidi, 2017). As a whole, mlearning allows flexibility in the learning process (Alzaza & Yaakub, 2010; Flesher, 2016; Gure, 2016).

In understanding what mlearning is, it is also important to understand the associated devices or technologies. Mlearning does not equate specifically to the use of

mobile phones, as other devices may be used for mlearning (Daughtery & Berge, 2017). Other devices may include, but are not limited to: iPads or tablets, PDAs, e-book readers, smart watches, etc. As such, mlearning can occur through interaction with applications (Teri et al., 2013), e-books, digital lessons, text reminders, mobile learning management systems (LMS), discussion forums, wikis, etc. The variety of mlearning types "helps to remove some of the formality from the learning experience and engages reluctant learners" (Gure, 2016, p. 2).

Addressing Current Issues

Technical Challenges

Challenges facing mlearning are numerous, however technical challenges are among the most diverse and rapidly changing. For mobile applications, in particular, the primary challenges are technological limitations (Teri et al., 2013). With the rapid development of the digital world, it is hard to keep up with the needs of new operating systems and devices. Despite this, the improvements being made to new products provide hope that these technical limitations may only be a temporary concern (Park, 2011). In the meantime, awareness of the issues provides the opportunity for instructors to adapt to the needs of technology and learners.

A large issue confronting mlearning is the requirement of learning content to be designed for several different devices and operating systems. Mobile devices do not have standardized physical attributes or operating systems (Ally et al., 2012). "Instructional designers should give thought to the kind of devices that they plan to leverage for their content, as not all devices provide the same services" (Wang & Shen, 2012, p. 566). Some devices may not support the type of content a learner is attempting

to access (Al Murshidi, 2017), such as Flash media being incompatible with Apple iOS devices. Similarly, not all LMS work seamlessly on mobile devices. There is a need for institutions to implement a LMS that is supported across devices through a responsive platform (Flesher, 2016). Responsive content refers to the ability of content to adapt/adjust to various device screen sizes. This is also a consideration for ISDs utilizing authoring tools, as interactive lessons require specific programming and adjustments in order to be responsive across devices.

Even when an LMS offers responsiveness, not all features work with the same ease as on a laptop or desktop computer. It is intrinsically harder for learners to save work within a LMS or to edit items such as discussion forums from mobile devices (Al Murshidi, 2017).

Other technical issues related to mlearning involve the devices themselves, and the supporting infrastructure. One challenge with devices include limited storage capacity (Al Murshidi, 2017; Alzaza & Yaakub, 2010), limiting a student's ability to download content such as textbooks or applications. This, however, may become less of a concern as more devices seek to incorporate cloud-based storage options. Battery life is also of concern (Al Murshidi, 2017; Ally et al.,2012; Alzaza & Yaakub, 2010), as mlearning is not possible without a powered device. While technologies are improving regarding device battery life, battery deterioration is a persistent issue.

Within higher education specifically, infrastructure should be improved in order to allow for better adoption of mlearning on campus (Alzaza & Yaakub, 2010). Poor infrastructure results in connectivity and bandwidth problems, which ultimately effects a learners ability to interact with content (Al Murshidi, 2017; Wang & Shen, 2012).

Bandwidth issues can be addressed by improving wireless network coverage and providing high-speed cellular networks (Wang & Shen, 2012). Mlearning becomes more difficult for students to access if infrastructure is not supportive. For instance, connection costs in low-coverage areas results in a high cost of connection for learners (Najima & Ajhoun, 2008). Likewise, in order to keep up with the demands of learning, students may feel obligated to purchase devices and/or regularly upgrade, in order to meet technical demands (Al Murshidi, 2017). Institutions should work towards arrangements with cellular companies to make devices more widely accessible at lesser cost to students.

A final technical challenge that should be considered involves security and privacy (Flesher, 2016). This may come in many forms, not limited to data leaks, phishing, or unsecured networks. To some relief, Al Murshidi (2017) argues that while these concerns exist, many digital infrastructures within devices already handle these security issues.

Instructors must consider the various technical challenges prior to implementing mlearning, and not lose sight of infrastructure needs. In order to improve the design of mlearning, Wang and Shen (2012) offer four principles for designing for various devices, including: 1) design for the least common denominator; 2) design for eLearning, adapt for mlearning; 3) design short and condensed material for smart phones; and 4) be creative when designing for mobile devices.

Challenges Related to Guidance

In many respects, mlearning is difficult to implement due to an overall lack of guidance. Within higher education, instructors need to be made aware of the

capabilities and recommendations as determined by the institution. They need instruction on how to incorporate mlearning into their courses (Pedro, Barbosa, & Santos, 2018). This can best be remediated through teacher-training, by which instructors can be provided with guidance to fill this gap. In addition to basics such as accessing mlearning platforms, instructors should learn how to use the technology themselves (Ally et al., 2014). Other skills that may be considered for inclusion in teacher-training include social learning and social media skills, online security and safety basics, and creation and sharing skills (Ally et al., 2014).

Guidance may also be lacking between instructor and student. As Salmon proposes in her five-stage model for collaborative online learning, the first step that should be addressed in an online course is that of access and motivation (Salmon, 2011). “The purpose at this stage is to expose participants to the platform… and to enable them to become successful in using technology as well as see the benefits” (Salmon, 2011, p. 34). Taking this step can easily fill the gap in guidance as instructors provide their students with directions for entry into the mlearning space and offer basic technical support.

Challenge of Multi-tasking

Some researchers have looked at the role of mobile multi-tasking and negative effects on learning. Reduced efficiency and accuracy can be attributed to multitasking (Pedro et al., 2018). Furthermore, “multitasking with digital devices… can have negative impacts on the learning outcomes, leading to a poorer academic performance” (Pedro et al., 2018, p. 9). Distractions may come in the form of messages, calls, social media, games, etc. (Al Murshidi, 2017). With mobile devices competing for attention, there is a

question of proper implementation of mlearning. If blended learning is being utilized, is mlearning taking place inside or outside of a formal classroom? Distractions inside a classroom are likely to look different than distractions facing learners outside of a traditional classroom. Instructors must weigh the challenge of eliminating distractions, while encouraging and implementing innovation within the classroom.

Addressing Pedagogical Needs

Instructors must be aware of the pedagogical difference between traditional classroom education and mlearning. The primary difference between the two being the locus of control switching to the learners as seekers of information (Daughtery & Berge, 2017). With this switch, the learner gains control of their learning, whereas the instructor is largely responsible for dictating learning in traditional educational experiences. Likewise, content developers must find a balance between "providing essential information while challenging students to seek clarification from other sources if they require further information" (Teri et al., p. 133).

While there is currently no mlearning theory or pedagogy, the rise of mlearning will eventually lead to this area being further developed (Daughtery & Berge, 2017). This is not to say that mlearning needs entirely new pedagogical approaches. In fact, a combination of constructivism and cognitivism, known as situated learning, is considered to be an approach best suited for mlearning (Najima & Ajhoun, 2008). Learning that focuses on collaboration, active learning, and blended learning may also be utilized (Ozdamli, 2011). Learning theories associated with traditional education can still be drawn on, but require a shift in thinking and a focus on learner-centered design.

Pedagogical needs can be addressed through several pedagogical frameworks and tools. A pedagogical framework for mlearning should include four key aspects: "integration of tools, pedagogical approaches, assessment techniques and teacher training" (Ozdamli, 2011, p. 928). To expand on tools, mlearning tools offer unique instructional capabilities that allow instructors to evaluate and assess learning (Ozdamli, 2011). Instructors should take advantage of the evaluation capabilities when designing mlearning, measuring effectiveness of course content and learning. Learning tools are not limited to evaluation, but also offer variety in learning experiences. "Communication tools integrated in mobile devices make possible pedagogical spaces… such as: blogs, wiki[s], forums, video-conference" (Najima & Ajhoun, 2008, p. 3). Through social learning and social communication, learners are encouraged to participate as the learning environment becomes a "cooperative" effort (Al Murshidi, 2017). With relatively little required by the instructor, mlearning tools lend naturally to innovative learning spaces that allow the learner to take control of their learning experiences.

Some devices allow users to address their perceived learning style, allowing them to better understand content (Al Murshidi, 2017). Similarly, context-aware applications allow learners to control their learning experience. The Smart Enhanced Context-Aware for Flipped Mobile Learning (SECA-FML) takes into account the user-centered context, environmental context, and the context of execution (Louhab, Bahnasse, & Talea, 2018). In simpler terms, SECA-FML takes learners through a series of questionnaires during log-in creation. The responses to these questionnaires determine the format of content that they receive from the application (Louhab et al., 2018), providing greater adaptability and a more personalized experience.

Effectiveness of Better Design and Implementation

Instructional design is an important component to consider when measuring the effectiveness of a course. However, if courses are well-designed and instructionally sound, we can then turn to delivery platform to determine the effectiveness. Assuming all else is equal aside from delivery platform, effective mlearning design can be measured through learning outcomes, as well as through student satisfaction and motivation. Learners play an important role in mlearning with the switch in locus of control. Research shows that students are not apathetic towards learning, and "have adequate knowledge and awareness to use… technology in their education environment" (Alzaza & Yaakub, 2010, p. 99). Instructors and ISDs should therefore cater to the priorities and preferences of students when designing content. Entertainment and efficiency prove to be top priorities of learners (Al-Shihi, Sharma, & Sarrab, 2018). These priorities can be achieved through the use of mobile technology, as it allows for more engaging and interactive courses (Al Murshidi, 2017). Furthermore, increasing student engagement increases the likelihood of success in higher education "as there is a link between engagement and students' academic achievements and persistence in college" (Al Murshidi, 2017, p. 31).

Research shows that regarding mlearning, more positive outcomes are associated with blended learning than an exclusive form of learning (Teri et al., 2013) suggesting that instructors can obtain positive results, such as efficiency and satisfaction, from supplementing traditional courses with mlearning. For instance, a study looked at the use of text messages to remind students of upcoming assignments in a traditional course and found that grades for those receiving messages were

significantly higher (Yaros, 2012). In addition, compared to other blended learning courses not using mobile devices, courses utilizing mlearning received higher marks in areas such as effective learning, engagement with peers, allocation of time, and self-directed learning (Yaros, 2012). Teri et al. (2013) found that frequent users of an mlearning application had higher average final grades than others, however this finding was not statistically significant and requires additional research.

Student satisfaction and motivation is another consideration for measuring mlearning effectiveness. While technology limitations can affect a student's motivation to use mlearning (Teri et al., 2013), research shows that students believe technology helps with the learning process, particularly with regard to information sharing (Al Murshidi, 2017). Immediate access to information and current information, and increased contact with instructors and peers are student reported benefits of mlearning (Alzaza & Yaakub, 2010).

Conclusion

Instructors can fill the demand for mlearning by incorporating it through blended learning. The various challenges facing mlearning can be overcome by giving thought to the types of devices they would like to leverage, creating responsive lessons that correspond to those devices, working within the confines of institutional infrastructure, providing clear guidance, and adapting to the pedagogical differences of mlearning. Institutions can also support instructors through teacher-training, and providing infrastructure that supports these technological advancements.

Mlearning can only be effective if it is appropriately implemented. Having mobile technology available doesn't mean it will be implemented, and the adoption of mlearning

does not guarantee learning effectiveness (Shin & Kang, 2015). By overcoming these challenges, instructors will be able to meet the demands of learners by adapting to their technological preferences and priorities. With improved satisfaction and motivation comes engagement and positive learning outcomes. Instructors can control for the factors that are within their control, in order to produce the best outcomes for students.

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