Mobile Learning in the Blended Learning Environment: Opportunities and Challenges

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Abstract

This paper will examine the role of mobile learning in the blended learning environment. The goal of this research is to explore the opportunities and challenges of integrating the use of mobile learning technologies into the blended learning environment. This paper will also review the implications of this rapidly developing trend to the field of instructional design; and identify common principles and best practices for mobile learning with regard to the design process and pedagogical strategies for effective classroom and online utilization.

*Keywords:* m-learning; mobile learning; blended learning; mobile technology; course design; best practices

Introduction

Mobile learning is a growing trend in education with the proliferation of technology and the accessibility of mobile devices. Educators are adopting the use of these mobile technologies to support and enhance learning in the corporate and classroom environments. To better understand what mobile learning has to offer the field of education, this paper will explore the opportunities and challenges of integrating the use of mobile learning technologies within the context of the blended learning environment.

Blended learning environments take many forms within the areas of university and workplace education. This research paper will review the definition of the blended learning environment as a context for the application of mobile learning technologies. The historical evolution of mobile learning will be reviewed and various types of mobile learning will be defined.

Features and platforms of mobile technology will be examined to identify how they can be used to facilitate the learning process. As educators are quickly adopting the use of mobile learning, it
has become more evident that there is a need for conceptual frameworks to guide the design of learning-centered educational environments that best exploit mobile and wireless devices (Cobcroft, Towers, Smith, & Bruns, 2006). Through the synthesis of information compiled from peer-reviewed articles, books, and other online resources, this paper will explore common principles of design and best practices for mobile learning course development and application.

**Historical background or context**

**Blended Learning**

For this research paper, mobile learning will be examined within the context of the blended learning environment. Blended learning is defined as a combination of a classroom environment and online learning environment (Hoic-Bozic, Mornar, & Boticki, 2009). Hoic-Bozic et al. (2009) describe the blended approach as the most efficient teaching model which combines self-paced learning, e-learning, and f2f classroom learning. McGee and Reis, (n.d) explain the blended learning approach as combined elements of face-to-face and online courses with a substantial portion of content online. Caulfield (2011) describes blended, also referred to as hybrid courses, as “technology-enhanced courses” (Caulfield, 2011, p.3). The author provides a broader description as “courses that have reduced “face time” that is replaced by time spent outside the traditional classroom. Time spent outside the classroom includes online learning and may also include experiential learning that takes place without the presence of a teacher (Caulfield, 2011, p.3-4).

Blended learning environments are becoming more popular as a new form of education and training that represents a fundamental shift in teaching methodology. This shift in methodology from instructor-centered to a learner-centered environment encourages an interest in independent
learning and prepares students for life-long learning (Hoic-Bozic et al., 2009). Some of the features of blended learning that vary from the traditional classroom approach are the focus on collaborative work and problem-based learning. Collaborative work involves students working together in small groups to solve problems or complete a project. This type of work provides opportunities for knowledge building, sharing and distribution and has a significant impact on learning outcomes (Hoic-Bozic et al., 2009). Problem-based learning (PBL) is a process of teaching that uses concrete problems to motivate students and has a focus on student-centered activities. In PBL, students work in groups to define and clarify a problem and attempt to establish the procedure to solve them (Hoic-Bozic et al., 2009).

Blended learning environments that incorporate the physical and virtual are seen as critical strategies for higher education institutions. These environments have implications for learners (learning experience), teachers (practices), technology planning and sustainability (Cobcroft et al., 2006).

**Evolution of Mobile Learning**

E-learning is a component of the blended learning model that evolved with the introduction of the personal computer. Hoic-Bozic et al. (2009) defines e-learning as the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration. The distinction between e-learning and m-learning is that e-learning typically refers to the use of a personal computer in a fixed location.

M-learning refers to the use of mobile or wireless devices for the purpose of learning while on the move (Park, 2011). Some examples of mobile learning devices include cell phones, smart
phones, palmtops, handheld computers, tablet PCs, laptops, and personal media players such as iPods. Mobile devices have become more dynamic and pervasive with recent innovations in program applications and social software using Web 2.0 technologies (e.g. blogs, wikis, Twitter, YouTube) or other social networking sites (such as Facebook and MySpace) which also promise more educational potential (Park, 2011).

Mobile learning has been referred to by researchers as “an extension of e-learning” (Park, 2011). Martin, Pastore, and Snider (2012) state that m-learning is the intersection of mobile computing and e-learning that includes anytime, anywhere resources. Researchers have viewed mobile learning as a useful component of the flexible learning model (Park, 2011).

**Types of Mobile Learning**

Traxler (as cited in Martin, 2011) identifies six emerging mobile learning categories: technology driven m-learning, miniature but portable e-learning, connected classroom learning, informal/personalized/situated mobile learning, mobile training/performance support, and remote/rural/development mobile learning. Figure 1 illustrates Traxler’s six categories of mobile learning.

**Figure 1. Traxler’s Six Categories of Mobile Learning**

- Technology driven m-learning
- Miniature but portable e-learning
- Connected classroom learning
- Informal/personalized/situated mobile learning
- Mobile training/performance support
- Remote/rural/development mobile learning
M-learning, for the purposes of this paper, could be applicable in several of these categories. Educators and instructors incorporating m-learning into the blended learning environment would make this determination based on pedagogical strategy and course design.

**Significance of research issue**

Mobile learning holds a lot of potential as an effective method for delivering content within the blended learning environment. Educators and researchers must continue efforts to leverage the benefits of mobile technologies for instructional purposes while also overcoming the challenges and limitations of this rapidly changing technology.

Due to the increasing accessibility and features of mobile devices, mobile learning is projected to become a more widely used learning strategy for educators hoping to attract and retain the “new breed of student” (Cobcroft et al., 2011) who is mobile, experimental, and community oriented. In developing a mobile learning strategy, educators must establish best practices for the design and development of mobile content for instructional purposes.

Mobile technology gives learners the freedom to learn at their convenience and engage in meaningful learning activities whenever and wherever they want. However, mobile learning as an approach to education must be examined further for empirical evidence of positive impact on performance results and learning success.

**Research Findings**

**Opportunities and Benefits**

The increasing availability of low cost mobile devices, constant access to the wireless network, and the development of interactive educational content for mobile devices, provides new
opportunities in education (Martin et al., 2012). Some of the features of mobile devices that can be used within schools and beyond include: portability, small screen size, computing power, diverse communication networks, broad range of applications, data synchronization across computers, and stylus input devices” (Park, 2011).

Jeng, Wu, Huang, Tan, and Yang (2010) found that mobile technology provides users with two important features in mobile learning situated context and ubiquitous mobility. Jeng et al. (2010) also found that the added equipment of mobile devices such as wireless network connection, embedded camera, embedded GPS receiver and additional RFID reader offer rich content and delivers information effectively for students during their learning activities. The wireless network connection provides access to the Internet using the mobile device. The embedded camera of a mobile device enables the capture of current environment in mobile learning activity. GPS receivers provide the current coordinates of the mobile device which provides location-based learning materials and triggers content relevant to the learning context. RFID readers tag and receive information during the learning activity to benefit the situated learning environment. All of these features can be leveraged when developing educational mobile activities as part of the blended learning environment.

Mobile technology can be used to support effective face-to-face communication with devices in classroom. With mobile devices students do not need to crowd around one computer. Research studies and pilot tests have shown participants who owned handheld devices were more involved in the learning process (Park, 2011).

The lower cost of these devices is also seen as an advantage of mobile technology in education. Mobile learning provides opportunities of access to meet the needs of a range of learners like
mature-aged, gifted, international and remote learners, those with cognitive, behavioral, or social problems, or with physical or mental difficulties (Cobcroft et al., 2006). Mobile technologies provide new ways for students to collaborate and communicate within their class or around the world.

Mobile technologies can be used to develop ideas, make connections, create, collaborate, communicate and evaluate. Mobile learning provides a shared conversation space for the creative, collaborative, critical and communicative engagement of learners. In the blended learning environment, mobile technologies can also facilitate improved communication and interaction between staff and students in the university environment. Mobile technologies can also be used to access timely information independent to place, new communication channels and facilitating peer and teacher communication (Cobcroft et al., 2006). For corporate users of mobile learning, it is valued as a promising method by which to deliver instructional content while employees are away from the office, as well as performance support at the point of need and interest with the use of their personal digital devices (Wagner, 2008).

The most compelling opportunity that mobile learning provides is mobility. Mobility decreases the dependence on fixed locations for work and study. This mobility enables learning in formal and informal settings thus changing the way we work and learn (Park, 2011).

**Limitations and Challenges**

The challenges of mobile learning that must be taken in to consideration are physical attributes of mobile devices, policy issues (e.g. BYOD policies/billing rates issues), security, reliability, which platform to use. There are also challenges unique to corporate and higher education institutions that must be considered.
Physical attributes of mobile devices, such as small screen size, heavy weight, inadequate memory, and short battery life are all limitations of mobile devices. There are also content and software application limitations such as lack of built-in functions, difficulty adding applications, and challenges learning how to work with a mobile device. Network speed and reliability, problems with outdoor use, personal security concerns, and possible radiation exposure from devices using radio frequencies can also be a challenge for mobile devices (Park, 2011). Wagner (2008) found that while mobile learning is growing, the adoption rate still has a ways to go to reach majority status. Another challenge is creating a seamless look and feel of content between screens of mobile devices and personal computers. For some users, mobile learning means taking training courses on a small screen. Nedungadi and Raman (2012) found that adapting a PC platform to mobile devices requires adjustments to the difference in processing power.

Many corporate IT decision makers are unsure about which mobile devices to support, which platforms to use, and how to address changing requirements associated with the evolution of mobile devices (e.g. iPhone vs. Android). There are also security impacts and blurring lines between personal and work-related activities (Wagner, 2008). In many workplace settings the lack of formal policies for the use of mobile devices also presents limitations for their use for training purposes.

There are additional considerations for the use of mobile learning for higher education. For institutions, change management projects need institutional support. Areas to be addressed include cost, compatibility, equity of access, security, privacy, and ethical concerns. Uptake and use can be impacted by issues including lack of teacher confidence, training, and technical difficulties with devices (Cobcroft et al., 2006). All of these issues must be taken into consideration when using mobile devices and designing the learning environment.
Implications

The implications of mobile learning to the field of instructional design are the need for formal policies and best practices for mobile learning course design. The expanded use of mobile learning in education will require the determination of common principles of design for mobile learning courses and content. As mobile learning becomes more widely used and evaluated it will be important to document what methods are appropriate and effective for the learning process.

Park (2011) found that the most serious issue faced by mobile learning is the lack of a solid theoretical framework to guide effective instructional design and evaluate the quality of programs that rely significantly on mobile technologies. Park (2011) also found that even though there have been studies and efforts to conceptualize mobile learning, these efforts suffer from a lack of a pedagogical framework. Park (2011) asserts that it is necessary to categorize educational applications with mobile technologies and position them in a logical framework.

Cobcroft et al. (2006) also found the need for conceptual frameworks to guide the design of learning-centered educational environments that best exploit mobile and wireless devices. While there are broad frameworks for e-learning that provide some guidance for learning designers, little attention is being paid to developing specific frameworks to support the design of mobile learning (Cobcroft et al., 2006). Mobile learning is unlike traditional electronic learning, thus the conventional pedagogical theory should be revised to fit the characteristics of the mobile environment (Jeng et al., 2010). Elias (2011) analyzed Universal Instructional Design (UID) principles for distance education and developed recommendations for m-learning. These recommendations were based on eight UID principles found to be useful in distance education,
that include equitable use, flexible use, simple and intuitive, perceptible information, tolerance for error, low physical and technical effort, community of learners and support, and instructional climate. The m-learning recommendations from the Elias (2011) research include the use of mobile technologies like open-source software, cloud-computing for file storage and sharing, support of situated learning methods, packaging content in small bites, and pushing regular reminders, quizzes, and questions to students, and using learner-generated content.

As mobile learning continues to become of interest to education, business, and industry it will be important for designers of educational materials to learn to develop mobile instructional content (Martin et al., 2012). Educators will need to understand and address issues unique to the mobile learning environment that include design, usability, and software development of content for mobile websites and mobile native application (apps).

**Conclusion**

The role of mobile learning in the blended learning environment is still being developed. With growing interest in mobile learning from higher education and businesses, the adoption of mobile learning as a viable option for delivering instructional content is growing. It is clear that there are features of mobile devices that can be leveraged to facilitate the learning process. Collaborative work and problem based learning, already proven effective in the blended learning environment, can be facilitated with the attributes and access of mobile technologies. While there are limitations to technology and no formal pedagogical framework for the design of mobile courses and content, these limitations can be overcome with advances in technology and further adaptation of universal instructional design principles specifically for mobile learning.
Further studies in the support of mobile technology could be directed towards the development of specific frameworks for the various types of mobile learning, as well as establishing best practices and formal criteria for evaluating the quality and efficacy of mobile learning. Learning designers will need to understand and stay abreast of the technological advances and evolving design principles for mobile content and what it means for instructional design in the 21st century.
References


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