M-LEARNING: A PERSPECTIVE APPLICATION OF MOBILE COMPUTING

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ABSTRACT

The use of wireless technologies in education is known as mobile learning (M-learning). The technology permits the change of traditional classroom teaching to digital learning or electronic learning (e-learning) and then into wireless medium through handheld devices such as personal digital assistant (PDA) or cell phones. M-learning is stated as a significant application of mobile computing. The m-learning adoption model shows the difference between two environments i.e., traditional teaching and wireless teaching. The architecture describes the implementation technology of m-learning system i.e. how the mobile devices can be made compatible with the network to establish effective learning environment.

KEYWORDS : education; e-learning; m-learning; perspective; service architecture

1. INTRODUCTION

M-learning is defined as the delivery of learning contents to the learners with the help of mobile computing devices. There are some specialties of m-
learning as compared to other types of learning activities. In m-learning, learners are continually on move. The revolution in education by wireless technologies, transforms the traditional learning and teaching method into ‘anytime’ and particularly ‘anyplace’ education. A number of handheld computers offer telephone functionality as well as e-mail and Internet access, along with PDA features. From technological point of view, hardware advances and wireless networking are the two key components of m-learning. Other than PDAs, mobile phones and MP3 players are also used. An m-learning educational process can be considered as any learning and teaching activity that is possible through mobile tools or in settings where mobile equipment is available. M-learning is the next progressive step of e-learning. M-learning is coined to describe the convergence of mobile technologies with e-learning. The point of intersection of mobile computing and e-learning is the m-learning. Since m-learning is done through wireless networking which is a component of mobile computing, it is necessary to know about mobile computing. Mobile computing is defined as a form of human-computer interaction where a computer is expected to be transported during normal usage or else mobile computing is the process of computation on a mobile device. The three main aspects of mobile computing are: mobile communication, mobile hardware, and mobile software. The first one address communication issues, as well as communication properties, protocols, data formats and concrete technologies, the second one describes the physical components. i.e. mobile devices and third one describes the characteristics and requirements of mobile application.

2. M-LEARNING AS AN APPLICATION OF MOBILE COMPUTING

There are a number of application fields of mobile computing such as:

- Airline and Railway Industries
- Education Field
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- Transportation Industry
- Manufacturing & Mining Industries
- Distribution Industry
- Banking and Financial Institutions
- Insurance & Financial Planning
- Hospitality Industry

M-learning is a most significant and most modern application of mobile computing out of the number of diversified applications. Computation through wireless medium such as PDAs, digital cell phone, palmtop provides m-learning. The main components of m-learning are:

- identity
- learner
- activity
- facility and
- collaboration

The standards used for wireless network right now are IEEE 802.11 wireless communication standard known as Wi-Fi and IEEE 802.15.1 wireless communication standard called Bluetooth. Regardless of the standards used, wireless networking provides learners with the opportunity to connect with colleagues and instructors via online resources from a number of varieties of places than are accessible via traditional wired connections.

3. M-LEARNING MODEL AND FRAMEWORKS

The proposed model for m-learning adoption is shown in “Figure 1”. In m-learning environment, the communication infrastructure (shown by dashed lines)
contains wireless access points which enable communication between the mobile devices. In the proposed model, mobile devices are used for learner support enabling learner-to-learner communication as well as learner-to-teacher communication.

![Figure 1: M-learning adoption model](image)

The different components of the proposed model are the following:

### 3.1 Stakeholders

The stakeholders identified in the proposed model (represented as ellipses) include learners, their parents, teachers, system designers, device vendors, and support staff. The designers of the system that execute on the devices, the vendors that sell the devices, and the parents of the learners involved all occur outside the m-learning environment. The system designers include both software and hardware manufacturers.

Teachers, learners, and support staff are found in a learning institution within the m-learning environment where the support staff would be involved in day-to-day support and maintenance of the m-learning system. Teachers and learners are the beneficiaries of the m-learning system, as they are the actual users of the system. Teachers and learners communicate via traditional learning
activities through mobile devices. Learners and parents communicate after hours, and teachers communicate with parents about the progress of the learner.

3.2 Critical Success Factor

Critical success factors are the collaborative learning component that determines the performance measurement of m-learning. The factors such as interactivity, coordination negotiation and communication, organization of material and mobility are included in this.

Interactivity refers to the amount of interaction between learner using mobile devices. Coordination refers to the use of mobile devices encouraging active participation by all learners and a need to coordinate activities. Communication implies that the communication between learner, and the teacher. Mobility refers to the portability of the devices and the extent to which they enable the mobility of the learners. Apart from this in the proposed model motivation and collaboration are also included. Motivation refers to encouraging the learner and collaboration refers collaboration between the learner and the teacher. The proposed model emphasizes the key issues of m-learning and also the critical success factors required for successful adoption of the system.

4. THE M-LEARNING ENVIRONMENT

The proposed model contains an m-learning environment, which is underpinned by the traditional learning environment and also supported by m-learning policies and guidelines as shown in “Figure 2” and “Figure 3”. Basically, the m-learning environment is a relationship between the teacher and student. For school level teaching, the environment includes the methodology of delivering instruction, assessment and local boards of education will have to wrestle. Again, ‘blended learning’ will also happen in the m-learning environment, which is a combination of e-learning and instructor-led training. All the information’s are available on the Internet for the student.
Sharing of knowledge in between the teacher and the student is possible by the social interaction. The m-learning is different from the traditional face-to-face instructor-led teaching method. The proposed learning model is compared with traditional learning method in “Figure 2” and Figure 3. The environment survey is done by the authors where the students gave positive feedback that the learning method is very communicative one and effective, but the teacher gave negative feedback that the teaching method is more time consuming, and the teacher-student relationship decreases. Another important aspect in the m-learning environment is the lack of extra curricular activities for the development of the student. Because in the college or school teaching
environment, these activities include cultural, sports, educational or any other social activities, which are missing in m-learning environment (Haggison, 2000).

5. ARCHITECTURE OF M-LEARNING

The architecture presented here in “Figure 4” called flexible services architecture.

![Figure 4: Architecture of m-learning](image)

It is a component based modular architecture allowing reusability of the modules. The architecture also allows interoperability with the help of significant standards, hardware and software. A particular course is offered with the help of wireless device. The main goal of the course is to make the system student friendly, with the development of a compatible mobile computing environment. The proposed architecture is open, scalable, assembles the downloaded objects and then transferred to handheld device. But the services of m-learning are provided by e-learning as the e-learning information intended for handheld unit should be formatted to suit that device. The proposed architecture is also capable to be integrated with the backend application systems – such as library, different laboratories, knowledge management, and other information
resources. The web service architecture provides modularity for the environment. The proposed architecture will contain four layers described as follows. The proposed architecture also provides facility to read e-books through different types of software installed on the mobile device.

5.1 Application Layer

The services of learners and educators are provided by the application layer. The different services include issue of books from library, admission details, fee submission, and providing grade sheet and language translation. The educator and the administrator are responsible for providing the above said services to the students. So, the application layer is the interaction layer between the learner, educator, and the administrator.

5.2 The Integration Through Web Services Standards Layer

The integration of all the services and applications in different formats is done in this layer. The architecture ensures availability, scalability, and performance, as well as the ability to simultaneously deliver data, audio and video. This layer also manages security, quality of service and content distribution. It enables e-learning providers to register entire learning applications as binary large objects (BLOBs).

5.3 The Delivery Devices Layer

The delivery devices layer is used to deliver the content with the help of devices compatible with the Internet. The flexible services architecture support the “on the go” communication systems including cell phones, e-mail, PC, AM/FM radio, and global positioning systems.

5.4 The Human Layer

The human layer consists of learners, administrators and educators. This layer shows that on one side the educators and administrators have interface with
application layer and on the other side there is a direct interaction between the educator and the learner regarding communication, feedback and other learning objects and have the interface with the end user layer.

6. CONCLUSION AND FUTURE SCOPE

As the wireless technology is growing, it leads to an increase on the subject of m-learning. This paper expands the study of existing m-learning models, in order to propose a new model for m-learning adoption that includes key stakeholders and critical success factors. XML messaging is used to exchange data. The problem associated with network and distributed software is eliminated by web services. So, the proposed architecture could become a new direction for developing web service applications for mobile education. The different types of perspectives are first an 'ownership perspective’ in which the British Educational Communications and Technology Agency (Becta) (2004), shows that some of the most significant benefits are gained in schemes that give learners wireless technologies for their own use. Becta 2004) also shows that ‘ownership’ of wireless technology increases the motivation power and responsibility of the learner. Secondly, in the ‘collaborative perspective’, Investigation of guidelines and policies to ensure successful adoption of m-learning lies in the future scope. An effective m-learning environment can be established if the guidelines and policies can be determined successfully. Analysis of the technical strength of the wireless technology, and determining their compatibility to the m-learning environment also shall be an important field of research collaborative perspective and communication can also be increased by the use of wireless technologies as stated by Becta (2004). Third one is ‘a teacher perspective’ in which the teacher reported effective learning, more effective collaboration, and learner independence after the integration of handheld devices into the classroom.
An effective m-learning environment can be established if the guidelines and policies can be determined successfully. Analysis of the technical strength of the wireless technology, and determining their compatibility to the m-learning environment also shall be an important field of research.

REFERENCES


