

Mobile Learning Conceptual Framework For Higher Education in Developing Countries

Christina Albert Rayed Assad

Abstract--Technology is now playing a vital role in teaching and training through mobile devices. The mobile devices connect people to strengthen relations between them and nearby distances. Mobile learning as distance and e-learning, there are many advantages and disadvantages of using technology in the learning process. Mobile learning depends on the use of mobile or wireless devices for distance learning. The main purpose of this paper is to build a mobile learning framework which is containing the characteristics of mobile learning. This framework will help students in higher education to adapt the educational resources from their mobile devices which can be used anytime and anywhere.

Keywords--Distance education, E-learning, Higher education, M-learning, Mobile technology, Mobility.

I. INTRODUCTION

Mobile devices are using increasingly in the learning process. Many instructors have incorporated the technology in the learning process for more interaction with their students and enhance the participation of their students. But the M-Learning community is still fragmented, with different national perspectives, differences between academia and industry, and between the school, higher education and lifelong learning sectors [1].

Use of devices such as mobile phones and personal digital assistants (PDAs) allow new opportunities for learners to be connected. Mobile learning platform tools can also enriched the e-learning platforms by allowing learners to access educational contents through Personal digital assistants (PDAs), Smart phones and other portable devices [2]. In other words, with the use of mobile devices, learners can learn anywhere and at any time [3].

The term mobile learning refers to learning with the aid of mobile devices. Typical examples of the devices used for mobile learning include cell phones, smart phones, palmtops, and handheld computers; tablet PCs, laptops, and personal media players can also fall within this scope [4].

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From the previous these all lead to the mobility of learning and mobile learning as a scientific term. Many education leaders are encouraged the opportunity to use smart phones and tablets as learning tools within the learning process and useful from the power of these devices to transform teaching and learning by using these mobile devices .

Mobile learning can foster academic engagement: sustained voluntary participation in pursuits related to learning academic knowledge (content, skills, culture), both in and out of school [5].

Moreover, Mobile devices afford rich and varied communication and collaboration possibilities [6] that are essential to build knowledge construction.

Mobile learning promotes a pedagogical shift from a formal, classroom-based and teacher centered approach to an informal, constructivist, collaborative and learner-centered approach where learning can happen anytime and anywhere [7].

II. USING MOBILE LEARNING IN HIGHER EDUCATION

Mobile technology is becoming an adoptable technology for many of the educational organizations with its dynamic scalability and usage of virtualized resources as a service in higher education through the Internet. Higher education stands on the edge of a great precipice of change brought about by mobile technology [8].

Students manipulate the mobile blogging system in a learning activity, the use of collaborative and technological perspective should be observed in the experimental process which can further influence the design aspect by evaluating the learning effect of students [9].

After the revolution in the mobile devices the capabilities of delivering present massive range of e-learning materials by means of new mobile technology. Specially in the last two decades widely utilized mobile phones and wireless communications technologies in higher education because of the less cost, availability and accessibility of wireless connectivity. Also, mobile learning can enhance flexibility

of learning, increase accessibility and improve student's learning experience.

M-learning is enabled transfer of skills and knowledge between students in higher education. M-learning applications and processes include mobile application-based learning, computer-based learning, virtual education opportunities and digital collaboration so all these can enhance the learning process in higher education. These new technologies can make a big difference in higher education by interactivity of new media, and develop their skills, knowledge, collaboration and perception of the world. M-learning requires open minded students and teachers to encourage engagement and communication where students can participate flexibly and communicate to each other all over the world.

There are many M-learning strategies such as the integration of SMS and Facebook applications have to help higher education organization cope with rapid technology change, competition, and globalization.

M-learning has depended on the features and tools embedded within powerful mobile devices and the new wireless technologies such as mobile phones, smart phones, tablets or any other handheld devices to interface and communicate all students worldwide that will improve their learning experience anywhere and at anytime. Above all, this mobility enables M-learning in formal and informal settings for individual learning and collaborative learning by multiple users.

III. ADVANTAGES AND DISADVANTAGES OF MOBILE LEARNING

The mobile devices are a connection between people to strengthen relations between them and nearly distances. Mobile devices present be always in touch with anyone who knows your phone number besides the internet mobile phone services. In learning process the mobile devices increase flexibility through the distribution of course materials in video, image and audio formats also podcasting has a way of providing greater flexibility to learners. Evolution of different digital technologies through numerous media has enhanced the distribution of audio and video contents over the internet. Students can subscribe to automatic downloads of new materials as it becomes available, so it can be accessed by the student in their own time and place. This availability increases the learner flexibility in accessing the learning contents.

Mobile technology has many advantages such as expected performance, reduced investments in software, hardware, and professional staff to maintain servers and upgrade software, high availability, reduced launching time, infinite scalability, tremendous fault-tolerance capability, and accessibility, enhanced collaboration, and mobility

through the using of mobile devices. Moreover, M-learning increase accessibility through the ability to access learning contents on portable devices enables learning on the go using mobile devices [10]. Evans indicated that most learners in this modern world has a busy schedule and are often forced to learn while on the bus train or car, at odd times. These schedules necessitate the need for portable devices that enable them to access the learning contents when they can spare the time.

In the higher education the mobile devices can Enhance Learning by increasing the use of podcast in education has the ability to positively influence the teaching and learning experiences of students [11].

According to (Huang, Huang & Hsieh, 2008, p, 3), the environments in which the study of mobile learning has been conducted have some similar features with in previous studies. These features include [12]:

- 1) Enhancing availability and accessibility of information networks;
- 2) Engaging students in learning-related activities in diverse physical locations;
- 3) Supporting of project-based group work;
- 4) Improving of communication and collaborative learning in the classroom, and;
- 5) Enabling quick content delivery.

For Ally demonstrated mobile learning is the intersection of mobile computing and e-learning that provides accessible resources wherever you are, strong search capabilities, rich interaction, powerful support for effective learning and performance-based assessment [13].

Using mobile communication devices to deliver higher education content, we are likely to reduce the physical walls of the classroom and replace them with other virtual barriers or constraints. However, it would support just in time learning and training in higher education context and “the results showed a significant correlation between planning and model quality, indicating an overall positive effect for the support tool [14].

By using M-learning in higher education through supporting student mobility in the various areas like accessing learning materials, performing learning tasks participating in learning interactions, performing assessment task, learning work processes, accessing learning supporting and evaluating teaching.

The limitations of mobile technology such as the harmful effects, the small screen size of most of the devices, there is no denying that the storage capacities of mobile devices are limited and devices may become outdated quickly. This is limited wireless bandwidth and changes are that if may further decrease with the number of users ever on the increase.

In fact, one of the limitations of mobile cellular hardware learning (the very limited size of its screen) provided the impetus to design a personal instruction and learning, and utilize a new format for text communication as well as imbue traditional forms with and different meanings. So, there is the definite inconvenience of size, as the student has to learn while hunched over the small screen of a mobile phone and PDA.

From the above, as a society, we have come to rely on technology in everyday life. M-learning is growing powerful, not just for education but for business and personal use as well.

IV. MOBILE LEARNING EXPERIENCES

A system is considered context-aware, if the system uses context to provide relevant information and/or services to the user, where relevancy depends on the user's task [15]. Context-aware applications have been the subject of many studies [16]. Context-aware computing is a rapidly growing research area. It aims to promote a flowing interaction between humans and technology. Barkhuus and Dey defined three levels of context-aware applications depending on the interactivity with the user [17]:

- 1) Personalization: the user determines the way the application behaves in a particular situation.
- 2) Active context-aware: the application changes the content independently, based on the sensor data.
- 3) Passive context-aware: the application presents the changed context, sensor data, to the user and lets him/her take control of decisions about how the application behaves.

Context-aware learning is a unique type of learning made possible by mobile technologies due to the capability of location-awareness, as a result of interaction among mobile device hardware such as GPS (global positioning system), Internet connection through wireless network or cellular network, and mobile apps. Even without GPS, current mobile apps or services like Google Maps can use wireless signals to triangulate the available data to estimate the mobile device holders' locations. This location-awareness feature provides many possibilities for context-aware learning. Learners will be notified based their locations and be able to access the information for analysis and learning in an authentic context [18].

An example of context-aware learning application is Wikitud, This application leverages the GPS integrated in mobile devices to allow users to point their device in any direction, and presents virtual overlaid tags/markers on actual physical locations such as buildings, parks, stores, etc. on the device's screen. Users can then click on the virtual tags on the mobile device presented by Wikitude to access Wikipedia or other web resources to learn more about the locations of interests [19].

It is a fact that the big benefit is the portability. Due to the portability of today's mobile devices, learners can take learning on-the-go with their mobile devices, this type is Seamless and ubiquitous learning. Learners can also share and discuss design examples and ideas Hsu and Ching found in their immediate environments [20].

When people can learn anywhere and at any time, learning is ubiquitous and seamless across environments and contexts [21]. Game-based learning refers to learning in a game play context where learners solve problems that are presented in scenarios [22].

All the information and materials are situated and interwoven into game scenarios and there are usually storylines in which learners as players are presented with problems to solve. For example, Dunleavy, Dede, and Mitchell designed an augmented reality game that leveraged mobile technologies. They challenged middle and high school students in a game play that involves [23].

Mobile social learning includes mobile technologies, if employed effectively, can support social constructivist approaches to learning Mobile social learning means learning that involves interacting with others in social networks by leveraging mobile apps and devices. Kabilan, Ahmad, and Abidin reported an example of social learning through their study on students using Facebook for language learning (writing) [24].

For example, Hsu and Ching integrated mobile devices and Twitter in an online course, where graduate students recorded, shared, critiqued, and discussed graphic design examples found in their daily lives. Students appreciated the social learning aspect that helped them connect with their peers, and valued the authentic examples to which the design principles were applied [25].

V. MOBILE LEARNING FRAMEWORK FOR HIGHER EDUCATION

Mobile learning system development is based on three main domains: mobile usability, wireless technology and e-learning system. The mobile usability includes the understand ability, learn ability, operability, attractiveness, and usability compliance sub-characteristics. International Standard ISO/IEC 9126-1 refers to validating the services in each mobile device that involved in the mobile learning system [26]. This includes the type of the mobile device, the features of the mobile and the mobile content design and evaluation method. Wireless network infrastructures, capabilities and the cost of services. This include also the operator rolls, such as the data rate, QoS security etc. There are needs of virtual learning and e-learning components and system [27].

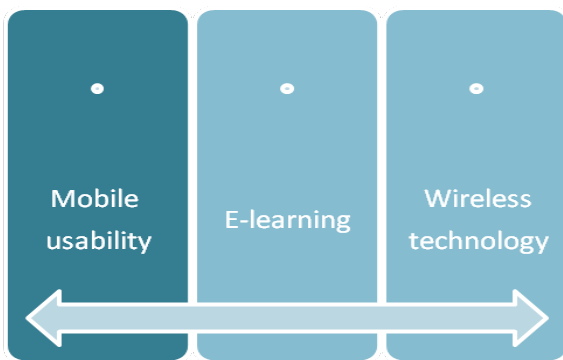


Fig. 1 mobile learning elements framework

From another perspective is based on three aspects device, learner and social. The intersection between learner aspect and device aspect is the device usability, the intersection between learner aspect and social aspect is the interaction technology, and the intersection between social aspect and device aspect is the social technology. So the interaction between the three aspects is the mobile learning. pedagogical design of the SPSML is premised on Kolb's experiential learning model, which focuses on experience as the main force driving learning because "learning is the process whereby knowledge is created through the transformation of experience" [28]. Thus, learning is a constructive process in context. It happens in a cyclical model (see Figure. 2) consisting of four stages: concrete experience, reflective observation, abstract conceptualization, and testing in new situations.

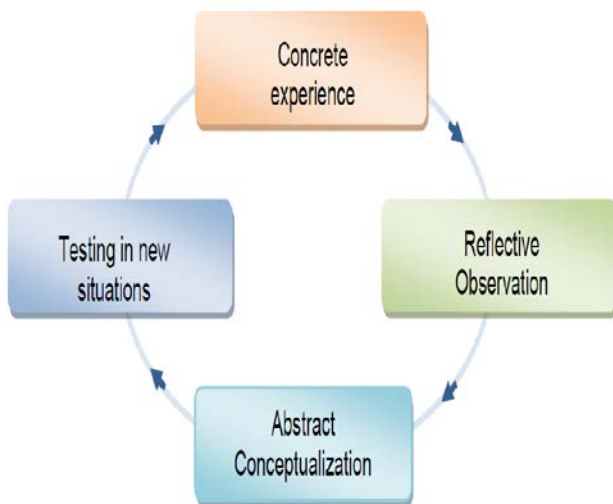


Fig. 2 Kolb's experiential learning mode I[28].

In addition, the technology acceptance model TAM theory is a model that tries to explain how users come to accept and use a technology. The model suggests that when users are presented with a new technology, a number of factors influence their decision about how and when they will use it, namely: Perceived Usefulness (PU) and Perceived Ease of use [29].

ICT adoption and diffusion has been studied in great detail lately by researchers in the information systems area. It can be studied at two levels: the first is at the organizational level and the other is at the individual level. If the unit analysis is an individual, then emphasis is on the acceptance of technology.

The user's attitude toward using and the actual usage of a technology are addressed in the technology acceptance model (TAM). Chang, Yan, and Tseng proposed another extended TAM by including perceived convenience as a predicting factor in m-learning acceptance [30].

Clarke and Dede document the application of a five-dimensional framework for scaling up to the implementation of the River City multi-user virtual environment for middle school science [31]:

Depth: evaluation and design-based research to understand and enhance causes of effectiveness

- Sustainability: "robust design" to enable adapting to inhospitable contexts
- Spread: modifying to retain effectiveness while reducing resources and expertise required
- Shift: moving beyond "brand" to support users as co-evaluators and co-designers
- Evolution: learning from users' adaptations to rethink the innovation's design model.

VI. MOBILE LEARNING IN DEVELOPING COUNTRIES

In many developing countries, there are lots of problems that facing postgraduate students or undergraduate students according to social and economic situations. So, many times is losing through waiting and transportations to and from the university. The mobile learning provides the learners with a learning environment that moves with them and is accessible anytime and anywhere. Mobile technologies have provided educators with series of educational tools.

A press release by The World Bank in 2012 entitled 'Maximizing Mobile' stated that about three quarter of the world population including much of the developing world, now has access to a mobile phone. The number of mobile subscriptions in use worldwide, both pre-paid and post-paid, has grown from fewer than 1 billion in 2000 to over 6 billion now, of which nearly 5 billion in developing countries [32].

The use of wireless, mobile, portable, and handheld devices are gradually increasing and diversifying across every sector of education, and across both the developed and developing worlds. It is gradually moving from small-scale, short-term trials to larger more sustained and blended deployment. Recent publications, projects, and trials are drawn upon to explore the possible future and nature of mobile education [33].

Higher education students in developing countries almost always use mobile learning devices as adjuncts to e-learning in higher education. Smart mobile devices are currently capable of delivering a range of e-learning materials by means of mobile applications, portals, web connections, infrared and bluetooth transmissions. The developed countries are more advanced in investing in research and development in mobile technologies and using new technologies and mobility in learning compared to developing countries.

Students in developing countries have the same need for M-Learning to be mobile, accessible and affordable like in developed countries. But, Social and educational challenges for M-Learning in developing countries include bandwidth limitations, access to and use of the technology in developing countries. Many students in developing countries have trouble accessing the internet, or experience difficulty in affording technology that enables learning in an M-Learning environment. The greatest advantage of using mobile learning is the cost of mobile devices is less expensive than traditional learning methods. Many developing countries started to applying mobile learning like Kenya, China, India and Malaysia.

But there are few challenges remain which require attention if mobile learning is to be fully integrated within higher education institutions in Africa. First, technical support should be provided to students and teachers on use of mobile technologies, learning management systems need to be designed in a way compatible with mobile devices, training should be provided to course developers and internet access on campuses including student residences, classrooms and library should be improved. This will address some challenges such as the internet costs faced by students [34].

Also, large classrooms in developing countries present a particular challenge, especially when multi-grade classrooms are involved, due to the variety of learning needs and learner backgrounds. The need for efficient formative assessments requires using ICT to implement and support real-time formative assessments for complex problem solving learning tasks and guided inquiry learning situations [35].

In this way, the mobile technologies contribute to a teaching/learning process more motivating and personalized. The students' motivation increases when this technology is used, leading to greater participation, and, consequently, better and faster acquisition of concepts/skills. Collaborative actions and cooperation between student/student, student/teacher and student/class are increased when mobile devices are used in the classroom context [36].

There are many models and frameworks developed specially for developed countries but there is a lack of models and frameworks formed for developing countries' contexts. The needs and challenges due to unique cultures, economical, different level of infrastructure, and various

learning systems in developing countries. Therefore, the proposed mobile learning conceptual framework will take in account cultural, economical and environmental factors

VII. A PROPOSED MOBILE LEARNING CONCEPTUAL FRAMEWORK FOR HIGHER EDUCATION

From the previous, in this paper we present a proposed mobile learning conceptual framework for higher education. This conceptual framework interacts between the mobile learning elements and the learning experiences. The mobile learning elements will be composed of mobile usability, wireless technology and e-learning (as seen in figure 3).

The three stakeholders are learner, device and social in e-learning. The wireless technology contains WIFI, Bluetooth, GSM, GPRS and 4G. By using of mobile devices smart phones, mobile tablets, IPAD, IPOD touch and notebooks. In addition to the resources of m-learning, we need mobile learning's experiences to enhance and improve the learning process by using the mobility. These mobile learning's experiences attach from the concrete experience, reflective observation, testing in new situations and abstract conceptualization.

Despite of many models and frameworks in mobile learning have a narrowed focus on one components of mobile learning or on mobile learning's experiences, this conceptual framework has a wide scope to contain the whole components of mobile learning and mobile learning's experiences.

So, we can use this conceptual framework as a guide for applying mobile learning in universities that inclusive of all aspects of mobile learning. This conceptual framework infrastructure depends on the knowledge and experience infrastructure base such as teacher training, students' skills, teaching materials, smart and modern devices to concrete experience by Abstract conceptualization, Reflective observation, Testing in new situations.

The knowledge and experience can assist to facilities and enhance the process of learning through the mobile learning. Mobile learning can present flexible access, ease of use, reliability, costs, interactivity teaching and learning approaches, novelty, and speed in learning process in higher.

In addition to mobile learning elements and experimental learning that are included in this proposed conceptual framework to help in mobile learning and guide in research and design for mobile learning experiences. The mobile learning conceptual framework based on cultural, economical and environmental factors in developing countries.

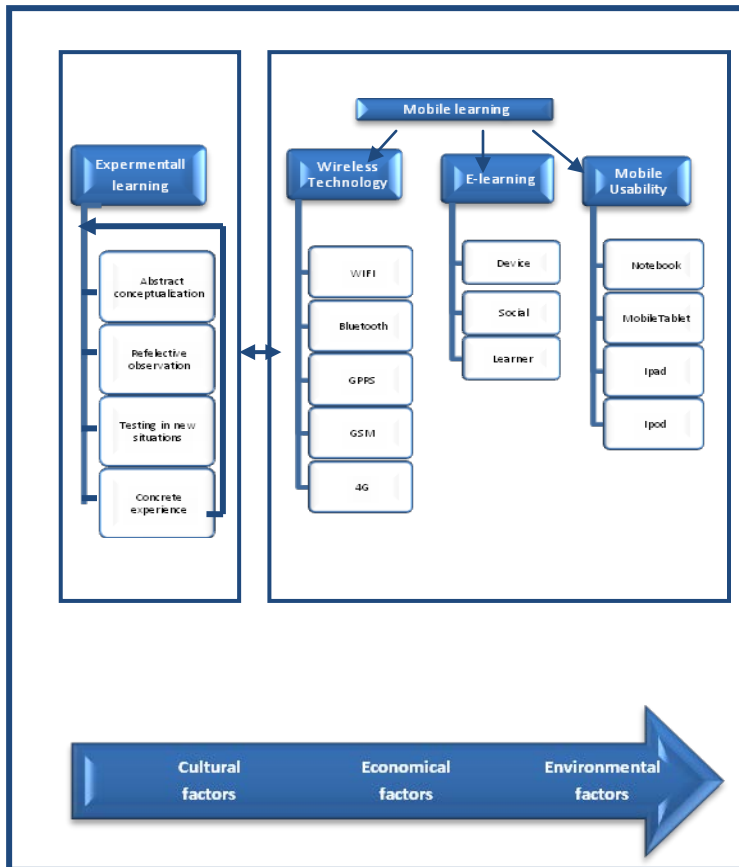


Fig. 3 proposed mobile learning framework for higher education in developing countries

This framework highlights how M-learning can be used to enhance the learning process through mobile usability, wireless technology and e-learning through the use of powerful mobile devices such as mobile phones, smart phones, tablets or any other handheld devices. Also the framework focused on the learners and social communities to support this framework.

VIII. CONCLUSION

The increasing learning options in higher education in developing and developed countries through supporting the mobility of the learner with mobile devices. As mobile technologies have evolved and become more capable of supporting learning experiences in many fields special in the learning process in the higher education. It is clear that the mobile technology will be available for all students in developed and developing countries. Portable, handheld devices have increasingly powerful multimedia, social networking, communication and geo-location (GPS) capabilities and consequently, mobile learning (m-learning) offers numerous opportunities as well as challenges in education. But, we need a planned and structured system that incorporates this technology into the day to day

operations of learning organizations, from administration to learning delivery and from staff to the learners [37].

The proposed conceptual framework for mobile learning can assist students, teachers and universities in higher education. The mobile learning presents flexible access, ease of use, reliability, costs, interactivity teaching and learning approaches, novelty, and speed.

IX. FUTURE WORK

The Proposed mobile learning framework for higher education could be extended to support other learning systems. This proposed framework could also be adapted to the new mobility technologies. Also, the proposed framework needs to be tested and experimented on universities in developed or developing countries. By applying this framework in some universities, we can measure the enhancement in the learning process in higher education.

Furthermore, many studies should be conducted to determine challenges facing deployment and adoption of mobile learning in Higher education

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