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M-Learning the Next Generation of Education in Cyberspace

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***Abstract*—**The technology usages of high speed Internet leads to establish and start new era of online education. With the advancement of the information technology and communication systems new opportunities have been created. This leads universities to have various online education channels to meet the demand of different learners' needs. One of these channels is M-learning, which can be used to improve the online education environment. With using such mobile technology in learning both students and instructors can easily access educational courses anytime from anywhere. The paper first presents literature about mobile learning and to what extent this approach can be utilized to enhance the overall learning system. It provides a comparison between mobile learning and traditional e-learning showing the wide array of benefits of the new generation of technology. The possible challenges and potential advantages of M-learning in the online education system are also discussed.

***Keywords*—**Mobile learning, M-learning, eLearning, Educational system.

I. Introduction

THE digital devices (Phones and PDAs) and Internet become increasingly very important learning tools, due to the fact that, the modern technologies has become more effective, portable, easy to use and cheaper in terms of Internet access. The term M-Learning refers to the use of eLearning plus mobility. The mobility can be added using handheld IT devices, such as mobile phones, laptops, PDAs and tablets.

One of the modern technologies strongest arguments is their mobility or availability, in which that the mobile devices are easily accessed than desktops. Despite a huge number of installed desktop computers over the world, learners are enjoying a little access to the fixed desktop computers. For example, many educational institutes provide a lot of computer facilities. However, these computers are located in labs for underground students in a remote corner of the campus and they are usually unavailable for self-access due to the fact that they are almost constantly reserved for teaching classes.

A lot of desktop computers are distributed between the community homes, but these desktop computers are outnumbered 1 to 5 with mobile devices distribution [1]. Beside that most of our students are spending their daytime away from these fixed home desktops. Thus the majority of our students spend only a very few hours using their desktop devices each week. Therefore, it can be said that many of our students are not very comfortable with desktop computers. In contrast, a lot of students in higher education level constantly carrying web capable mobile devices. These students are extensively using their mobile devices to send short email messages and to display huge number of web pages, during their waiting time between classes [2]. In future students should be regularly allowed to utilize some of this time, and enable the use of mobile technology outside the classroom.

Nowadays, students are very rarely asked to use their mobile devices for school work. In fact, most of universities explicitly prohibit the use of mobile devices inside classrooms and students are very rarely using the web browser in their mobile devices to search or look up information during lectures and classroom exercises. Some students may use their mobile devices in foreign language classes for look up words in bilingual dictionaries either built in or web based dictionaries. Other students may use their mobile cameras to photograph blackboards, PowerPoint displays or any other important documents. Therefore, mobile devices can be an effective educational platform, due to the fact that mobile devices are easily accessible by students and provide adequate support for standard Internet technologies. Using modern methods and techniques integrated in M-learning, help in making the learning of our student more interesting, more interactive, widely available and flexible. M-learning is cost-efficient that helps students to learn more without traditional restrictions. Furthermore, the possibility to integrate M-learning systems into existing E-learning systems [3] makes it easy to stay in touch with the newest advances made in teaching research. Mobile devices are expected to be a part of every class and activity both inside and outside lecture classrooms, rather than being limited to a few assigned functions in rarely visited computer labs.

II. Literature Review

Despite a large amount of mobile phone technology development in mobile phones more than 20 years, there is not development can be seen comparing with what can be seen in internet innovations. Even there is a wide mobile technology market, very few trivial applications developed over the past 20 years. Several researches have been done on M-learning environment including requirements design [4], architecture [5], M-learning model [6] and current trend [7]. Also there are some applications in the market that enable teachers to manage their online quizzes and monitor their students' progress online, such as Alykko [8].

Alykko is an intelligent mobile tutoring tool for teachers that support interaction and educating dialogue using mobile technologies. It helps teachers in managing their tutors activities using web and mobile technologies. It also supports communications between students and their teachers using either the system on mobile devices or personal computers. Active campus [9] is a context-aware organizer that supports some classroom activities. The provided activities include

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asking the instructor online anonymous question for students who are shying or having online quizzes in classrooms made by the instructor. The Active campus was successfully adapted to the real world but the main drawback is that some students do not like to use it and they said that they do not have any questions to ask the instructor.

A context-aware mobile and collaborative learning scenario [10] is a context-aware mobile application for university that supports many universities campus requirements such as in the beginning of each session. The attendance list is filled automatically during sessions, lecture materials are loaded in a student hand-held device. Absent students will be informed via SMS. POODLE [11] is a course management system for mobile phones which is a redesigning of MOODLE [12], for being suitable for hand-held devices and compatible with wireless networks. This course manager provides many features such as online and offline text assignment, designing quizzes, course files, survey tools, chats, online question in class and library. Saipunidzam et.al [13] provided a new approach of M-learning environment with mobile graph for tracking the students' progress and performance. They argue that the purpose of this system is not to replace traditional classrooms but to complement the learning process in Malaysian schools. Since the development of mobile application is not yet as matured as desktop or personal computer application development, which may take some time to establish and provide a well-accepted standards [14].

Therefore, there is no standard developed for M-learning yet. But the existing E-learning standards and models can be used to develop M-learning applications. With the rapid increasing in the development of wireless technology, learners are exposed to a new learning and educational experience, what is called mobile learning or m-Learning. The experts in this field have offered different definitions for this form of learning. Such as that the M-Learning is e-learning through mobile computational devices [15]. A project group in Norway in 2001 has defined M-Learning as a new learning mechanism using mobile devices because of Geo-spatial mobility and the increasing demand for flexible learning [16]. In 2002 Chabra and Figueiredo defined M-Learning as learning with a specific device, at any time and in any place [17]. In 2003 another definition has be provided as a learning mechanism that can take place anytime, anywhere with the help of a mobile computer device. [18].The mobile learning can be defined as a new learning technique using mobile network and tools, expanding digital learning channel, gaining educational services, educational information and educational resources anywhere at any time [8]. Mobile device is a personalized device where it must continuously monitor its environment, thus making mobile applications inherently context aware (collectively location-aware, device-aware, time-aware …etc.) [19, 20].

M-Learning applications are now contextualizing proximity, time, weather, location, etc… to deliver dynamic, hyper-specialized, rich content to learners via context-aware applications. M-Learning using context awareness is new feature and one of the primary factors directing the popularity of M-Learning applications.

III. M-LEARNING VS. E-LEARNING

M-Learning is a technique that uses mobile and wireless technologies for learning and education. M-Learning enables learners to merge their learning experiences in a shared collaborative environment [21]. Currently, Internet and WWW have improved the learning activities providing a high level of interaction between geographically separated teachers and learners. In fact, Internet is not just a way to deliver and distribute the knowledge and learning contents, but it creates learning environments that fit the needs of modern, diverse learners where it engages the learners in many activities such as interactions, collaborations, conversations and problem solving. An Internet enables the e-learning to become the state of art for distance learning over the world and the mobile learning (m-learning) will be the next generation of distance learning. Mobile devices are technologies that can be carried and used everywhere to enable learners accessing knowledge anytime and anywhere.

The main target of the next generation of the learning systems is to use current and modern technologies to provide new techniques of learning, training and education that will be easy access and available to all who wish to be part of it. The nomadic computing environment is different from the normal and traditional distributed systems. In nomadic computing environment there is a diversity of , handheld devices, smart phones and mobile workstations, which enable users to access and use Internet services anywhere [22]. Although M-Learning started to be used in supporting a wide range of learning activities there are not much of research done to know the students requirements or understand what types of mobile applications students need to use on their mobile devices and how an effective mobile educational software can be designed to support learning in an educational environments [23].

This rapid increasing of mobile devices in the last five years has dramatically altered the platform for business, social, gaming, entertainment, marketing and productivity using software applications. Containing global positioning sensors, wireless connectivity, voice recognition, built-in web browsers, photo/video capabilities among other sensors, mobile devices have enabled the development of mobile applications that can provide rich, highly-localized, context-aware content to users in handheld devices equipped with similar computational power as a standard PC [24]. So far, these novel features present new benefits, challenges and requirements to mobile application developers that are not found in traditional software engineering applications [25].

IV. M-LEARNING ADVANTAGES

The computing and communication devices such as smart phones, laptops and PDAs with the connection to wireless networks facilitate M-Learning. M-Learning enables educator, learner and teacher to extend beyond the traditional

schoolrooms (classroom, tutorial room, laboratories and Lecture Theater); the schoolrooms, portable computing and communication devices provide instructors and learners increased flexibility and offer new interaction opportunities.

The advantages of M-Learning are as follows:

- Can enhance student centered learning.
- Flexibility: accessing content anywhere at any time.
- Great for just in time training.
- Support differentiation of student learning needs.
- Learner control: direct the learner own learning activities.
- Good management of use: M-learning can happen during dead time, while travelling or waiting for a meeting to start.
- Suitable for many different learning styles: reading, writing, video, animation, collaboration, discussion, listening, exams, researching knowledge ... etc.
- Easy evidence collection using writing, audio or video.
- It can be used more effectively for the differently-Abled.
- Cost-effective: M-learning is cheaper than booking the resources required for face-to-face training or supplying laptops and other computing devices for eLearning.
- Reduce cultural and communication barriers between faculty and students by using communication channels that students like.
- Context sensitive learning: with GPS and the use of QR codes learning can become specific to location awareness or a real life QR code marker.
- Personalized learning in which the user can do the training on his personal device.
- Improves social learning and eliminate of technological barriers.

M-learning is a natural extension of E-learning. It has the potential to additional extend when, where and how students learn and perform in all aspects of their life. One of the main benefits of M-learning is its possibilities to improve students productivity by making knowledge and learning available anytime and anywhere, enabling learners to participate in learning activities without the traditional place and time restrictions. Mobile technologies support accessible and widely available learning than the learning that used in the existing E-learning environments. M-learning supports performance with easy access to information, which can immediately impact students' performance in a learning environment, facilitating their education. M-learning manages different learning requirements, where it is ideally geared for allowing students to get knowledge at their own speed. M-learning enhances two-way interaction where it supports direct communication between students and their teachers, in such way to encourage shy or hesitant students to communicate more easily than in classrooms. As well as, teachers of large groups can use the direct interaction as a way of giving special instruction to all students. M-learning also helps students those facing financial, family or health problems in migrating out to university classes. Finally, M-learning is self-motivated, self-disciplined that supports studying with on time waste, studying anywhere and at any time.

V. M-Learning Challenges

The previous advantages do not come without challenges. The rapid proliferation of mobile applications has outpaced the traditional software applications. However, these traditional software engineering applications cannot be applied directly in mobile devices because of the following issues:

- Mobile device user interfaces (UI) which provide a new mechanism of human computer interaction sequences such as multi-touch interfaces, image recognition and code scanning, that have not been previously explored in research and there is not any established user interface guidelines exist [24,26].
- Different mobile platforms such as iOS, Android, Windows etc…
- Different hardware makers for platforms such as HTC, Google, Samsung, Apple, etc…

The future challenges of M-learning are as following:

- May make it easier to cheat.
- Finding the best infrastructures.
- Creating universal user interface.
- Limited mobile memory.
- Limited mobile battery life.
- Limited user interfaces.
- Irregular connectivity.
- Different mobile platforms.
- Finding the best infrastructures.
- Problem of learners trusting the wireless network.
- Design an effective context aware mobile application.
- Prevent the disclosing of the learner information via network.
- May create a feeling of isolation, separation or of being out of the loop.
- Could require additional learning curve for non-technical learners.
- Existing applications are not easily integrated to all the mobile technology environment.
- Getting teachers and instructors to use digital content. Many teachers are not for digital content and technology based teaching and learning.

VI. M-Learning and Cloud Computing

Cloud computing is the meaning of using computing resources (software and hardware) that are delivered as a service via a network (typically the Internet). The cloud computing has the significant scope to change the whole education system. Due to the fact that cloud computing has many advantage such as lower costs, improved performance, increase storage space, increased data reliability, universal data access, device independence …etc. In present scenario that the eLearning systems are getting the popularity but cloud computing will surely help in the improvement of the education offered to poor students which will increase the quality of education offered to them [27].

Cloud based learning system will help students, tutors and administrators to a very high extent and mainly students from rural parts of the world will get an opportunity to get the knowledge shared over different part of the world. Even

governments should take initiatives to implement cloud computing systems to offer M-learning in schools, colleges and universities in future.

VII. Ready for M-learning

The possibilities for mobile learning both in the workforce and the higher education can best be summarized by Alexander [28], who said, "Science fiction is our best instructor…Think about a room…and the simple act of crossing it pulls down documents, changes a screen, sends a signal a different way. We are turning the entire space into a living medium we are just beginning to conceive." In the last four years, modern technology has evolved to reach the point where it can offer make practical M-learning. Although there are still some issues and barriers to overcome, the future of our education system looks very promising [29]. Thus, the question is, are we ready for mobile learning now?

VIII. Conclusion

M-Learning provides the connection between technology and education possible. The learner includes nomadic, institutional, home, children and adult users and the variety of learning environments includes standalone, schoolroom, networked, internet-based, nomadic, distance, collaborative, asynchronous and synchronous will arise the interest of the new generation of eLearning (M-learning). The paper has discussed the background of M-Learning and how it can be used to enhance the whole learning system. The paper also provides highlights of the advantages and future challenges of M-Learning in our education systems. Finally, our students and tutors should be prepared for the next generation of learning and training. The M-learning systems are not to replace traditional classrooms but they can be used to complement the learning process in our schools and universities. Finally, offering M-learning through cloud computing will surely improve the current system of education and improve quality at an affordable cost.

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