The Role of Pervasive Computing in Mobile Learning

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ABSTRACT

The need for usage of technologies which removes the boundaries of time and location increases day by day today when information and accession to information gains importance. Effect of mobile learning to education is an issue to be researched in order to provide lifelong learning. Learning through mobile devices has enhanced a lot with the advent of pervasive computing technologies. The mobility of the individual increases the capabilities of the individuals to adapt to new learning environments. This paper the first introduce mobile learning methods then has been studied pervasive computing in learning. Finally check the importance and usage of pervasive approach in mobile learning and mention limitations of pervasive mobile learning.

KEY WORDS: D-learning, E-learning, mobile devices, M-learning, Pervasive computing, Pervasive mobile learning.

1. INTRODUCTION

The traditional form of education does still exist, but the growth and expansion of ICT is so tremendous that it paved the way for the rapid development of Internet based learning. The Internet has radically reshaped our higher education area. Today Internet-based teaching is an opportunity for millions of students to receive their education. It is not too expensive to use the Internet for study, and the courses provide excellent tools like message boards, chat rooms, etc.

The traditional education is made in classrooms where the teacher presents the learning material to a group of students. The educational technology depends mainly of teacher and the students must physically participate in the learning process. Regardless of obvious advantages as a direct contact between a teacher and students and immediate feedback the traditional classroom education has many disadvantages. For example if the student has no ability to take part in some lesson he or she will miss the training material. These disadvantages lead to search for new and more effective educational methods. [1]

The rapid growth of information and communication technologies and rising computer knowledge of the students make possible appearance of these new educational forms. If 15 years ago the main accent has been on Computer Based Training which used primary CD and local area networks as information medium, 5 years ago the accent is moved to use of Internet and Learning Management Systems. The E-learning as new term is Appeared. Nowadays extremely actual and perspective is mobile learning. [1,7]

The paper is structured as follows: In Section 2 explained pervasive computing in learning. Section 3 and Section 4 addresses the objective of this paper which explains the mobile learning and introduces some portable devices in mobile environment. In Section 5 and 6 study pervasive computing in M-learning and technical limitation in improving of that approach. Finally we conclude in Section 7.

2. PERSVAVE STUDIES IN LEARNING

New technologies are being adopted in teaching and learning processes. But still traditional learning is a key model in learning where the teacher has face-to-face interaction with the students. This type of learning has a cultural effect because students are able to interact and learn from one another. Also the relationship between the students and the teacher is very strong [12]. But lack of efficient classroom equipments, accessibility of the location, and the limitation of class rooms are the major disadvantages of traditional method. So in many educational institutions E-learning and M-learning have gained attraction in the recent years because the students are able to access the learning sources from anywhere, at any time on all these web-based learning environments.

Later learning materials were produced and delivered in digital form instead of the printed form. The next phase was the arrival of multimedia and hypermedia technologies, enabling the delivery of learning materials through CD ROMs thereby improving the effectiveness of learning. The advantage of these educational CDs

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was that it can be customized and reused according to the learner’s needs. Rapid development of Internet and WWW lead to web based learning environments. It provided tremendous opportunities for learning. [11]

Pervasive computing, is a rapidly developing area of ICT. The term refers to the integration of ICT into people’s lives and environments. It enables authorized access to anytime-anywhere any device-any network-any data. In 1991, Mark Weiser, a researcher at Xerox PARC, coined the term ‘Ubiquitous Computing’. His vision for the 21st century was “The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it”. He predicted that the technology itself will become invisible and networked into our daily lives. The hardware to support pervasive computing was not available at that time. But still he envisioned a future where tiny devices will be embedded in the environment making the pervasive computing a reality. And now the unbelievable growth in hardware technology has fulfilled his vision. [13,14]

3. M-LEARNING

Mobile learning is a type of learning which appeared as a conclusion of co-evaluation of 'mobile informatics' and E-learning fields, provides accession to E-learning content independently of a specific location, utilization of services created dynamically and communication with others. M-learning can be used to support traditional learning as well as distance learning. From the other side the M-learning is part of E-learning and therefore-part of D-learning. In the literature there are different definitions for M-learning. Some of them consider it as only wireless or Internet based.[1] M-learning is a distance learning model which is designed to meet education needs with the help of mobile devices such as PDA, cell phones, portable computers and Tablet PC. [2, 4].

Mobile Learning is intended for those people who were not able to undergo traditional education. It has shattered the requirements for students to be seated for lengthy periods at a given time and place. It enables students to take courses at their convenience. Moreover, wireless network access to the Internet increased students’ mobility because it allowed them to carry their laptops around. [8]

The most important advantage of M-learning to E-learning is accession by the student to demanded information independent of time and environment. If we analyze, we can range advantages of mobile education as follows:

- Life-long learning,
- Learning inadvertently,
- Learning in the time of need,
- Learning independent of time and location,
- Learning adjusted according to location and circumstances. [5,6]

4. MOBILE DEVICES IN M-LEARNING

The realization of mobile learning is impossible without use of the mobile devices. They vary significantly in their abilities, sizes and prices. The common ability which united them is their mobility and possibility to make wireless connections. The fact that mobile devices are small and they have got with a lot of features despite their size increases interest for them. The feature of mobile devices that enable educational atmosphere encourages individuals for their usage. Besides, it enables an educator who shares the information to contact more students independent of time and location with the usage of mobile devices in education. [2]

Important mobile devices progressing gradually and used in M-learning and education process are listed as follows; Servers, laptop computers, tablet computers, smart phones, pocket computers, portable media players, MP3/ video players [1].Here list some problems of using portable device for M-learning:

- Cellular phone screen sizes limit the abilities to display information.
- The small keyboards of PDA make the input of the information difficult.
- Today PDA and mobile phones have limited memory size.
- There is necessary to regularly charge the mobile devices' battery.
- Until now it is impossible to use all of applications developed for PC in mobile devices.
- There are difficulties to use multimedia elements in cellular phones.
- The prices for wireless communications are still high.

Although follow above items there are several problems in using of portable devices for M-learning, but the change from E-learning to M-learning will excite the change in the educational paradigm [3].

5. PERSUASIVE MOBILE LEARNING

Mobile learning is the union of mobile computing technologies and E-learning. This type of learning environment enables the learners to access the learning materials from anywhere at any time. But Pervasive mobile learning is learning enhanced with intelligent environment and context awareness. While the learner is

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1 World Wide Web
2 Personal digital assistant
moving with his/her mobile device, the system dynamically supports his/her learning by communicating with the embedded devices in the environment. So by the integration of pervasive computing and mobile learning technologies, users are enriched with a great learning experience. [8] Mobile devices, embedded systems, wearable computers, sensors, RFID tags, etc make the environment pervasive. Devices embedded with microprocessors are used to sense our movements [14]. So apart from distance and time, pervasive computing provides users with the ability to access information. It provides the possibilities of embedding computational support for the learning activity in the learner’s physical contexts [15]. These environments can be built either by embedding models of a specific environment into dedicated computers, or use computers to inquire, identify, search, and dynamically build models [16].

Pervasive computing is becoming common place and has a huge influence in the way in which individuals relate with others and their surroundings. Mobile learning has become more popular with the advent of pervasive computing technologies. A pervasive environment utilizes context-aware applications to deliver the learning materials depending on the user context. Pervasive devices are able to sense the environment and can offer efficient services to learners. Depending on the location, learners can exploit the resources/services in his/her neighborhoods’ [9].Recent developments on mobile devices and pervasive computing enable new opportunities for mobile learning users. In the near future, even learners don’t need to carry the mobile devices; the environment itself will guide them to avail the services as per the user’s needs. Mobile learning helps in the development of knowledge society. [10]

6. TECHNICAL AND EDUCATIONAL CHALLENGES IN PERVASIVE M-LEARNING

Pervasive Computing opened new dimensions to learning methods. The limitations of pervasive M-learning are a combination of technical and educational challenges.

- Developing Learning Models to support Pervasive learning
- Middleware and System Support
- Privacy & Security

There is a need for middleware, networking and a software framework for interaction among the various pervasive devices that together constitute the learning environment. Some of these disadvantages may disappear as technology improves. [8]

7. CONCLUSIONS

The educational process will became more flexible and will fulfill to the needs of lifelong learning. Usage of mobile learning (M-learning) technologies in education is the most important of required technologies to provide main goals in distance education. It offers learning and data accession opportunities to learners notwithstanding time and place. The paper focuses on the success of pervasive mobile learning environments. The assimilation of pervasive computing in mobile learning marks a great step forward. This new technology has changed the traditional concept of learning so that we are being frequently surrounded by, and immersed in learning experiences.

So the integration of mobile learning with pervasive computing may offer great innovations in the delivery of education in the coming years. Even the recent developments in mobile technologies foresee a day where learners don’t even need a device to learn because of the development of mobile technologies has provided important advantages in works of experts as well as for those in need of data.

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^ Radio Frequency Identification


