Abstract

Along with the fast developments in mobile technologies, the need to learn mobile learning has become more important. The easy usage and easy accessibility of these mobile devices have made them more significant than ever. This study gains importance in extend of the need for mobile learning and meeting the new learning conditions. In addition, handling the current and the future mobile learning and suggesting some new ideas about it are also considered as important topics.

INTRODUCTION

Along with the development of information and communication technologies, their positive impacts particularly on universities and their extensive use, new and strategic methods have been developed related with them. The inclusion of e-learning in the learning process and its becoming widespread as a component of traditional education has caused positive changes in extend of pedagogical, technological and economic aspects (Birch & Burnett, 2009). The need to access to the information regardless of time and place has increased the effects of mobile technologies and mobile learning, and it has also brought new strategies to learning process (Uysal & Gazibey, 2010).
A great number of researches have been done and plenty of methods that can facilitate learning have been developed for years. In fact, the Chinese Philosopher Confucius summarized learning 2400 years ago as his following quote:

“I hear and I forget. I see and I remember. I do and I understand.”

The fact that learning through mobile technologies we mostly use nowadays as a means of getting the necessary information comply with Confucius’ description of learning suggests that these devices should be used in learning environments and they should be given more importance. Particularly, using mobile telephones more than the computers and their accessibility to the popular pages such as Facebook, Youtube, and Twitter indicate that they have the potential to be used in learning environments. In recent years, the efficiency of constructivism learning method, the transition from computer based learning to web based learning and the improvement in technologies have made mobile learning as one of the most popular learning styles (Yamamoto, 2011).

The researches show that the data transferred through mobile networks have increased dramatically. This increase in data transferring points out that people are using mobile technologies more often and they usually prefer to use these environments in order to access information. In Figure 1, the uploading and downloading traffic in mobile devices can be seen clearly.

![Figure 1.2007-2012 Global Traffic In Mobile Networks (Ericsson, 2012)](image-url)

**Definition of Mobile Learning**

Along with the fast developments in mobile and computer technologies, new methods in this area have also emerged besides traditional ones. As a result of this, mobile learning methods and especially web based distance learning have gained importance (Yildirim, Goktas, Temur, & Kocaman, 2004).
Distance education is a method that has appeared as a result of the distance between teachers and students (Moore, 1973). On the other hand, Bates (2006) suggested that distance education is neither good nor bad, but trying to get the benefit of educational technologies is an important subject. Distance education is an educational method rather than a philosophical approach. It is a method that students study on their own wherever they want without coming face to face with teachers. This education method has developed correspondingly with technology since its emergence. With the developments in technology, the lack of interaction in the distance education system has started to disappear, and the trends of both individuals and governments towards distance education have changed immensely. Therefore, the technology with its changes has influenced the individuals in distance education environments (Bates, 2006). E-learning and distance education has been supported by governments due to the economic competition, lifelong learning, social equality and accessibility, better education, cost effectiveness, commercializing of education and geographic reasons (Bates, 2006). Bates (2006) has also suggested that neither e-learning nor distance education can solve the problems, but they perpetually go on developing (Bates, 2006). One of the methods used web based distance education is mobile learning. There is no definite explanation for mobile learning in education; however, it can be defend as easy and flexible learning due to the fact that it occurs regardless of time and place using portable mobile devices (Köc, 2010). Keagen (2005) stresses the mobility of mobile learning while defining it. Mobile learning enables students to learn outside the class through mobile phones or tablet PCs, and it can be accepted as perfect form of flexible learning (Seppala& Alamaki, 2003). In general, mobile learning can be defined as a type of learning that takes place through portable devices which provide its users to meet their needs within seconds in terms of accessing ever-changing data and communicating with others without sticking to anything and anywhere.

**Mobile Devices**

Along with the developments in information technologies, wireless communication and mobile devices have been started to be used in order to support the traditional learning (Wang at al., 2004).

Wireless communication techniques may help student obtain the necessary information. Besides this, it also teachers and the learning systems can direct students to the information by using these techniques. Therefore, students can use their mobiles or PDAs (Personel Digital Assistant) in order to access to the information they need (Wang, Liu, Horng, & Chen, 2003).

In our modern life, it is possible to outline the mobile devices used in mobile learning as the following:

- **a) Laptop:** Laptops and another kind of it, known as notebook, are some of the portable devices that are mostly used in our daily life. These laptops can have all the properties of a normal PC. Due to being manufactured through advanced technology, being made up of valuable pieces of this technology, and their difficulty during installation, their cost is quite high. These laptops enable users to obtain the information they want by means of such wireless connection types as USB, wireless network, Bluetooth and infrared devices independent from time and place.

- **b) Tablet PC:** Tablet Pc is the most popular computer of our time which is a portable personal computer typically smaller than a notebook computer but larger than a smart phone, and it is easy to transfer the data by means of its internet and memory device. It is a kind of computer usually having 7 or 10.1 inch-touch screen.

- **c) PDA (Personal Digital Assistant):** Personal Digital Assistant, also known as palmtop computer, is a mobile device that functions as a personal information manager such as keeping addresses or names. It has the ability to connect to the internet and, it is also portable. With the developments in electronics and computer technology, the size of computers has become smaller and features of them have increased. The production of computers having the features of camera, video and GPS have expanded, but it has also started to give its place to smart phones.

- **d) Smart Phone:** It is a kind of communication device that has been designed by adding the features of PDA. Due to the fact that smart phones have mobile operating system and many applications, they are very
common devices used actively in all areas for different purposes. As it can be seen from the Figure 2, the number of smart phone users is increasing day by day.

**Mobile Technologies**

In order to provide the mobile devices with online communication or communication with the other mobile devices, there are four different communication or connection technologies used, and these are GPRS, Wireless(Wi-Fi), Bluetooth and Infrared. These communication technologies are available in some mobile devices. The mobile devices that do not have these technologies are supplied with communication ability by using one of the transferring technologies such as USB, Compact Flash Card and PC Card (PCMCIA). Wi-Fi, which is mostly preferred in mobile devices, is a technology that provides devices such as personal computers, play stations and digital audio players with wireless internet. The other technology that increases the applications and efficiency in mobile devices is Augmented Reality (AR). AR technology, having developed in a very short time, has proved to be innovative and efficient technology in order to solve some kinds of problems. AR can be defined as an interactive device between human and computer, which has been developed by a computer in real world environment (Nee, Ong, Chryssolouris, & Mourtzis, 2012).

AR technology can be used in smart phones (Android, iPhone), tablet PCs (Android, iPad), desktops and internet-based applications. It is though that AR technology will be used actively in mobile applications and it will bring different approaches in learning. Traditionally, orientation educations are given by tour guides or they are given online. However, these methods do not erect conscious learning. With AR technology, the mobile learning carried out by means of smart phones that include video camera and internet connection or thorough a GPS technology makes learning conscious, easy and unlimited. The AR technology is very important technology in terms of being user-centered, visualizing the processes it does and providing real-time feedback. This technology arouses interest among learners and reinforces learning (Chou, & ChanLin, 2012).

Mobile Cloud Computing technology is a kind of service that provides common data sharing among the data processing devices through its performance to deliver data online. MCC offers a wide range of opportunities for mobile service sector by making computing recourses available in mobile devices on a data network (Yang, Cao, Tang, Li & Chan, 2012). Mobile learning devices and technologies instantly provides interaction between the learners and the teachers, among classmates or with learning systems (Wang, Liu, Horng, & Chen, 2003). The learning devices are able to be used intensively in managerial and educational processes in many associations, and they also play an important role in developing interaction within the classes or outside the classes in educational institutions. Ericsson, being one of the leading communication technology companies in the world, estimates in the report published in 2012 that the number of people using mobile devices will exceed 4 billion in 2018 (Ericsson, 2012). It is possible to see in Figure 2 that the use of mobile devices has been widespread particularly in recent years.
It is thought that however much mobile technologies and devices improve, it is not possible to get to the expected performance and success as long as they are not used in learning environments depending on the theoretical base. Therefore, the design of mobile learning environments and environment becomes more of an issue.

The design of mobile learning environments

The researches carried out for years in the realm of education have been done in order to provide effective, productive and permanent learning. Besides this, mobile learning, which has recently been one of the main focuses of the educators, is believed to have influenced the learning process. Mobile learning environments have importance in providing effective learning according to such certain approaches as Knowledge Objects and Learning Objects. According to Trifonova, mobile learning should support and guide students and teachers about when and where the learning situations are necessary (Trifonova, 2003). The technologies to be used in mobile learning environment should have the following components as showed in Figure 3 (Dickersen & Browning, 2009):
Not being lost in hyperspace in the process of accessing to the required data is very significant issue in terms of practicality for the users. Not being lost in hyperspace is defined as the users know where they are on the net and know how to get the intended pages (Conklin, 1987). Using surfing items and tools that will help the users find the information they want, paying attention to the individual differences among them and using simple interfaces are important aspects in the extend of preventing users from getting lost in hyperspace (Conklin, 1987). Mobile usage is a developing field. The researchers studying on computer-human interaction suggest that to understand the psychological, agronomical, collaborative and social factors which define how the human-being work in order to produce computer systems are important (Kukulska-Hulme, 2007). Before attempting to use the mobile technologies in education, the other aspect that is supposed to be studied is technology roadmap. By using this technology roadmap, it is possible to practice and implement the predictions about the mobile technologies, to provide long term planning and management, and also to increase the effectiveness and productiveness. This effectiveness and productiveness will increase the quality of education, as well. Therefore, a technology roadmap is needed. This roadmap will play an important role as a bridge in accessing to future targets in mobile learning in terms of product, service and technology (Uysal & Gazibey, 2010).

The features of Technology Roadmap may include the processes shown in Figure 4:

Figure 3. Educational Development Components (Dickersen & Browning, 2009)

Figure 4. The Phases of Technology Roadmap (Garcia, & Bray, 1997)
Mobile Learning Applications

When looking at the developments in mobile technology, it is possible to see METIL (Mixed Emerging Technology Integration Lab) that has put the mobile applications such as Microsoft Mobile Learning Project, Mobile Sports Pulse, TUSK, Johnson & Johnson, Allogy, which were all established in the USA in 2006 in order to research and develop modern technology, into effect.

Besides this, many mobile learning projects have been put into practice in Europe for teachers’ education, pedagogical development, and educational support and research.

Table 1. Some Mobile Learning Projects in Europe (Unesco, 2012)

<table>
<thead>
<tr>
<th>FIELD OF INTEREST</th>
<th>INSTITUTION</th>
<th>COUNTRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers’ Education and Pedagogical Development</td>
<td>MoLeNET</td>
<td>England</td>
</tr>
<tr>
<td>Management Support</td>
<td>UnivMobile</td>
<td>France</td>
</tr>
<tr>
<td></td>
<td>Mobilskole</td>
<td>Norway</td>
</tr>
<tr>
<td></td>
<td>Yorkshire Coast College, Mobile Oxford</td>
<td>England</td>
</tr>
<tr>
<td>Instructional Support</td>
<td>Mobile in Salford, University of Leeds</td>
<td>England</td>
</tr>
<tr>
<td></td>
<td>Medical School, Priory School, Apps for Good</td>
<td>England</td>
</tr>
<tr>
<td></td>
<td>Distance Learning for Apprentices</td>
<td>Turkey, Spain, Portuguese, Germany, and Denmark</td>
</tr>
<tr>
<td></td>
<td>REACH</td>
<td>Turkey, Italy, Norway, and Spain</td>
</tr>
<tr>
<td></td>
<td>Presemo</td>
<td>Finland</td>
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<tr>
<td></td>
<td>WapEduc</td>
<td>France</td>
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<td></td>
<td>ENVI GAME</td>
<td>The Czech Republic</td>
</tr>
<tr>
<td></td>
<td>BlackBerry Academic Program</td>
<td>In many Countries</td>
</tr>
<tr>
<td>Research</td>
<td>MOTILL</td>
<td>Hungary, Ireland, Italy, England</td>
</tr>
</tbody>
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In Turkey, some universities, companies, and public institutes have been developing and using some applications about mobile learning. By means of the project called Fatih Project in Education (2006-2010) prepared by Ministry of National Education, it is thought that mobile devices will be used more extensively, the tendency to mobile learning will increase and also the objectives mentioned in Table 1 will be implemented.

Table 2. Objectives of Fatih Project in Education (MEB, 2012)
OBJECTIVES OF FATIH PROJECT IN EDUCATION

- To develop life-long learning, make the individuals improve themselves through e-learning, to improve the e-content they use
- Every student graduating from a high school should have the ability to use information technology and basic knowledge
- By means of using internet effectively, one out of every three should get the benefit of e-education services,
- Offering every individual opportunity to use and learn information and communication technology
- One out of two should be internet user
- To make the internet a safe environment for all the community

The Advantages of Mobile Learning

Lifelong learning, peripheral learning, learning when needed, autonomous learning, situated learning and learning depending on the conditions, which are known to be applied through distance learning, were not be able to implemented completely due to some difficulties and limitations. Therefore, Mobile Education have helped a great deal to these learning situations and types (Bulun, Gülnar, & Güran, 2004; Sharples, 2000; Vavoula ve Sharples, 2009). According to Sharples, the more the learning becomes student-centered and individualized, the better and the more personalized the new technologieswill be (Sharples, 2000). In Table 3, the implementation and realization of lifelong learning through new technologies has been shown.

Table 3. Comparing Communication and Information Technology to Lifelong Learning (Sharples, 2000)

<table>
<thead>
<tr>
<th>Lifelong Learning</th>
<th>New technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>Personal</td>
</tr>
<tr>
<td>Learner-centered</td>
<td>User-centered</td>
</tr>
<tr>
<td>Static</td>
<td>Mobile</td>
</tr>
<tr>
<td>Collaborative</td>
<td>Network</td>
</tr>
<tr>
<td>Available everywhere</td>
<td>Available everywhere</td>
</tr>
<tr>
<td>Lifelong</td>
<td>Permanent</td>
</tr>
</tbody>
</table>

Mobile learning provides students with individual study and online resource opportunities. Being easy updatable, being assessed by the students and providing feedback can also be considered as some of its advantages (Jacob & Issac, 2008). It is possible to support the activities of students and teachers thanks to the developments in mobile technologies. (Trifonova & Ronchetti, 2004). It is a great freedom for the learners to start and stop or even interrupt learning process whenever and wherever he/she wants. Until recently, it was common to experience some problems such as cable need in order to access to web-based learning environment, nondurable batteries and difficulty to access to the internet. Thus, it was almost impossible to create the desired free atmosphere for learning (Bulun, Gülmar, & Güran, 2004). However, today, by means of the tablets whose
functionality has increased, more developed smart phones, durable batteries, accessing to the internet easily have made mobile devices more usable.

**Results and Discussions**

In this information age, the importance of information is increasing more and more, and this has led the institutions to look for new methods in order to access the information. Some experts define the devices, especially the internet which plays an important role in the process of transferring information as a technology so as to implement different approaches in education. However, it should be known that these technologies are not produced for educational purposes or transferring information. Otherwise, it is possible to encounter some problems such as time loss in education due to the fact that they will be directly implemented in education without analyzing, determining a technology roadmap, assessing its suitability for education. On the other hand, even if these technologies have been developed with the imperialist approach, they have an important role in education in terms of efficiency and making learning an enjoyable activity after being aware of the fact that they know how to take the advantage of them.

In recent years, the projects that have been carried out for the purpose of both instructional support and increasing the functionality have increased the interaction between the teachers and students.

Using mobile learning environment gives learners an opportunity to access the information whenever and wherever they want. Therefore, mobile devices which are sometimes criticized as one of the learning tools and which are developing in extent of size and features have recently been used intensively and they have increased the effectiveness of learning environments. To adopt mobile technologies simply as a means rather than a target while preparing plans and programs will provide more effective usage. It is predicted that Augmented Reality will develop and it will increase the efficiency of mobile learning, and also it will be very common in educational institutions. In order to get the benefit of mobile devices, the first thing that should be done is to have one. Thus, along with obtaining these devices easily through some institutions and companies, getting a place in the culture shows that mobile learning applications can be applied to a wide mass. There have been many researches on distance education, e-learning and mobile learning for years. These researches have concluded that these kinds of learning have supported learning, increased the interaction and contributed to the persistency in learning; however, it has also been concluded that it is on its own, never adequate for learning.

**REFERENCES**


