

Transitioning from e-Learning to m-Learning: Present Issues and Future Challenges

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Abstract

This paper places mobile learning in the space of the existing learning methods. The three main groups of challenges – technological, development and pedagogical – in the transition from e-learning to m-learning are defined. The influence they make over the main participants in the m-learning process – developers, educators and students is also examined.

1. Introduction

Due to the continuous growth of the information and communication technologies, we witness today a fast progress in the development of educational technologies. Distance access to the large amount of the educational materials became easy and faster with the development of the Internet technologies. This leads to the continuous increasing of the user's number which use the new services offered by the distance learning.

The growing use of mobile devices and wireless communication technologies enables access to contents at any place at any time, thus providing a new, more flexible educational method– mobile learning (m-learning).

During the transition from one educational method to the new one always faces challenges. The same is the case in the transition from e-learning to m-learning, [5, 6]. One of the disadvantages of the existing descriptions of these challenges is that they concern only mobile learning without the examination of its cross-interactions with other educational methods. The other disadvantage is that these challenges are being studied separately from each other. For example the pedagogical challenges are examined without the connection of the development challenges, and so on.

We take the position that the challenges in the transition from e-learning to m-learning needs be observed in light of the cross-interaction among them, and from the

perspective of all the participants in the m-learning process – developers, educators and students. Only on this base a successful solution for all challenges can be found.

The paper consists of two parts. In the first defines the place of m-learning as a part of the all educational process. The second part examines the challenges in the transition from e-learning to m-learning.

2. The place of m-Learning

M-learning is quickly picking up momentum, as a new stage of the development of e-learning, respectively distance learning, from a technological standpoint. It can also be used to support traditional approaches, as well. Fig.1 shows existing learning methods classified by the technologies they use [2].

Item 1 on Fig.1 represents Traditional Learning (Face-to-Face Learning). The main characteristic of Traditional Learning is that the education process is lead in the class rooms and there is a continuous communication among students and educators.

Distance Learning (d-Learning) is the second educational method (Item 2 on Fig 1). Its unchangeable characteristic, despite the fast growth of the technologies, is that it gives the students an opportunity to learn at a given time and place. The students are physically separated from the educators and the education institution.

Items 3 and 4 denote Technology Enhanced Learning (te-Learning). Its name indicates the usage of special tools and technologies for increasing the quality of learning. It can be used for the support in Traditional Learning or to support Distance Learning.

Learning was initially defined as learning via Internet. Today this term covers education via Internet (on-line) as well as computer-based learning (off-line). Item 5 on Fig 1 denotes online e-Learning, and item 6, off-line e-Learning.

Mobile Learning and Wireless Learning (w-Learning) are often observed as a part of e-Learning paradigm.

These two terms often are used interchangeably, despite the fact that they stand for two different educational methods. M-Learning not always is wireless and vice versa.

M-Learning uses mobile devices (cell phones, PDAs, smartphones, Notebooks computers, Tablet PCs) to present educational content. Depending on the need for wireless connection, mobile learning can be either on-line m-Learning (item 9) or off-line m-Learning (11). Item 10

denotes a hybrid solution where wireless connection is used to load the necessary educational content in the mobile device memory and after that the student works off-line.

The Wireless Learning is method of learning which is supported by the wireless technologies. In most cases w-Learning is a subset of m-Learning. W-Learning also can be observed as on-line (item 7) and off-line (item 8).

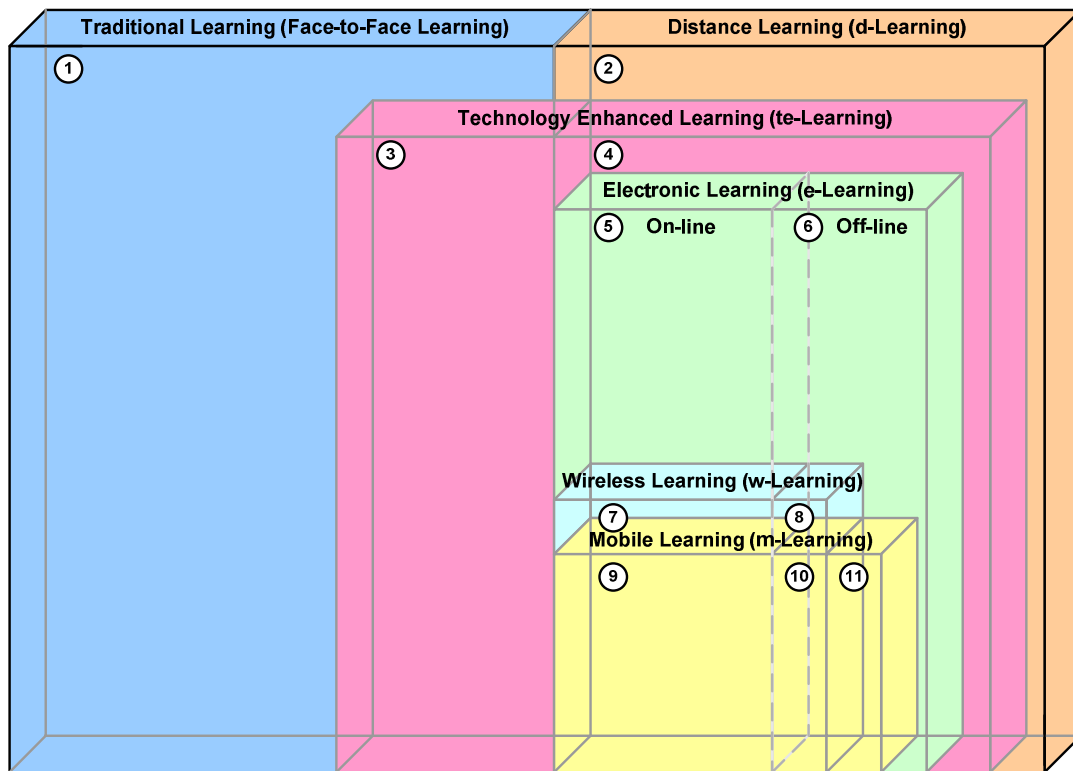


Fig.1. Existing learning methods and technologies used

3. Challenges in the transition from e-Learning to m-Learning

In this section we comment on current challenges in the transition from e- to m-learning. These challenges are for all participants in the m-Learning process. As the mobile, information and communication technologies are growing very rapidly, we can expect that in near future a part of these challenges will fall away but new ones will appear and will require appropriate solutions.

There are three main groups of participants in the m-learning process:

- Developers, whose main task is to design and develop the mobile learning systems

- Educators, who develop the learning content using the mobile learning systems. They also actively participate in the education process
- Students, who use the learning content by the support of mobile devices and mobile learning system.

These three groups are faced to the same challenges – technological, development and pedagogical (Fig.2). These classes of challenges are not disjoint; for example, the technological challenges raise development and pedagogical challenges.

3.1. Technological challenges

The first challenge for all the participants in mobile learning is technological. The main difference between e-

Learning and m-Learning is in the technologies used for educational content supply. E-Learning uses mainly desktop personal computers whereas m-Learning uses mobile devices [9]. These mobile devices vary in

computing power, memory size, screen size, operational system, software, and wireless communication abilities, etc. [7].

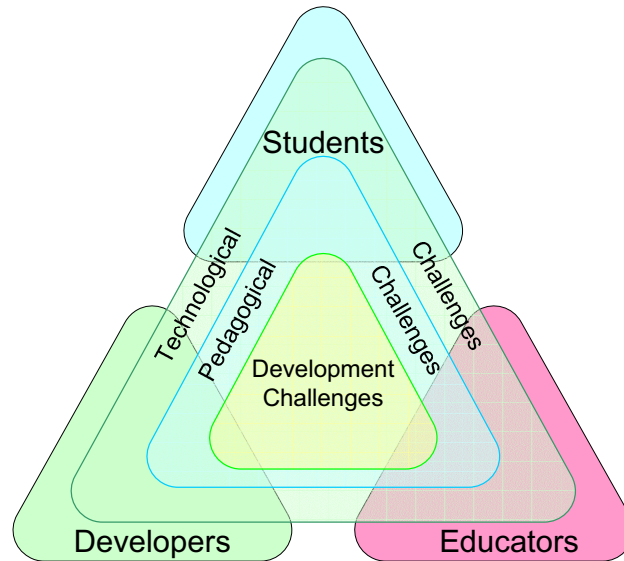


Fig.2. M-learning participants and their primary challenges

3.1.1. Developers. The technological challenges for the developers result from the features of the mobile devices, less powerful when compared to the personal computers – less memory, less computing power, smaller screen size, absence (in most cases) of keyboard, etc. Another challenge is that the developers must very well know all the abilities and downfalls of the particular mobile devices and communication technologies to successfully design and develop a mobile learning system.

3.1.2. Educators. Educators need to know very well how to operate mobile devices to a degree where they are convinced of their potential for educational use. It is only then when they could successfully cooperate with the developers of mobile learning system. Educators must know what to require from the developers and to know what the limits of such systems are. After that they can develop an educational content taking into consideration the abilities of mobile learning system. Educators must be also fluent with the modern communications devices used by their students in order to be able to respond to their expectations.

3.1.3. Students. The group of the students is this which uses more often a new mobile and communication technologies. The main challenges for them from the technological point of view are due to the different

features of mobile devices compared to the personal computers they use for e-Learning. Students have to know the abilities and limitations of their personal mobile devices when presenting educational content. Thus they can fully take advantage of the possibilities the mobile systems support.

3.2. Development challenges

3.2.1. Developers. Developers face their main challenges during the development of mobile learning systems. On one hand, they must define what type of mobile system they will be developing – one for on-line and/or for off-line learning [1]. In the first case the system can be based on an existing e-Learning system. Due to the different abilities of the mobile devices to present data, there is a need of well-grounded decision of an appropriate method for adaptation of educational content – server-side, proxy-based, or client-side. From the view point of the design it is important that the developers have to take in consideration the vast differences between the mobile devices and desktop computers for the users’ interaction and presentation of educational information [3]. The developers also must consider with the information transfer speeds at different wireless technologies. The other challenge is the problem of the loss connection when a wireless communications are used. In this case there is

need of appropriate technologies for caching the information on the user's device [10]. The development of an off-line system for mobile learning, on the other hand, is materially different than the development of off-line e-learning. The off-line e-learning can use CDs or DVDs that make the use of large audio and video files possible. M-learning modules are limited by the size of the device's memory.

Another challenge to the developers is the choice of a development platform. This choice depends on the type of the system under development -- on-line or off-line and whether the system is based on an existing e-learning platform. The next challenge is the ability to test mobile learning system. Unlike e-learning, where the development and testing of the system can be made on the personal computers, testing a mobile learning system first usually happens on mobile device emulators, and afterwards on real mobile devices.

3.2.2. Educators. As the focus of m-learning, all solutions are directed towards the main goal – adapting to his/her learning needs. The main challenge for the educators is the development of educational content. On one side, they must be fluent in the authoring tools for mobile learning systems. On another, the system imposes restrictions in what educational units they can use, how to edit these units, how to order them, what communications to use for collaborative learning, etc. That's why it is very important educators and developers to solve main dilemmas at the design and development stages. If the educators do not have the mobile devices, they have to learn to work with mobile device emulators when testing the educational materials developed.

3.2.3. Students. As the students are the main users of the mobile learning systems, they can only participate in the development process as testers.

3.3. Pedagogical challenges

3.3.1. Developers. The main pedagogical challenge to the developers of mobile learning systems is that most of them are computer specialists and have little knowledge about different pedagogical approaches. That is why it is very important that developers and educators work together during the development process of mobile learning systems, so that the system supports a desired pedagogical approach. Another challenge to the developers stems from the technological limitations of the mobile devices. To decrease the content loading time, systems must have the ability to store the users' profiles and predict the learning path of each individual student.

3.3.2. Educators. In the transition from e-learning to m-learning, educators also face significant pedagogical challenges. They must find a useful way to combine the new communication and mobile technologies with different pedagogical approaches. As opposed to the traditional learning where the educator is the center of the process, the focus of m-learning is the student [4, 9].

3.3.3. Students. A pedagogical challenge to the students is that they need to be self-organized in order to achieve the required goals. In the mobile devices, however, the ability to self-learn is interlaced with the good communication opportunities for collaborative learning [8].

Conclusions

In this paper we discussed the present technological, pedagogical and development challenges in the transition from e-learning to m-learning. Successful solutions to current and future challenges can be made only if the cross-interactions between them are taken into account. The joint efforts of the all participants in the m-learning process – developers, educators and students are also a necessary condition for success. A successful solution for m-learning can be the mobile learning system which can integrate and makes mutual complementation of traditional learning, e-learning and m-learning possible. Such system will ensure the optimal access of the students to educational content.

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