

## NEW PERSPECTIVES OF M-LEARNING

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### ABSTRACT

*The traditional learning methods were completed with electronic possibilities due to the spread of internet. The global needs, for mobilities have an effect of this field too. Be Mobile! Everything everywhere! We meet the usage of mobile environments in the most different field of life.*

*There are available now a lot of educational, learning possibilities (E-Learning). The needs of mobile technology, require that the methodology and the server framework of the E-Learning tool-kit has to be changed. It is often used M-Learning as an E-Learning independent from location, time or space. A good method of changing the framework can be the storing small contents in XML structures this guarantees the quick and effective page generation and the structural relations.*

**Keywords:** mobile, mobile Web, ASP.NET, Visual Studio, E-Learning, M-Learning.

### 1. INTRODUCTION

With the spread of internet the traditional learning methods were completed with electronic possibilities, which are called nowadays as electronic-learning methods, briefly E-Learning. The wideband internet access is often available, and mostly it is free (e. g. stations and institutions).

While the access of information, learning materials is very important in an electronically way, we have to remark, that the expectations about the possibilities of E-Learning were not confirmed by researching or empirical results too. [1]

At the same time we are the witnesses of continuation of computer miniaturizing and besides these small computers have got bigger and bigger capacities, resources.

The use of mobile-size computers became natural. Accordingly the learning contents have new interpretations.

They have to be adequate to two conditions:

- The information giving pages have to make the best of the possibilities of mobile environments.
- The structure of content can be simple, else it will be not traceable and handable.

With the aim of expansion the possibilities of self-learning or helping the learning- process, the popular educational applications have to rebuild on mobile-platform as well, besides the commercial applications, like lifestyle advices, navigation or advertisements.

### 2. MOBILE ENVIRONMENTS

Recently we meet slogan “Be Mobile”. [2] It means a developing direction, which resulted on the field of user serving computers and mobiles two representative changes.

- The traditional computers are slowly changed by the mobile ones, the notebook.
- The traditional mobile-phones are changed by smart phones, which are “smart” because their phoning functions are expanded with classic computing services.

The operating system of mobile devices gives wider and wider network connection possibility, GPRS (3G) or WLAN usage. The operating systems of our smart phones are varied, but we can follow the consolidation loan in this field too.

Probably the result of this process won't be a single system. (Maybe the two main directions results are the Windows Mobile 5-6, and Symbian directions.)

This development won't leave the developers for mobile -platform untouched. Besides traditional game-development, there are developing on the most different fields. (We can mention for the sake of curiosity a W@P-DOCTOR or Mobile-EKG applications.)

Naturally the situation is the same on the field of the education, learning help and assist environments too. Like the E-Learning, we can meet several terms too, just as nano-learning, n-learning, mobile-learning or M-Learning. [3] Correspondingly the term of E-Learning, on a mobile platform, the educational, learning, content or information transmission applications are called M-Learning applications.

It is often used, that M-Learning is an E-Learning independent of location, time or space. [5]

From a pedagogical perspective, mobile learning supports a new dimension in the educational process. Characteristics of mobile learning include:

1. urgency of learning need;
2. initiative of knowledge acquisition;
3. mobility of learning setting;
4. interactivity of the learning process. [4]

A mobile device can be used as a mobile learning environment if it can receive, store and send information – PDA, smart phone, camera-, and can warrant the double direction communication between the teacher and the student. [6]

There is one essential difference between the traditional and mobile computer environments, and that is the absence of full interactive possibilities of user-surface. (There is no keyboard or it is incomplete, often we use anyway the small screen as a keyboard too.)

Similarly the resources of mobile devices (processor, memory, accumulator), the size of screen is not measurable to desktop computers. That is the reason why, we can not use E-Learning materials, systems invariably.

For example playing videos or moving pictures, which are popular parts of traditional E-Learning subjects, needs a lot of resources and it has to be noted as an important question in the case of mobile devices.

The mobile device main obstacles can be summarized in the following form:

- Limited memory and storage are major inhibitors.
- Screens are generally too small for the use of any sophisticated applications.
- Cross-platform solutions are not yet possible.
- Links to learning management systems or enterprise systems are in an embryonic stage of development.
- The industry is plagued by proprietary solutions.
- Existing applications are not easily integrated to the mobile technology environment.
- Start-up costs are invariably high.
- Cost of accessing major third-party networks is punitive.
- Multiple permissions are necessary in terms of negotiated access.
- Continuous technology development militates against stability and sustainability in terms of mounting viable M-Learning applications.” [7]

That’s why we’ll focus in our work onto two fields.

- A new method, model has to be worked out ensuring that elements of information on a small surface produce a related curriculum.
- The worked out method ensures that we can create an application and a test for the use of this new mobile environment.

### 3. MOBILE MODULARITY

Our traditional educational systems are varied and they are not connected to devices in any way. We can use all illustratable information elements (picture, moving picture, text, sound) nearly without limitation.

From the above mentioned set of possibilities only the sounds are useable without limitations in a mobile-platform. In the case of pictures, moving pictures or texts we have to make an attention on the size of screen which

is typically 320\*200 pixels (QVGA-QUAD VGA) PDA, while this size is often smaller e.g. 180\*200 in the case of a smart phone, but the QVGA can be accepted as a standard.

As an interesting data we can mention, that formerly a bigger variety of screen-size was reachable on the market, e.g. a different category was led by devices with VGA (640\*480 pixel) screen, produced by several factories, nowadays these types are mostly disappeared, and the all in one type devices (GPA, GSM, 3G, WIFI, Bluetooth) became determining. In this category a bigger size device has no place, because it can lose its mobile function. Simply we can not use (simply not comfortable) a so big device for phoning.



Fig. 1 Devices with QVGA resolution.

Maybe it is strange, but the existence and availability of proper-size surface devices has an important influence. On the figure 1, we can see three devices with QVGA resolution. All three devices have the same functionality. A traditional device on the left has a normal PDA size, so it is not so good (too big) for phoning.

The device on the right is a normal phone. According to this, it is very nice to have a QVGA resolution, but its size is too small from the point of view of (web) applications (working with).

We think the device in the middle is ideal for mobile applications. Not too big, it can be handled with one hand as well. Meanwhile it is not too small for using applications with its screen size.

### 4. APPLICATION PLATFORM

Before we begin to talk about the main principles, we have to review the potential platforms of our future application.

In justice we can choose from two opportunities:

- to prepare a mobile application (WM5-6 API)
- to develop a mobile web application (MIE, MOpera)

Considering the size, the varicolored, and the easy variability of learning contents there is no doubt about our choice, only mobile web application can answer to all our requirements.

Besides our researching work, which produce the principles of mobile framework, our aim is to develop such a mobile application with which we can get and read

learning contents and to work out some test mobile learning contents as well. Let's review the most important devices from the viewpoint of applications, taking into consideration the easiest availability.

**5. MOBILE DEVICE TOOL-KITS**

During an application development the main (especially in our case too) task is to design the user interface. But before doing this, the choice of developing tool is important too.

For our choice we have the traditional developing tools (HTML, CSS editor) or we can choose from the software market an existing framework, free ones as well, like Moodle. These tools are completely general and they are not thoughtful of the most important feature of mobile world - for the limited size.

That's why we use an integrated developing environment (ASP.NET), which grants proper tools for this interface as well, and this project will guaranties mobile features. [8]

By way of introduction we have to mention that the controls, mobile-devices are row oriented, so characteristically we can put only one control in a row (breakafter = true). That's why the size and resolution of display and the readability of page demand, that after each interactive control should be a line break.

Usually it can be said, that complex pages with frames, tables (with fix size) can appear on mobile browsers as well, (but the compatibility is not 100%) so they are not traceable. Therefore we'll use only base controls, which are the followings:

- Label: A control for active, changeable content
- Textbox: Input field.
- Command button: Command, link button.
- Image: Displaying pictures (important features, the size parameters
- List, SelectList: For selections, the radio or checkbox list.

**6. SAMPLE MODEL**

In our model there are three level elements. In the top most level there are the names of courses. Below them are the chapters contained in the course, while the chapters can be divided into lessons, themes. In the implementation framework, we may use recursive formulas too, but it wont' do this, because of its effectiveness. Instead of it we use the traditional sequence representation.

This has got a benefit of easier implementation as well, besides the effectiveness (from the viewpoint of resources). We store the elements in XML form, which can be related to a library control inside application memory (XElement).

The lessons, themes are composed by properly articulated information units. The content of them can be produced with a simple HTML editor. The information units contain the illustration pictures and moving pictures.

The format of the content describing file should be the following:

```
<?xml version="1.0" encoding="utf-8" ?>
<courses>
<course id="CourseID" name="Name of Course">
<chapter id="ChapterID" name="Name of Chapter 1">
  <preview />
  <lesson id="LessonID" name="Name of Lesson 1">
    <Keyword />
  </lesson>
  <lesson id="LessonID" name="Name of Lesson 2">
    <Keyword />
  </lesson>
  ...
  <review />
  <questions />
</chapter>
</course>
<course> Other courses </course>
</courses>
```

It is useful to give the under mentioned controls to the single content pages:

- Back to the content
- Back to the chapters
- Previous lesson
- Next lesson

It is practical if the identifiers of the objects are chosen as the name of the content file, so the framework will behave likewise in the case of traditional previous, next or links inside the files.

Naturally, the usability of an information system is derived mostly by its content. The under mentioned demo page will assure us about the clearness and transparency of the framework's system and the next step should be the definition of proper unit. At the moment this page can be reached from the <http://csutka.inf.elte.hu/mobile> link. At present there are supported only for mobile devices. (Figure 2.)



**Fig. 2** Example site.

## CONCLUSIONS

With the spread of internet, the traditional learning methods are completed with electronic possibilities.

The global sensitiveness for mobility is not kept this field untouched. The educational, learning possibilities (E-Learning) are already available. There is a need for a change in methodology and in frameworks too, for the exploitation of E-Learning tool-kits on mobile.

It is often used, that M-Learning is a location, time or space independent E-Learning. A good usable change in the framework can be that the small content is stored in XML structures.

With this we can assure the quick and effective page generating on client-side. Miniature HTML elements (m-HTML) optimized on QVGA size flatter us with promising results.

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## BIOGRAPHIES

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**Ildikó Pšenáková** (Ing., PhD.) was born on 7. 3. 1957. In 1982 she graduated (MSc.) with distinction at the Department of Computer Science and Engineering of the Faculty of Computing Technologies and Informatics at Saint Petersburg Electrotechnical University. She defended her PhD. degree of Technology of Education in 2001 on the Pedagogical Faculty of the Constantine the Philosopher University in Nitra. Since 1982 to 1992 she was working as an associated professor at the Department of Computers and Informatics at Technical University in Košice. From 1995 she works at the Constantine the Philosopher University. Since 2006 she is the head of the Institute of Natural Sciences and Informatics. Her research interests include the usage of websites in education and the preparation of E-Learning/M-Learning materials.

**Viktória Heizlerné-Bakonyi** was born in 06. 12. 1961. She graduated in 1985 at the University of Eötvös Loránd in Budapest, and has got her diploma as a mathematics, physics and informatics teacher. Since 1985 she has been working as a teacher at the University of Eötvös Loránd. She is interested in methodology, E-Learning and web programming. She is a co-author of some exercise book for children on informatics. She is recorded as an informatics expert on the National Register for Professional Informatics. In 2005 she has got an award of “master teacher” granted by the dean of the Informatics Faculty.