The Way Towards M-learning

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Abstract—**The paper offers an insight into specific features of mobile e-learning (m-learning) and the alternative solutions for its implementation. The experience of its practical use during a pilot project is evaluated.**

Keywords-mobile communications; m-learning; distance education courses; Moodle-MLE

I. INTRODUCTION

The contemporary world is characterized by new technologies emerging in the area of electronic communications. It is obvious that there are occurring many (more or less successful) attempts to implement and use these technologies in education, especially in electronically supported distance learning (or e-learning). The development is focusing mainly on the user segment, i.e. mobile terminals for voice and data communication, and we can observe the convergence of two worlds that were originally very different: the world of computer technology and the world of telephony. The practical result of this process is that computers are becoming smaller and smaller (keeping or even increasing their performance), while the size of mobile terminals, resolution of their displays and their computational power are growing. Therefore it is logical that many scientists and teachers are pondering on the possibilities of such easily portable devices, especially in relation to the needs of e-learning.

Distance learning with the aid of mobile devices, or mobile e-learning, is referred to as m-learning. Its definition is straightforward: "Any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies." [1]

Our department has been involved in research and practical application of innovative pedagogical methods for many years, and therefore we eagerly accepted the offer to participate in a European lifelong learning / Leonardo da Vinci project, the main purpose of which is implementation and pilot testing of m-learning within a defined target group.

II. TECHNICAL PARAMETERS

In principle, the application of m-learning can be based on either of the following technologies:

- Java application,
- Web browser.

Java application is a piece of software that is installed in the mobile terminal. The learning process uses off-line approach and the method does not support full range of interactive elements. There is only limited communication with a server, and only the most important data is transmitted (usually in small batches), e.g. the answers to test questions.

The principle of the "Web browser" approach consists in traditional server-based solution. The complete learning system (specific type of LMS) is installed on a remote computer. Trainees access the services provided by the remote computer through a standard web browser installed in their mobile terminal device.

The latter (web browser) offers more advantageous, flexible and universal solution.

The advantage is that the look and/or content of the pages can be easily altered (on the server side) and there is no need to update the local software in the remote terminal (unlike the Java application). It should be also noted that the web pages work without limitations on different types of terminals (at present time, for example, it is relatively complicated to use Java applications on iPhone platform, and that different versions of Java introduce various unexpected problems).

The disadvantage is that the user interface may be slightly different for different types of browsers (similarly to non-mobile terminals). It may be also considered a specific disadvantage that this approach requires on-line data connection with higher volume of transmitted data (compared to the solution employing Java application).

III. IMPLEMENTATION

The selected technical implementation requires a LMS system installed on the server side, having the support for mobile devices already built-in, or employment of other learning system that allows such option to be supplemented. For the purposes of the current project we have chosen Moodle as the learning management system.

It is vital for the success of m-learning implementation to provide the users of the courses with a comfortable and friendly GUI. The original Moodle system is not suitable for devices with small displays. Therefore we have decided to use the MLE (Mobile Learning Engine) plug-in, which helps to optimize the learning content for presentation on mobile devices, organizing it into the format of relatively narrow columns.

As the recent version of MLE did not meet all requirements given by the nature of the considered courses with respect to the proper presentation of their content, we have started adequate modifications of the MLE source code, so that it becomes more compatible with project objectives.

IV. PILOT COURSES

Now we have prepared an operable version of two exemplary courses (and third and last one is under construction). These courses are relatively short and their main purpose is to verify specific functions of MLE-Moodle as well as the m-learning methodology. The courses can be accessed at the following addresses: http://mlarg.cvut.cz/mobile (version optimized for mobile terminals), http://mlarg.cvut.cz/moodle (PC-compatible version for reference purposes). The following topics of the courses are currently available (or will be added shortly):

- Restaurant,
- Tourist information office,
- Check-in.

The target group involved in the pilot testing is composed of students at secondary schools specialized on tourist industry, and the particular objective is learning of English language with emphasis on specific situations and the corresponding vocabulary.

V. TYPICAL FUNCTIONS

After login and entering the homepage of the courses, the system displays a screen containing the list of available courses and the upper navigation bar (see Figure 1). The user interface and its functions are based on the conventional Moodle version, but some features are not available.
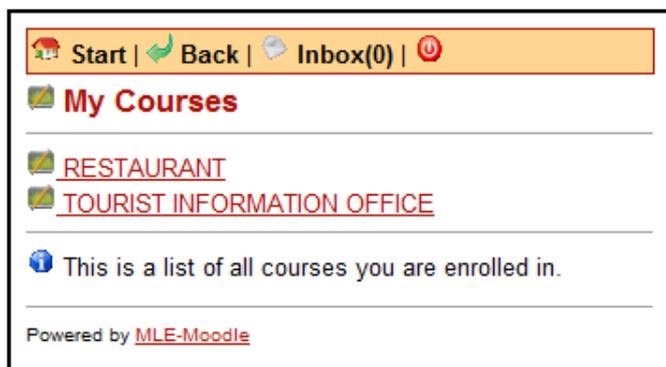

Figure 1. Initial page

The overview of specific types of exercises can be seen in Figure 2. The type **"Listening for gist"** consists in listening to an audio file, after which the students pass a simple test (e.g. single-choice out of three options) verifying whether they have understood the meaning of the message. The **"Listening for specific information"** is a similar type of exercise, verifying whether the listeners understand also particular details of the message. In these tests students are usually given two attempts,

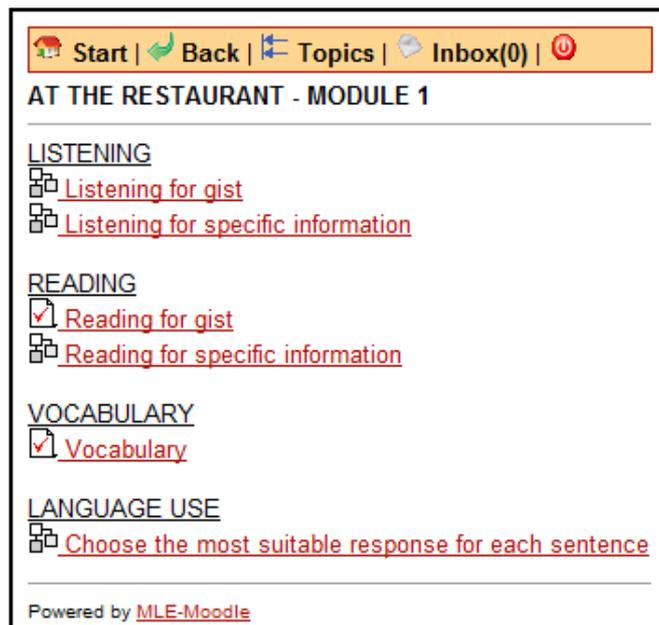and if both answers are wrong, then the correct response is eventually displayed.

Figure 2. List of exercises

The exercises of **"Reading for gist"** type are focused on the understanding of written texts. The question is in the textual form, and students are offered only one attempt to answer. **"Reading for specific information"**, similarly, focuses on searching of specific information in a text. Individual questions are displayed successively, and a wrong answer cannot be corrected. The total numbers of correct and wrong answers are summarized at the end.

The **"Vocabulary"** exercises (see Figure 3) are, as we could expect, intended to practice the vocabulary. The individual tasks consist in complementing of sentences (choosing one option from a limited offer of expressions) and in assigning of corresponding words to pictures.

One of the major problems is displaying and viewing of large images. As the display area is limited, there are basically two solutions coming into consideration:

- Displaying of the entire image in a reduced size (which introduces the risk of poor readability because of the small dimensions), or
- Viewing by parts, changing the displayed area with the help of horizontal and vertical scrollbars (which might be difficult to get oriented in).

MLE-Moodle uses the latter option (scrollbars), as illustrated in Figure 4. The picture is displayed in its original size, but users have to move over it.

The last frequently used type of exercise is **"Language use"** – practising of understanding the language. Different types of questions are available for testing. This type of exercise is included at the end of every module or lesson.
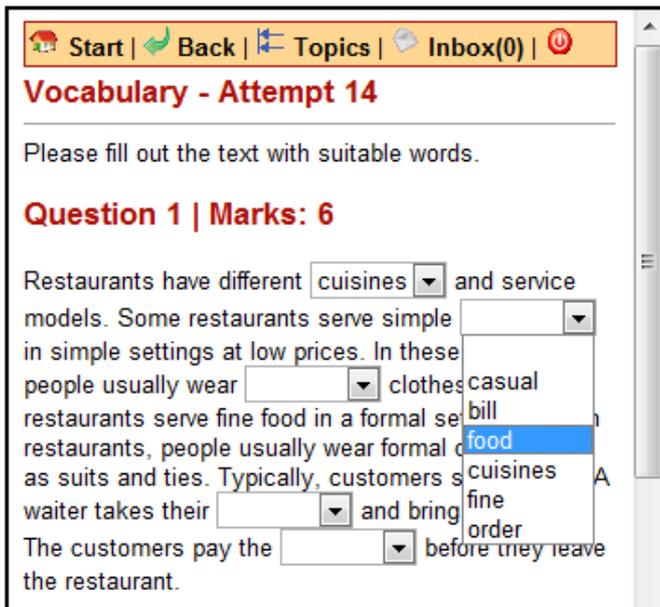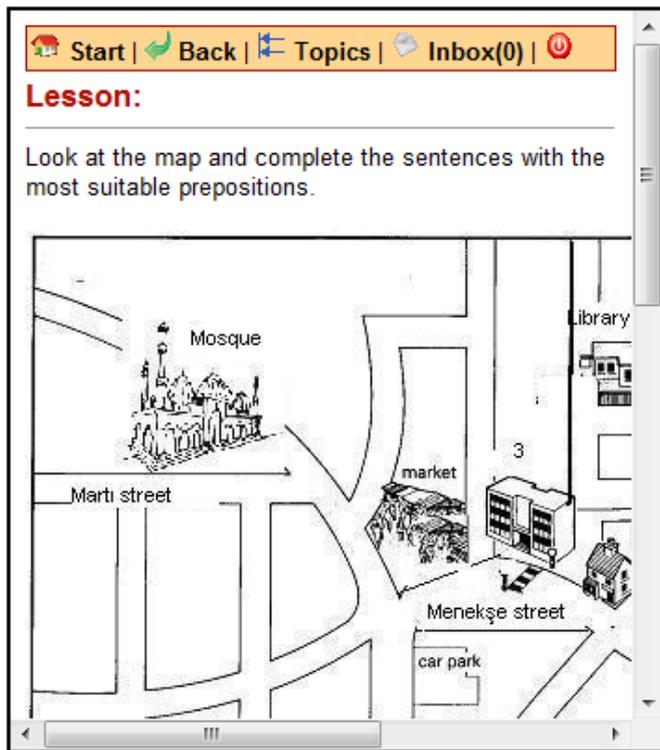
Figure 3. "Vocabulary" type of exercise

Figure 4. Picture in Moodle MLE

Usual communication and messaging tools common for Moodle system (chat, discussion forums, and direct messages) are available for students (and also for teachers).

We have encountered some problems related to presentation of multimedia content, caused by the wide variety of operating systems used for mobile terminals and to the different level of (different) web browsers integration.

For example, Android 2.2 operating system (Samsung Galaxy i9000 S) cannot play MP3 content delivered from Moodle server directly – such file must be first saved to the memory of the phone, and then opened by the associated application. On the contrary, in Symbian OS version 9.3 (Nokia E72) or 9.2 (Nokia E66) a link to such file works correctly – but only in the integrated web browser; the attempt to use Opera Mobile 10.1 (for Nokia E72) for direct opening of multimedia files was unsuccessful and, moreover, direct link to the MP3 file did not help in this case. Windows Mobile 6.5 (HTC TouchPro 2) with Opera Mobile 9.7 browser did not have any problems and the link was working properly.

In Android operating system, the described problem is caused by passing of the file to the web browser. The workaround in this case is to use a direct link to the MP3 file, outside the course (an then it is interpreted correctly), or to set file downloading in Moodle so that the browser is sent data content respecting the specific features of these browsers and devices.

The initial page allows the users to download Java MLE application. However, we consider this option to be just an alternative one, as the identical operation on different types of mobile terminals cannot be guaranteed. Moreover, the Java application also has occasional problems with access to multimedia content.

VI. CONCLUSION

The pilot run of the courses should bring the answer to the basic question: Is m-learning suitable complement to the electronic form of education, or is it just a modish matter to be overcome and then abandoned? Therefore the feedback obtained from the course participants and their willingness to use the individual learning objects on a regular basis (if any, to what extent) will be crucial for the future employment of this technology in regular education.

We anticipate that the m-learning technologies will become useful mainly in those areas where the learning content can be presented in a visually simplified form (with emphasis on reduced volume of textual information). On the other hand, we expect lower interest in m-learning applications that require reading of many texts, filling of numerous forms or frequent movements on the screen of a mobile terminal device.

REFERENCES

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