

PREPARING LESSONS, EXERCISES AND TESTS FOR M-LEARNING OF IT FUNDAMENTALS

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ABSTRACT

This paper represents a result of studying the efficiency of applying mobile learning technologies, as well as the accompanying advanced teaching methods in the area of Information Technologies, at the School of Electrical and Computer Engineering of Applied Studies in Belgrade, Serbia. It contains a brief description of the form of application and distribution of teaching materials designed for the area in question, which are available to students on their mobile devices (Smartphone, iPod touch, Tablet computer...), supplied with the suitable mobile operating systems (Android, iOS, Windows 8...). The paper focuses on the benefits of mobile learning, observed so far, based on the experience of both teachers and students acquired during Information Technologies Fundamentals, a course which is held this year, during which students get familiar with the basic concepts in this area, as well as with its applications which are of relevance for future engineers of computer technologies.

KEYWORDS

m-learning, m-devices, IT course

1. INTRODUCTION

The application of web and mobile learning technologies leads to a “revolution” in education. The world is turning into a global classroom, the conditions for studying are becoming flexible, new forms of application and distribution of teaching materials are being adjusted to students (Brooks-Young 2010). To make them more efficient, new forms of teaching materials are developed on the basis of the available materials, adjusted to the specific conditions. All these materials are blended for the modern e-materials (Parsons 2011).

Teaching and learning at the School of Electrical and Computer Engineering of Applied Studies (SECEAS) are modernized on constant basis, and adjusted to modern generations of students. Due to the fact that modern mobile devices (m-devices) and programme tools designed for them are becoming increasingly available to teachers and students, the aim of the school is to pay more attention to designing and adjusting the teaching materials for mobile learning (m-learning).

In the first year of their studies in this school, within the programme called New Computer Technologies, students have the course named Information Technologies Fundamentals (ITF). In this course, they get familiar with the basic concepts from information theory and computer technologies, together with the application of information technologies relevant for them. Thus, students get an introduction for the more narrow areas of expertise which they study later at the School. They begin to master the currently used learning technologies, in order to adopt the habit of constant follow-up, examining and using advanced technologies during and after the completion of their studies, and of an active participation in the further development of these technologies after graduation. As of late, all teaching materials and regular knowledge checks within the course ITF have been prepared in a form suitable for the use on m-devices by students in the classroom or out of it. From the beginning of the school year 2013/2014, realizing the teaching and learning in this course includes m-learning, as well.

The coming sections of this paper contain a brief description of: the manner in which these teaching materials have been prepared, the form of m-learning realization and existing experience of both teachers and students with m-learning in this area.

2. PREPARING LESSONS, EXERCISES AND TESTS FOR M-LEARNING

In order to make them more efficient, the teaching materials for the course ITF have been designed based on the generally adopted standards (Lunt 2008) and available literature (Senn 2004, Talbot 2007), just like in any other area. However, the increasing availability of modern m-devices to teachers (in ITF course it is 100% out of all teachers) and students (the survey results in ITF course show 81% out of all students), has conditioned the inclusion of the existing mobile technologies (m-technologies) into the preparation and realization of teaching and learning (Sharples 2002, Georgiev 2004, Trifonova 2006, Anastasios 2009). With the purpose of modernizing teaching and learning in ITF course, a material has been designed which is available on modern m-devices to both: students for learning the lessons, reading instructions for exercises and knowledge self-check, and teachers for providing help in learning and the overview of student progress.

The teaching programme of the course ITF, has been adjusted to the existing standard IEEE/ACM: IT Fundamentals Curriculum 2008 (Lunt 2008). According to this teaching programme, in classroom teaching, students get to learn lessons which comprise the following topics: History of IT, Pervasive Themes in IT, IT and Its Related and Informing Disciplines and Application Domains. During exercises in computer laboratories students master: installing different operating systems currently in use, using programming tools under each of these operating systems, as well as programming tools available on the Internet for creating: documents, block schemes, diagrams, algorithms, wikis and blogs. During exercises students also master team work and communication on the teaching material via the Internet.

The remainder of this section of the paper contains a brief description of the form in which lessons, exercises and tests are prepared and distributed to students m-devices in ITF course.

2.1 Preparing Lessons for m-Learning

ITF course has existed in SECEAS since the school year 2007/ 2008. and it has been modernized several times, through constant consultations with experts in areas of computer science and information technologies. Lessons in this course include the following topics: Information Theory Fundamentals, Managing Information in Computer Systems, Information Transfer in Computer Hardware, Software as an Instruction for Managing Information, Information Management by Operating Systems, Information Systems and Information Transfer via Computer Networks. For several years, SECEAS has had their own site, <http://lectio.viser.edu.rs/moodle>, on the LMS. LMS Moodle has been elected (Moodle 2.5 Docs 2013), because of: freely software, language localization, simple administration and use and good adjustment to students. For each of the ITF topics, e-lesson has been designed. PowerPoint presentation of the lesson in .pdf format gets its place at the ITF course topic on LMS Moodle, in a specific week of the semester.

2.2 Preparing Exercises for m-Learning

In ITF course, exercises are performed in every week of the semester in the computer laboratory. With the help of assistants, students: have access to Moodle system, install the virtual machine, using programmes under these operating systems, create documents, tables, diagrams, data bases, wikis and blogs, and learn how to work as a team via the Internet. Instructions for work on any exercise in the classroom or out of it, in electronic form, have been designed using Adobe Captivate software which enables creating audio-video material for working on the exercise, with the computer screen for every step of the exercise, and by adding animations and sound. In this way, interactive instructions have been designed for every exercise.

2.3 Preparing Tests for m-Learning

For regular checks and self-checks of knowledge in ITF course, LMS Moodle tests with multiple choice have been designed and placed in the system, each of which covering the content of lessons and exercises which the course includes. Both kinds have been realized in the form of “quiz“ tests, as a part of ITF course testing on the school LMS Moodle system. The questions and answers for all tests have been entered through the system portal into the questions data base, and have been memorized with suitable adjustments (fixed time limit for every question, scoring for every answer, review of correct answers...)

3. LESSONS, EXERCISES, TESTS AND DISCUSSIONS ON M-DEVICES

In order to obtain maximum results, it is always advisable to combine several existing teaching methods (Parsons 2011, Brooks-Young 2010). This chapter contains a brief description of teaching methods that have been elected in the ITF course. In the specific case, teaching and learning are realized inside the classroom and the school computer laboratory in one part, and in the other, out of them. Both kinds however, involve using advanced m-devices, with access to the Internet enabled on them:

- Students have a review of lessons and instructions for exercises in electronic form on their m-devices;
- Regular knowledge checks in the school and self-check outside school, also available via m-devices;
- Students can also access discussions via the Internet using their m-devices.

3.1 Learning from Lessons on Mobile Devices

In each week of the semester, students have a lecture in the classroom. Immediately before the beginning of the lecture, on the web page of the subject called ITF, figure 1, on LMS Moodle school system, they have a PowerPoint presentation of the lecture in .pdf format available to them. They get access to the page in question on the above mentioned system in the beginning of the course. Students can thus have access to the review of the lesson on their m-devices during the lecture as well, and given the huge number of students in the lecture group (about 300), such a review of the lesson can be quite convenient.

Students can access their electronic lesson on their m-devices very easily, through logging in the LMS Moodle system, and regardless of which mobile operating system (m-OS) has been installed on the device (Android, iOS, Windows 8...) repeat reviewing the lesson any number of times, figure 2.

3.2 Exercises Guides on Mobile Devices

During the work on the exercise in the laboratory of the school, as well as after it, on the web page of ITF, on LMS Moodle school system, students can access the link to instructions for the exercise. This instruction is on the school address on YouTube, reserved for this subject, <http://www.youtube.com/viserOIT>, and it contains audio-video guidelines for working on any exercise step by step.

Students can have access to electronic instructions for the exercises on their m-devices rather easily, through logging in LMS Moodle system, and go through these instructions any number of times, figure 3.

3.3 Regular Self-Checking of Knowledge on Mobile Devices

In every week of the semester students have regular checks of knowledge on the LMS Moodle system, in classes of exercises in the school computer laboratory, during which they can gain points in pre-exam activities. Out of school, students can do self-check tests, figure 4, using their m-devices, also by accessing the LMS Moodle system first. The results of all knowledge self-checks are not visible to teachers, since their purpose is to help students observe their learning progress.



Figure 1. ITF course



Figure 2. Lesson



Figure 3. Exercise guide

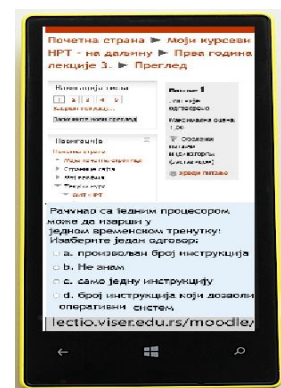


Figure 4. Self-check test

3.4 Results of Discussions via the Forums Enabled on Mobile Devices

On regular basis throughout the semester, there are discussion forums on LMS Moodle: via the “news” forums students receive from their teachers all announcements; via the “general” forums students and teachers have e-consultations. Students can access all forums on the course web page (on LMS Moodle system) on their m-devices. Based on the interviews conducted with students, in ITF 2013/2014 course, the following can be concluded: they embrace m-learning of both, lessons and exercises; they accept knowledge checks within m-learning; they accept the role of active participants in the learning process. Based on the interviews conducted with teachers in ITF 2013/2014 course, the following can be concluded: they direct students to m-learning; they encourage students to perform regular self-check; they offer students support and help in learning. The evaluation of m-learning in ITF 2013/2014 course, which is prepared for the end of the course, should provide results on how applying mobile technologies affects the efficiency of IT courses.

4. CONCLUSION

To make teaching as efficient as possible, improve conditions for learning and adjust them to the needs of modern generations of students, the School of Electrical and Computer Engineering of Applied Studies in Belgrade, Serbia, has adopted a trend of applying modern technologies and teaching methods (Talbot 2007). This year, for the first time, the course IT Fundamentals involved the use of mobile devices during lectures and exercises in school, while at the same time, using these devices for learning proves out of school as well. The following factors are considered as important in the development of m-learning;

- Using a suitable system for learning management and constant development of materials in e-form;
- Combining m-learning with other e-learning forms and face-to-face learning;
- Embracing m-learning by students.

Further realization of this course will show in which direction to develop m-learning in it: more intensive cooperation between students and teachers in using web 3.0 tools on the Internet, their joint participation in creating teaching material, as well as in upgrading forms of teaching material suitable for m-learning.

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