Improving University Teaching Using Application for Mobile Devices Based on Netbiscuit Platform and Integration with the LMS

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Abstract: **This paper present a way of developing web applications for mobile devices in NetBiscuit platform which is implemented at the University of Novi Pazar. The process of implementation is based on project management of e-learning, more precisely on the application of project management (through four phases: definition, planning, management and evaluation). It's designed the combination of project management phase which enables more efficient planning and performing online education with the procedure of design courses for e-learning. The final part contains the process of integration of mobile web applications with Learning Management System (LMS).**

Keywords: **Mobile Applications, e-Learning, Netbiscuit Platform, LMS, Project Management**

1. Introduction

In today's modern society, emphasis is placed on the availability of information which should be provided on all devices that users use to search for information. Therefore it is necessary to optimize web pages for mobile devices, and this trend is increasing fast. Using the mobile internet, customers receive the highest possible comfort in finding quick information that interests them. Some of the statistics that speak in favor of the development of this area are [3]:

- 4 billion mobile devices in the world and out of that 1.08 billion are Smartphone's,
- by 2014. mobile Internet will overtake the use of the Internet through computers,
- 1/2 of all local searches are performed on mobile devices,
- 86% users of mobile Internet using their mobile devices during watching TV,
- 2.7 hours per day - during which the average user spends on social networks (Facebook, Twitter...).

In response to modern trends of distance learning at the University of Novi Pazar is established combination of traditional education and distance learning. This type of learning represents a form of student support and supplements to the classical method of education using information and communication technologies (ICT). Values indicator of this system is to help students and teachers with ICT technology to easier overcome the teaching material. Apart from the implementation of e-learning at the University in classic web environment through a system of e-learning (*Moodle and Google Aps*) on this institution of higher education are formed and the shape of e-learning in the form of web applications for mobile devices. In the future, our web application will be developed to monitor the trends of modern education. One of the following steps in the development is the ability of electronic exam registration as well as filling the various types of forms, which will among the other things, reduce travel costs of students who do not live near the University.

This paper consists of three parts. In the first part we describe the method and platform development of University Web applications. In the second part, we specify the basic phases of project management and development of the application. In the third part is given a concrete integration process of mobile applications with the courses that are implemented in systems for e-learning.

2. Netbiscuits platform for mobile web application

To develop applications for mobile devices, we chose Netbiscuits platform which provides fast and efficiently publishing web content through all available mobile platforms in the form of a Web site or the native application. This platform supports the publishing of web content to many types of mobile devices including smart phones, media tablet (mini-computers and phones at the same time) musical devices, game consoles, e-readers and even TV set-top boxes. Netbiscuits retains its independence from any mobile operating system installed on the devices and provides optimization of Web content for each browser on the phone. This platform actually translates the code and adapts it to the browsers in order to present web contents.

Netbiscuits has integrated world classes of mobile devices in its platform which is connected to one rendering machine that deliver you optimized mobile Web applications on any mobile device. This platform uses the latest mobile technologies such as HTML 5, CSS and Java script, in order to create Web sites that users will experience as application [2]. This platform provides the use of PHP and MySQL technologies to communicate with the database. In order to improve the user experience Netbiscuits provides optimization tools that enable the optimization of labels, CSS, images, audio and video content and provides their introduction to the characteristics of each mobile device. Netbiscuits content is optimized to reduce the load time for users who have access over the limited permeable scope. Netbiscuits has created a database that contains more than 6000 tested mobile device profiles from over 50 countries worldwide. In order to guarantee maximum coverage, reliability and quality of mobile sites and applications Netbiscuits does not use of any information or open source database. Database of this platform not only check the basic properties of each device such as the size of the screen but already have detailed information about the search capabilities media support, processing power or memory capacity of the device. Although mobile phones use different platforms and operating systems this web application adapts to any phone independent of who runs the startup [8]. During development, we considered what is it that in relation to the primary web site of the information should be placed on the

mobile web site which will certainly facilitate the University students.

While creating the application we were guided by the following rules:

- Application should contain the most needed information for moving users.
- Navigation should be easy, fast and intuitive,
- Rejection of the functionality, content and information that are not very necessary to the mobile web site reduces the time required to access the site.
- Speed access is also determined how the information and content is formatted and displayed to the end user.

Figure 1. Home page of applications for mobile devices

As mentioned above, during development of web application is used PHP and MySQL technology under which the printed BiscuitML source code which is only understandable for the Netbiscuits platform. When it comes to speed of navigation the use of mobile applications offer many benefits to students. All information that applications carries are already in local phone memory, thereby the speed is much higher than in the case where looking for any new information on the web site which requires additional time needed for data transmission over the Internet when you load and display the desired content.

A detailed functionality description of the University applications for mobile devices is described in our paper [9]. In this paper we focus on system integration for e-learning with a mobile web application. In the following we describe the process of managing the project through its development phase.

3. Project management for development of mobile web applications

Project management is a concept with the help of appropriate methods of organization, information technology, planning, management and control, performs a rational alignment of needed resources and coordination of necessary activities to realize a project in the best manner. The process of project management learning is a much broader concept of project management, instructional design, program leadership, team management and information technology. The concept of project management of development of our applications for mobile devices is based on establishing efficient organization of data, that allows the best use of available methods of planning and control for effective project implementation with the emphasis on the better navigation, content, and easier communication.

3.1 Development phases of the concept of project management applications for mobile platforms

In this part of the paper we will present the basic phases of the e-learning. Firstly it is necessary to make a difference between the following concepts: processes, products and projects of e-learning. The process of e-learning involves the whole strategy of providing the knowledge using technology and networking. The product of e-learning is a package that comes with the completion of the project of e-learning. A project of e-learning is an initiative to deliver or improve a separate package of the content of e-learning or to create, establish and maintain software or infrastructure to support e-learning process [6]. Figure 2 (the first and second part) presents a model that is implemented through three phases in the design of the project: planning, design and development. Phase of design and development have their sub-phases which are in mutual interaction. During the design is created a prototype of application that can be reviewed and re-design in the future iterations. In the development phase is carried out the implementation of received applications and carried out its evaluation. There is also iteration between the phases of design and development.
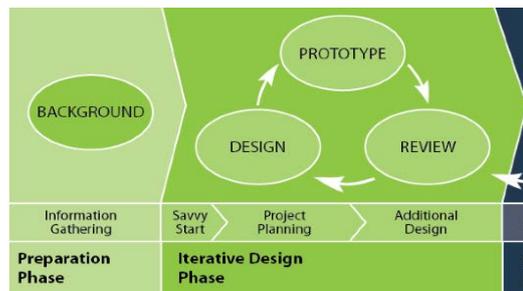

Figure 2.1 The development of applications based on the model 3-Phase (P-ID-ID) – 1 part
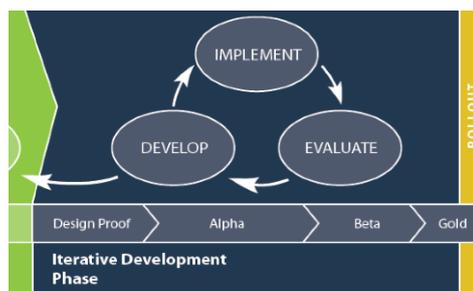

Figure 2.2 The development of applications based on the model 3-Phase (P-ID-ID) – 2 part

The concept of project management and development of the application for mobile platforms based on the previously presented model can be defined through the following main steps [1]:

1. PROJECT DEFINING is a phase that includes development of the project plan, its implementation and control changes, which is very important for the subsequent maintenance applications. In this phase are defined the types of risks for each phase of the project.
2. PLANNING is the phase of determining the scope and duration of the project. It performs the evaluation of individual activities, developing the project plan and control changes.
3. MANAGEMENT is a phase in which are determined defined tasks. Manages the risks, project scope, quality, cost, communication and resources.

– *management of project implementation* is actual monitoring of the implementation, recording and updating of actual data on the realization

(completed work, cost, duration) as well as monitoring of possible changes

- *management of communications* is an important segment that includes communications planning, distribution of information, reporting about the project and its administrative closure.
- *resource management* is the process of defining the resources needed for the project and their scheduling. It primarily refers to the selection of data that are used and imported from the traditional web site of the University.
- *quality management* refers to planning and definition of measures for its implementation and control that is necessary in order to achieve desired quality of the results of the project.
- *risk management* is the process of identification, analysis, planning responses to the risk and its control.

4. EVALUATION is the phase during which it conducted a formal evaluation of the actual value of the project, published reports and documentation for the project to ensure the quality of the e-learning.

The project ends with a final report, which will serve in the realization of future similar projects.

4. Systems integration for e-learning with mobile web applications

Systems for support learning have experienced significant changes and passed many development phases and approaches and to the early learning system based on large computers with multiuser operating systems through the software system based on microcomputers developed for various computer platforms. Learning Management System (LMS) are the key applications in the model of electronic education or e-learning [5]. This kind of the system includes a set of functionalities that are designed to deliver, monitoring, reporting and administration of the learning content. One of these systems for e-learning is Moodle [7].

Despite the fact that the concept of Moodle architecture respects the principle of minimal consumption of resources and computer communication networks, there is a need to further simplify and optimize it. The reason for this is that mobile platforms used today, do not have available computer power or speed and bandwidth of modern

internet connections. The result attempts to respond to these requests was implemented as additional modules for Moodle environment.

MLE (Mobile Learning Engine) Moodle is a module that adds a Moodle installation the ability to access with mobile platform (*mLearning*). This module allows you to access on the system besides the usual, using the computer, and using mobile phones, smart phones, tablet computers and etc. Mobile access is possible using a customized web pages or specially created applications for mobile devices. To integrate our web application with the LMS system, Moodle we used described supplement for open source system (LMS) Moodle. Supplement is copied into the installation file system of Moodle and then when you access to the system via mobile device browsers or with some special mobile phone application designed for learning on mobile phones (called the MLE phone client), MLE Moodle recognizes the device and adjusts according to its performance. To log on the educational course is required to login on the mobile application.

Figure 3. Login form and students portal

M-Learning use the mobile phones as a medium for learning. Therefore the use of mobile phones as a medium it can be used anywhere. One possibility is to connect mobile web applications with Moodle, a system for e-learning which is customized to run on mobile devices. With *MLE Moodle* can be implement some mobile learning scenario. The mobile web applications are especially good for terrain trips where students need to complete quizzes or upload images / video / audio or written reports. Creating

locations based on the learning scenario for mobile tagging or integrated GPS. Make a quick research and submit the results immediately in the classroom with mobile devices and see results immediately. We will present an example of source code that uses the link to access the *MLE Moodle* applications within the University. The main issue in this code is linking with the MLE-Moodle.

```
<container>
<column>
<?php
print ('<LIST class="mylinklistclass">
<items>
<item
href="http://d.uninp.edu.rs/blocks/mle/
browser.php?xml=courses,c9-2 ">
</items>
</LIST>');
?>
</column>
</container>
```

To demonstrate the functionality of MLE modules, we have listed Moodle course which was developed for the needs of University teaching. This course will be used to configure the module and it is necessary that the identical role assign at both courses. One such example is illustrated in the following figures.
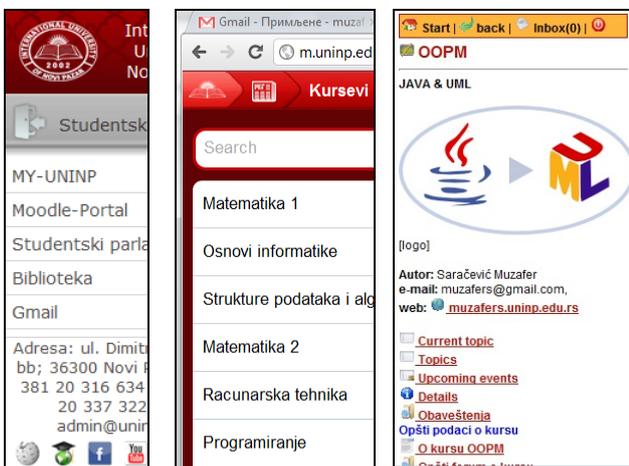

Figure 4. Loading procedure for Moodle course to applications for mobile platforms

Moodle has provided that, instead of solely classroom training is done and in our working rooms, MLE adds a new dimension to learning from any location, at any time, regardless of whether you have a computer with yourself [4].

5. Conclusion

Without a doubt, the future of the internet lies in mobile platforms. With the appearance of Smartphone mobile devices internet has become more attractive to a wider audience. This mini Smartphone revolution cannot ignore changes in the habits of Internet users. This paper is a proposal of how to raise teaching in higher education institutions at a higher level and to allow students faster and easier access to the information.

This paper outlines some of the advantages of one model of the implementation of e-learning in higher education. We give proposals for application of project management in teaching improvement with emphasis on rapid development and high quality projects of e-learning. Product e-learning which is implemented in this way requires a flexible content and simple interface customized to learning. The advantage of this way of implementation is that the method of creating courses for e-learning relies on the concept of a person's mobility. This process promotes the teaching approach in which the student is at the center of attention in any place at any time and thus achieves better study.

The combination of traditional learning with the support of e-learning and m-learning is the best combination for the study. It is very important to apply described procedure of implementation at all educational institutions, because in this way the teaching will raise to a higher level but also the level of student achievement.

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