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CASE OF SUCCESSFUL IMPLEMENTATION OF MOODLE LMS IN ENGINERING EDUCATION

Abstract: The most common LMS platforms (such as Moodle) have the main task to enable easy development, organization, presentation and usage of course for both teachers and students. In this paper we will present sucesful implementation of Moodle LMS in engineering education at Faculty of engineering University of Kragujevac.

Keywords: LMS, traditional learning, blended learning

1. INTRODUCTION

Much attention has been given recently to modern education. A leading idea to all educators was given in [1]: "*Educators must have an open attitude towards new technologies. They should sensibly incorporate new technological development to avoid the risk of teaching the students of today, how to solve the problems of tomorrow, with the tools from yesterday.*" Information and Communication Technologies (ICTs) have changed the conception of the teaching process both in the classroom and in the theoretical teaching approaches. The Internet provides a new environment for developing a variety of applications for educational and research purposes. From the educational perspective, it is an enabling technology for the Internet based education and active learning. From the industrial perspective, it is a competitive service for remote measurement, supervision, diagnosis, and control. From the information and communication technology (ICT) perspective, it is a challenging application that pushes research into the web services and communication systems. The web enables more flexible delivery (anytime), distance education (anyplace), new visualization possibilities (interactivity), and cost reduction. The Internet (web) has become a widespread tool for teaching and learning. In different fields of education the Internet and web technology have increasingly important roles, especially in the concepts of e-learning. This issue was a topic of a large number of research articles [2, 3, 4, 5, 6]. Both developed and developing countries have been using e-learning concept in order to improve rather that replace traditional learning approaches. One of the most common tools for e-learning is LMS (Learning Management Systems). The most common LMS platforms (such as Moodle) have the main task to enable easy development, organization, presentation and usage of course for both teachers and students. These systems rely on intensive usage of information systems and Internet.

This paper will address the number of important issues: The implementation, usage of LMS Moodle system on Bachelor level education at Universities in Serbia. The key issues, implementation of LMS as support to University study program, development of LMS course and educational results of blended learning environment at University of Kragujevac will be presented.

2. BLENDED LEARNING IN ENGINEERING EDUCATION

Blended learning is a popular term in modern education and learning with it is ambiguity about what it actually means. Graham [7] offers a definition of blended learning which recognizes some combination of virtual and physical environments. Some authors [8] placed the definitions of blended learning cited in the literature into seven categories: Mixing E-learning with Traditional Learning; Mixing Online Learning with Face-to-Face; Mixing Media; Mixed Contexts; Mixing Theories of Learning; Mixed Learning Objectives; and Mixed Pedagogies. These and further researches are important because they have helped overcome a gap and a strict division between face – to – face and online learning. It is clear that all definitions of blended learning cover a combination of online and face-to-face instruction. E-learning can involve a greater variety of equipment than online training or education, for as the name implies, "online" involves using the Internet or an Intranet. The integration of Information and Communication Technologies (ICTs) and the Internet into education is most commonly achieved through the following methodologies:

- Developing a course website to centrally house various online functions and facilities course management. The different learning management (LMS) usually enables this methodology.
- Creating a remote laboratory where multimedia animation or simulations are provided to replace physical experiments.
- Developing a web-based laboratory that enables students to set up parameters and undertake experiments from remote location.

LMS have number of advantages and they are widely used in e-learning. Among the number of advantages the LMS systems has the main disadvantage as other distance and e-learning approaches, absence of laboratory or at least practical work.

Multimedia animations or simulations could partly bridge this gap. The only possible solution to ensure practical work as a part of concept of distance learning is implementation of web laboratories that consist of remotely controlled experiments with video feed-back. Besides, web laboratories with remote control of experiments could be used as a very useful educational tool in classical or blended (mixture of classical and e-learning approaches) learning environments.

The most important, students of today and even more students of tomorrow belong to digital age generation, and they need to have both opportunity to work using virtual learning environments, as well as to opportunity to work with real systems and real University environment. Students from developing countries also need skills and knowledge in usage of different e-learning platforms in order to fully utilize the concept of open access to the knowledge that emerges on Internet.

It is clear that "pure" e-learning approaches could not exist or could not produce optimal results. Modern learning environment is generally "blended" environment. There are varieties of blends: blends of goals, benefits, information sources, motivations, learning philosophies, collaboration possibilities, participations, courseware designs, resources, educational systems, educational designs, information flows, business models, commercial constraints, contents, styles, costs and beliefs. The future of learning will be the future of different blends.

3. MOODLE LMS FOR ENGINEERING EDUCATION

One of the most common LMS

systems is *Open Source* LMS Moodle.

As all other LMS Moodle has main function such as: content of the course, administrative information, information boards, forums, chats and additional resources.

Actually the most important part in implementation of LMS in real traditional and / or blended learning environment is right definition of eLessons. At the Faculty of Engineering the Moodle LMS was addopted as e-learning platform at BSC level of engineering studies.

The major pedagogical model for development of eLessons was je ECLASS model (develoepd as the part of GITTA (http://www.gitta.info) GIS-*eLearning)* *[10]*. ECLASS actualy means (Figure 1)

- Entry: Stands for the introduction into a lesson or a unit (the sub-category of a lesson);
- Clarify: A clarify element is used to explain some theories, models, principles or facts;
- Look: Examples that help the student to understand the theory;
- Act: This elements animates the student to act, try out a model or discuss issues;
- Self-Assessment: Check if the learning objectives of the lesson or unit were fulfilled; and
- Summary: Provides a brief summary of either the whole lesson or an individual unit.
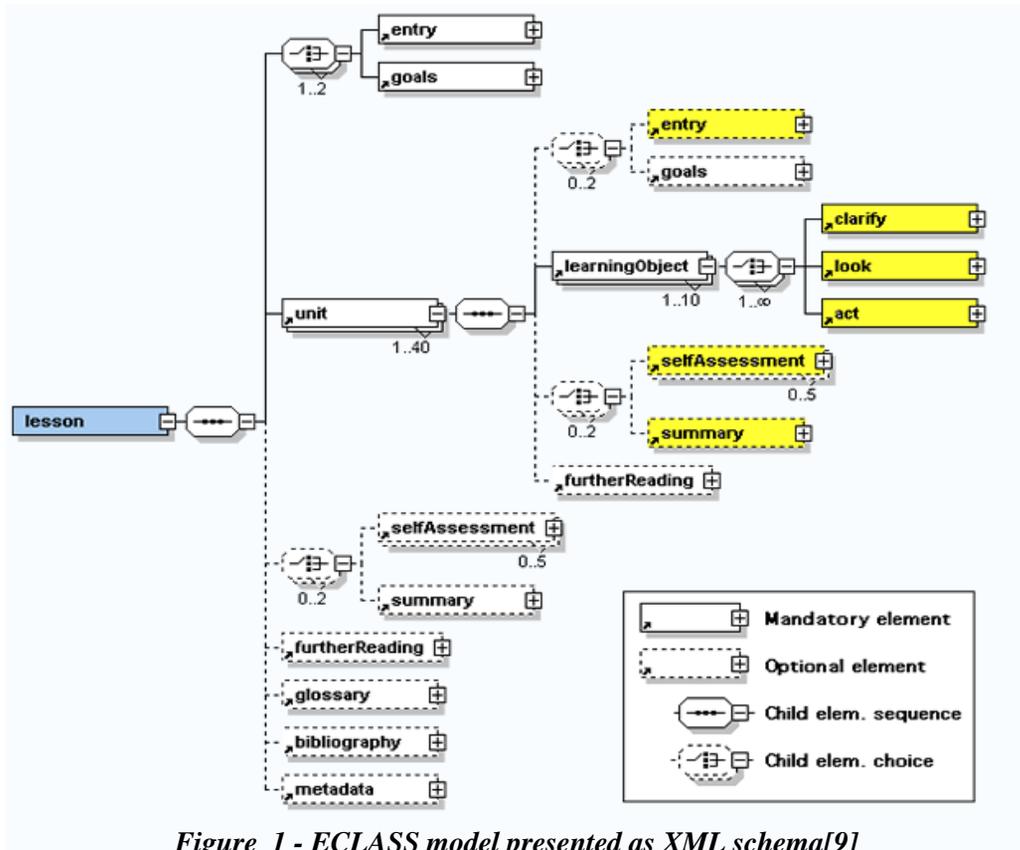

Figure 1 - ECLASS model presented as XML schema[9]

Each eLML lessons starts with introduction or the list of educational goals for that specific lesson. Each lesson contains elements with specific educational goals. The lesson ends with conclusion, list of literature, questions and

test and additional resources (such as video clips, or web laboratory exercise) (Figure 2 and 3).
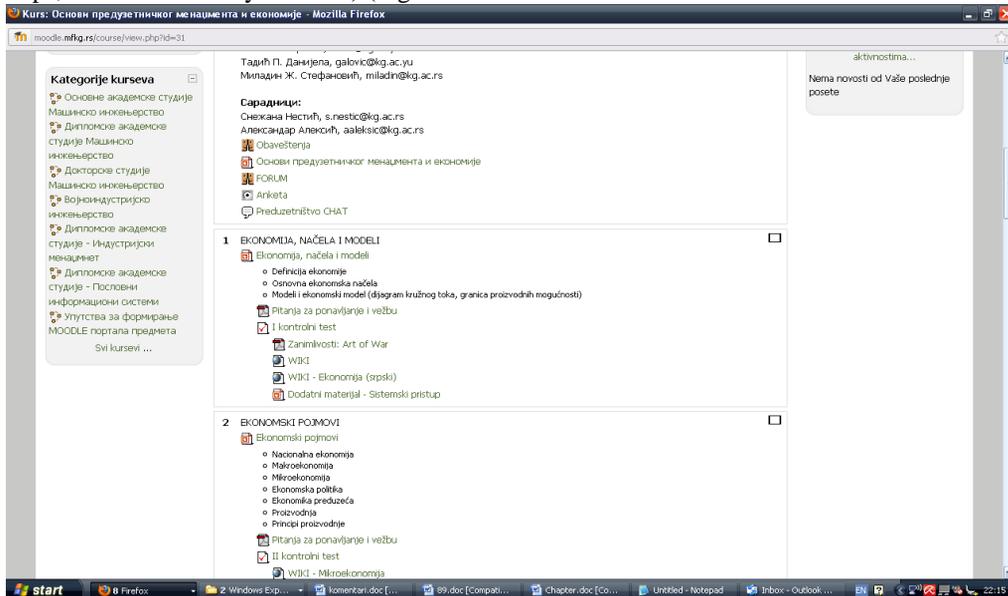

Figure 2 – Structure of a course on BSC level at Faculty of Engineering
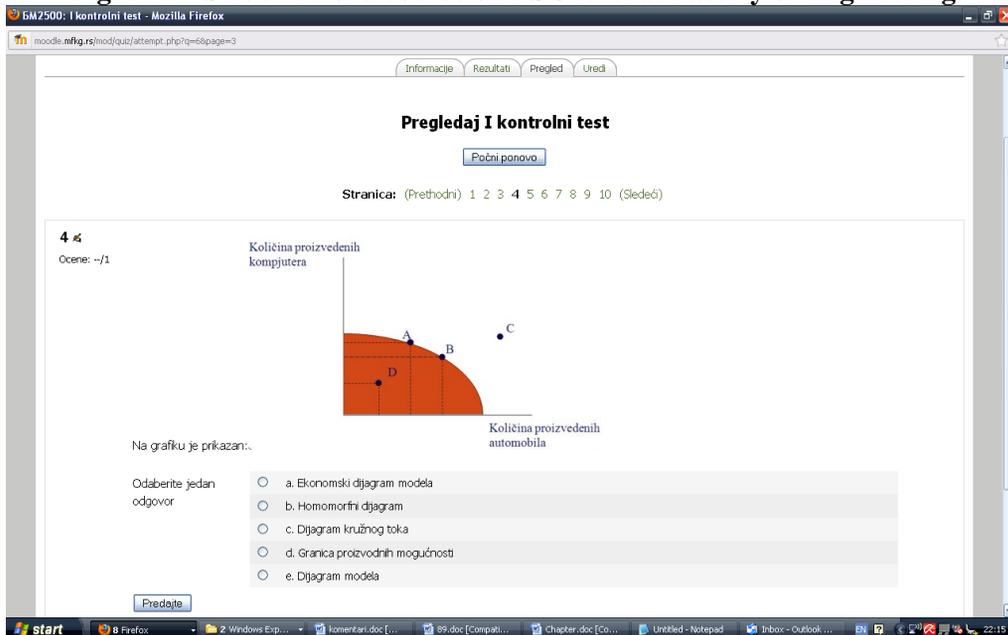

Figure 3 – Short test after e-Lesson

The Moodle LMS system has been used for 4 years and following number of students were subscribed to the specific course (Entrepreneurship 2ⁿᵈ semester):

- Year 2008 / 2009 - 169 students
- Year 2009 / 2010 - 191 students
- Year 2010 / 2011 - 167 students

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- Year 2011 / 2012 - 205 students

The total (732) number of students were asked about their opinion in usage of the Moodle LMS system as the part of their blended learning environment. The average grade for the 4 year period is 4.31 (on the 1 to 5 scale and equation was: Evaluate usefulness of LMS Moodle at specific course).

It is interesting that total number of 732 students took (14 control tests) 37628 times (with repetition). Meaning that approximately each student performed self evaluation through control testing 51,4 times during the semester or average student repeated each control test 3,6 times. This fact proves that students use Moodle LMS for self testing and thy repeat self – testing in order to improve their knowledge. So it is clear why students graded tests (for self evaluation) as useful tool with mark 4.74 (on the 1 to 5 scale). Each lesson has been downloaded or at least 2,08 per student.

4. CONCLUSION

LMSs are the most common tool in e-learning environment. Additionally it is clear the pure e/learning is hard to achieve and even learning outcomes of this environment are less quality comparing with blended learning environments. In this paper we presented the implementation of LMS Moodle at Faculty of engineering and BS level in one specific course. The lessons were organized according to ECLASS model. The Moodle LMS was 4 years in the use and during that time 732 students used this platform as the part of their BSC engineering education. According to data and feedback from students it is possible to conclude that usage of Moodle LMS could contribute to the quality of learning in different disciplines. Students highly evaluate access to the learning material and possibility to have self assessment (using the control tests after each lesson).

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