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FEATURES OF E-LEARNING AT THE FACULTIES IN SERBIA

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***Abstract**: Development of E-Learning and Distance Learning in the world has reached one of the turning points. This paper explores which universities and colleges in Serbia have built appropriate platform following world's leading e-learning platform model. Also, how all aspects of distance learning, development of information and communication technologies (almost daily, get a new form), multimedia technologies and interactive elements and contents are analyzed and implemented. The main part of the paper is about how Serbian multimedia and interactive platform for distance learning developed the complete software solution. The Academic Net of Serbia (AMRES – Akademska mreža Srbije) is the national research and education network of Serbia, offering to its users a modern information-communication services and Internet connection. There is also, GOOD OLD AI Research Network, which is internationally recognized network of award-winning researchers, engineers, and students interested in the broader fields of applied artificial intelligence and software engineering. Research focus includes intelligent tutoring and learning, service-oriented architectures, model-driven engineering, semantic technologies, intelligent reasoning, intelligent agents, natural language processing, knowledge representation, knowledge discovery, and ontologies, AI-based music and visualization. A good example of E-Learning in Serbia is a training program for students (E-learning program) in fields of democracy and human rights. The results are Students' E-learning Projects (Tolerance as a prevention of peer violence, Letter to a woman, Protection of personal data). Distance Learning Project- which is applicable in Serbia through Distance Learning System, which fully satisfies in some segments and provides significant opportunities for applicable standards, is defined by accreditation for education institutions in Serbia.*

***Keywords:** E-learning, Distance learning, Universities in Serbia, Learning software solution*

I. INTRODUCTION

Nowadays**,** *e-learning* and *distance learning* worldwide development has reached a turning point. The paper investigates which faculties and colleges built adequate platforms following the leading world e-learning platforms. It has been examined to what extent all of the aspects of distance learning have been analyzed and implemented, given the fact that due to the current developmental trend of information and communication technologies their form evolves daily, especially new multimedia and interactive elements and contents. Also, the paper tries to investigate to what extent the overall softer solution of Serbian multimedia and interactive platforms for distance learning has been developed, as well as to what extent the elements required for the simulation of teaching process at any chosen environment have been implemented. The Academic Net of Serbia (AMRES – Akademka mreža Srbije) is the network that connects research and higher education institutions, and provides them with the connectivity to the Internet and other research institutions in Europe and around the world. It also provides a number of advanced IT services mainly to researchers and scientific community. The AMRES connects 126 institutions: universities (Belgrade, Novi Sad, Niš,

Kragujevac), several high schools, scientific institutions (e.g., SANU – Serbian Academy of Sciences and Arts), Students' Cultural Centre, and other. The paper also discusses Distance Learning Project applied in Serbia throughout Distance Learning System. The project fully satisfies the conditions for accomplishing distance studying defined by 12-document standard for accreditation of higher education institutions in Serbia.

II. ADVANTAGES OF E-LEARNING STUDENT PACKAGE AND DISTANCE LEARNING

Certain number of schools and faculties in Serbia use very advanced e-learning platform in order to make studying easier for their students. Such online learning systems were introduced because they enable online testing system, ensure that course materials stay permanently in teacher's possession, they have perfect technical support and also, because only competent professors, experts in their field, are in charge of applying the e-learning method of studying. Online testing system enabled efficient evaluation of students' knowledge. Without any subjective influences on the student's knowledge, one of the multitudes of test form the database will be done, and the acquired knowledge will be tested after each lesson and each unit. The system also automatically calculates the percentage and indicates mistakes so that student is referred back to the lesson to revise these parts that haven't been mastered yet. By using e-learning student package each student gets complete material needed, which he gets to keep after his studies. In this way it is possible to work offline in case the internet connection is slow and one can use the given materials as a reference after the studies. Likewise, it is not necessary to order additional books to prepare for the exams as in this way one is given both books and knowledge at the same time. The programmes deal with information technologies, administration, databases and information technologies management, as well as their application in all areas.

At the meeting, that was held on 20th October in 2006, the National Council for Higher education in Serbia issued the Regulations concerning the standards and process of accreditation of higher education institutions and study programmes, where within these regulations the standard number 12 talks about distant studying. [1] Study programmes that are based on the distance education methods and technologies are supported by resources which secure quality implementation of the study programmes. A higher education institution may organize distance learning according to its own standards for each study area and each educational-scientific and educational-artistic area. This is possible if the curriculum supported by available resources could be acquired through distance learning and also if it enables the same level of knowledge of graduate students, the same studying efficiency and the same ranking (quality) of the diploma equivalent to the usual realization of study programmes.

Colleges and faculties in Serbia designed a potential solution for platforms as well as for preparing study materials which are an integral part of this project. They are built according to the world leading e-learning platforms. All aspects of distance learning have been carefully analyzed and implemented, whose forms, due to the developmental trend of information and communication technologies, evolve daily, especially new multimedia and interactive elements and contents. In addition, all the elements required for the simulation of teaching process at any chosen environment have been implemented. The platform is browser-based and it doesn't require use or installation of additional and supporting software solutions. Taking into consideration the standard for accreditation of higher education institutions, Distance Learning System fully satisfies, and in some segments offers much more possibilities than it is required, the conditions for accomplishing distance learning studies which are defined by 12-document standard for accreditation of higher education institutions.

2.1. Studying approach

This kind of access to the platform is available to every student 24 hours a day, 7 days a week. The students have freedom to choose on their own when to access the platform and to study with

regard to their other obligations and activities. For studying students have different types of elements at their disposal, depending on the nature and type of the course: previewing in advance prepared high-resolution videos from the lectures or recorded paper in software tool; listening to the audio files; reading online texts; reading prepared pdf materials for each lesson; ppt presentations and all the other elements which the given professor supplies with respect to the nature of the course; tests to check the acquired knowledge, as well as tests for every covered unit.

2.2. Communication and information system

Communication and information system enables interactive communication among the students in the process of distance studying, through synchronous and asynchronous communication by means of the following: the system of personal and system messages in Distance Learning System; posting on the forums of colleges and faculties; participating in chats within Distance Learning System; sending personal messages through DLS as a way of interaction with another user at the 1-1 level; sending group messages through DLS as a way of interaction with other users at the one to many level; notification about consultations to be held in ITS [2] venues for each course a couple of times during the semester; sending system messages which automatically notify all users about assigned courses, unlocked modules, assigned tests, points earned, etc.; sending system messages which automatically notify professors and staff about all received papers, asked questions, completed tasks, completed tests etc.; exchange of files between the users directly through the system; credits (points) which users earned for particular fulfilling their obligations; locking/unlocking the modules aiming to guide the user through the course; sending news and notices through the mailing list, students get notices about all new messages and activities upon each logging to the system.

2.3. System for tracking the user's progress

All students' activities are tracked and recorded in the system database. Distance Learning System allows the following: students to track the number of access times for each course, module or other system element; record of tracking time spent by each student on DLS; testing at different levels on the system (progress tests and module tests) and overview of achieved results as well as automatic calculation to points; professor's grading and marking of all students' activities.

As far as *online testing system* is concerned which is integral part of DLS, it enables the implementation of the whole online testing: testing with different types of questions (multiple choice, selecting the correct answer, fill-in the gaps, questions with pictures); possibility for time-limited testing; controlling the number of times one test could be started; efficient navigation and movement through the test (previous and the following question, etc.); preview of the current points achieved during doing the test; table overview of the test results; overview of the test results with clear graphic representation of correct and wrong answers for each question; help for the test.

Compared with classical "traditional" approach, Distance Learning approach shows the following advantages: lifelong learning and professional training; students learn independently, at their own pace, choosing place and time for learning on their own, having a variety of courses to choose between, which are offered by different institutions or teachers-individuals; personal tempo – students go over the materials as many times as they want at desired speed; place for studying could be chosen as well – depending on the media used for the distribution of the materials for studying (studying at work, at home, on a journey, etc.); availability of topics that are not offered at the courses/programmes in their region – students find and attend programmes that interest them, but if there is no educational or business institution in the place they live and work; taking part in top-quality and most prestigious programmes – a student can attend at least some of the courses at prominent institutions or at institutions held by recognized experts but without changing their place of residence; selecting their personal study approach – active or passive studying, different levels of interaction: "traditional" written material along with taking your own notes, interactive simulations of discussions with other students (email, telecommunications, …), more multimedia – graphics, animation, sound…; practical work with different technologies – gaining not only information about what you are studying, but additional knowledge and skills related to using different technologies enables the student to reach and

maintain "the 21st century literacy" level; independent studying and interaction, and professors also learn from the students who independently look for the sources of information.

The basic benefit of distance learning for Serbian students is lower living costs above all and other costs related to the residence in a place of student's studies, as well as the possibility to choose a study programme and study in another place without actually moving from your current place of residence. Selecting a school outside the borders of home country made it possible for the students to choose study programmes which are not on the list of accredited study programmes in their home countries. Students have the opportunity to work during their studies irrespective of the place of their studies and because a student is not able to attend the "traditional" lectures due to personal permanent or temporary physical problems, damage or disease. One of the important things about the DLS is the possibility to independently organize time for studying (great motivation, planning time and ability for analysis and synthesis of study content), etc.

III. THE ACADEMIC NET OF SERBIA (AMRES – Akademska mreža Srbije)

This is the network that connects research and higher education institutions, and provides them with the connectivity to the Internet and other research institutions in Europe and around the world. It also provides a number of advanced IT services mainly to researchers and scientific community. Academic Network of Serbia (AMRES) is the national research and education network of Serbia, offering modern information-communication services and Internet connection to its users. AMRES is the most significant scientific, research and educational resource and a carrier of the Information Society development in Serbia. It's considered to be the most advanced network in our country, with over 150 connected institutes and more than 150.000 active users. It represents one of the most important national research and educational resources and carriers of Information Society development. The AMRES connects 126 various institutions: universities (Belgrade, Novi Sad, Niš, Kragujevac), several high schools, scientific institutions (e.g., SANU – Serbian Academy of Sciences and Arts), Students' Cultural Centre, and other.

Many scientists, researches, professors, students, librarians, other authors and users of information nowadays confront the opposites such as: traditional forms of organization and management of academic and cultural institutions versus information globalization which is widespread due to its digital form, and other forms of networking with the aim of more complex way of informing; economic and political impact on the position of universities and libraries in a society versus information digitalization as a precondition for distance learning and knowledge globalization. Due to the prominent presence of e-learning and distance learning in Serbian universities, electronic libraries have become the most interesting and most accessible for finding wanted information, because "electronic literature brings another alternative for literature on paper" [3]. University of Belgrade with the central university library "Svetozar Marković" and University of Novi Sad both have electronic catalogues within Library Information System COBISS.SR, which was founded in 2007 and which is accessible online. These universities are connected to 18 other Library Information centers in which users have access to domestic and foreign databases for the needs of lectures or research at given faculties. University of Niš with the central library "Nikola Tesla" is connected to Pergam System and virtual library at University of Novi Sad is uses Software BISIS Rel. 3.01., UNIMARC, Unicode, pure Java, XML-based interface.

Local e-learning applications at University of Belgrade can be found at Belgrade University Computer Centre (RCUB), which uses 3D Images Modeling and Visualization in Medicine (Surgery) and at the Faculty of Electrical Engineering, which has Virtual Lab – Simulator of Computer Architecture (for students exercises). On the other hand, at University of Novi Sad e-learning is used at two faculties: at the Faculty of Technical Sciences (Virtual Biped Locomotion Laboratory and Web based Self test System) and at the Faculty of Science - TUTOR General System Supporting Tutor

Directed eLearning. The Faculty of Technical Sciences from Zrenjanin is patenting Elementary and High School Mathematics eLearning software.

Through AMRES Academic Serbian Network [4], all of the faculties which use eLearning could be enlisted there. MOODLE (Modular Object-Oriented Dynamic Learning Environment) platform at AMRES is currently in the phase of initial implementation. It is a very simple system, with minimum hardware and software demands, efficient and accessible to the teachers of different requirements. As the system installation and maintenance has been significantly improved in the latest versions, more and more institutions opt for this very platform when choosing the appropriate environment for eLearning. One Moodle website can support thousands of courses, which could be categorized and search for. As a part of the courses, there are a great number of possible types of activities: forums, tests, lessons, assignments, workshops, etc. Complete information regarding the activities of the course participants is available in both textual and graphic form.

Beside the courses organized within the MOODLE system at AMRES, the Faculty of Architecture in Belgrade developed a special eLearning system on the faculty's website. [5] School of Electrical Engineering in Belgrade organizes courses which provide students with the possibility of working independently on their projects on the computer network stimulator. It also offers studying biomedical informatics which encompasses the following topics: hospital information system, electronic medical records, health information standards, radiological information standards, PACS systems, simulation and virtual reality in medicine, computer-assisted interventions, telemedicine, informatics in genetic research, information security and privacy, medical resources on the internet, challenges arising in collaboration between doctors and information scientists, patients, doctors and health insurance in digital era. [6] In addition to the general idea, which is the development of (inter)active studying and promotion of good educational practice in medical education, a considerable attention is paid to scientific research. [7] At the Faculty of Philosophy, along with the basic course categories, there is Moodle seminar which teaches the definitions of eLearning, as well as its advantages and disadvantages. [8] At the Faculty of Sciences in Novi Sad, Moodle has been in use since 2004. At first, it was introduced as a support for traditional teaching at the Department of Mathematics and Informatics, mostly for the Informatics courses, where it has proved to be very useful in everyday usage and became indispensible tool for complementing the traditional teaching. Today the faculty's Moodle installation is at all faculty teachers, associates and students' disposal for online teaching, interpersonal communication, easy distribution, that is, downloading teaching materials in electronic form, easier organization of lectures, different kinds of testing, etc. [9] The Faculty of Philology at University of Belgrade uses eLearning methods for learning English and German language, also for learning about digital texts, and introductory courses of foundations of lexicology, lexicography, word building, phraseology and stylistics of the Dutch languages.

IV. GOOD OLD AI Research Network

GOOD OLD AI is an internationally recognized network of award-winning researchers, engineers, and students interested in the broad fields of applied artificial intelligence and software engineering, founded in 1997. The heart of the network is the GOOD OLD AI Lab, situated at the University of Belgrade. [10]

Their research include intelligent tutoring and learning, service-oriented architectures, model-driven engineering, semantic technologies, intelligent reasoning, intelligent agents, natural language processing, knowledge representation, knowledge discovery, and ontologies, but also AI-based music and visualization. GOOD OLD AI Lab is a research unit at the Faculty of Organization Sciences (School of Business Administration), University of Belgrade. [11]

There are currently three teachers and two teaching and research assistants in the Lab. They teach about a dozen of courses related to software engineering and computer science, conduct several research projects, and advise student members of the Lab (BSc, MSc, and PhD candidates). [12]

V. CONCLUSIONS

During the last couple of years there are an increasing number of conferences which are trying to connect researchers, programmers and teachers in order to discuss technology, innovation and best experiences in the field of eLearning, distance learning and new learning possibilities. Moreover, special attention is paid to all the aspects which ensure quality in eLearning and to the issue of accreditation in the higher education sector, as well as in other sectors. The teachers are offered the possibility to create their own eLearning courses and are encouraged to inform themselves constantly so that they could improve the existing courses, or to improve graphics or efficiency, but also how to start from the scratch and still reach the goal. The teacher is the key figure for the functioning of eLearning system in terms of contents. Its role is to create and add new contents to eLearning courses, to upload materials and practice, to form event calendar, as it is to analyze the data and results accomplished by the students attending the course for the first time and direct them in their further educational development based on that.

The most complex aspect of the teacher's role is outlying the curriculum and developing adequate teaching methodology, which mostly consists of developing so called "learning path". The teacher must determine the appropriate methodology for mastering the materials in order for students to develop consistently and make progress. Within the eLearning course the Teacher adds the materials in any format that is adequate for presenting them on HTTP protocol (html, doc, audio, video, flash, ppt…), and then he makes an exercise that will practically test the knowledge acquired in the given chapter. The good examples of e-Learning practice are State University of Novi Pazar's portal and COBISS (it is the name of the network that connects autonomous (national) library information systems of different states and their research information systems. COBISS programme equipment technically allows downloading files from any shared COBISS databases, OCLC catalogues (WorldCat) and other databases. Countries such as Bosnia and Herzegovina, Montenegro, Macedonia, Slovenia, Serbia and Bulgaria participate in the free flow of bibliographic references which are created in their autonomous library information systems. At this moment, in Serbia there are public and private institutions which offer distance learning as a way of getting a diploma. While some of them are very renowned, some are still regarded as a sham. The process of acquiring accreditation and recognizing institutions depends on the country of that institution and it is regulated by local laws.

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