

MODERN CONCEPTS OF E-LEARNING TECHNOLOGY AND ITS APPLICATION IN SERBIA

Milan RADOSAVLJEVIĆ¹, Maja ANĐELKOVIĆ²

¹University Union "Nikola Tesla", Belgrade, Serbia, milan.radosavljevic@fppsp.edu.rs

²University Union "Nikola Tesla", Belgrade, Serbia, maja.andjelkovic@fppsp.edu.rs

Abstract— Distance learning has become an integral part of the educational system, especially in developed countries. In Serbia, there is a need for this form of learning and now is the moment when it received a serious role. To be ready for this kind of learning and to be able to use it optimally, we need to meet with him and examine it in detail. The aim of this paper is to review modern concepts of distance learning and its implementation in Serbia.

Keywords— e-learning, education, Serbia.

I. INTRODUCTION

WHEN we talk about distance learning, often are used a set of terms: Distance Learning, Distance Training, Distance Education, e-learning (e-learning, "e" Learning), Online Education, Virtual Instruction, Virtual Education, Virtual Classrooms, Electronic Classroom, Blended Learning and so on. Distance learning is developed to take advantage of modern technologies. It takes place on the Internet and students can get a diploma, but they did not set foot in a conventional classroom. The advantages of distance learning have led to a revolution in the field of Advanced Education [1]-[3]:

- 1) Lectures can be held via streaming, transfer of multimedia content that does not require that you first download the complete file, and then look at it, but you can do all of that while transferring data.
- 2) Lectures may be available in the form of printed material as files stored on the server of the educational workers.
- 3) Students can communicate among themselves and with the teacher via e-mail, companies and Internet forums.
- 4) Tasks can be put in the drop-down menu, and tests and exams can be automated and that are placed online.
- 5) Course materials are always available and easily updated. Online formats enable flexibility, as well as to ourselves determines the

speed of work and progress.

Distance learning was realized through various media such as radio, television, newspapers and magazines, video tapes, CDs and a variety of other ways. However, the current and the most attractive form of distance learning is certainly going through a computer. Nowadays, more and more popular as online universities, which students via the Internet provide lectures, provides literature and organize exams.

With the help of the Internet, students become familiar with the material, communicate with teachers and each other. The material with examples can be obtained through a variety of drives, but without the Internet, communication with teachers is very difficult or even impossible. Mutual interaction between teachers and students, as well as between the students themselves can be done in several ways. The most popular of these are: e-mail, chat, Internet forum, and the technically well-equipped environment and via video link.

II. PROCESS OF E-LEARNING CONTENT CREATION

To get a better understanding of what kind of expertise is required for producing a course, we have to first examine the process a course creation [4]- [7]. On Fig 1 and Fig. 2 is given a general concept of e-learning platform.

Outlining training objectives: Once chose a training topic, the first step is to spell out the supposed outcomes or learning objectives. The learning objectives will function the framework for the course, and the element by that all the supporting content is provided. The course outline ought to be written by a subject matter skilled or a trade skilled who best understands however the coaching applies within the field.

Writing the course content and assessment questions: After outlining the course objectives, the next step is to spell out the who, what, when, why, and how. If working directly with a subject matter knowledgeable, this person can typically give the supporting research-based proof to validate the coaching program, otherwise it is needed to

use a team of researchers to produce this data. At this point, writers should additionally be functioning on producing a pool of check queries and interactive inquiries to assess learner data supported the established learning objectives.

Developing course storyboard: Once the content is written, it needs to undergo a translation method to confirm that it is simply digestible on-line which it'll

effectively interact the learners. This is where an educational designer comes in. The instructional designer can enhance the educational expertise by adding interactive exercises to the training to strengthen learner information. The instructional designer ought to conjointly spell out the art specs, infographics, charts, and photo specs he or she thinks can interact the learners and retain their attention [8]-[11].

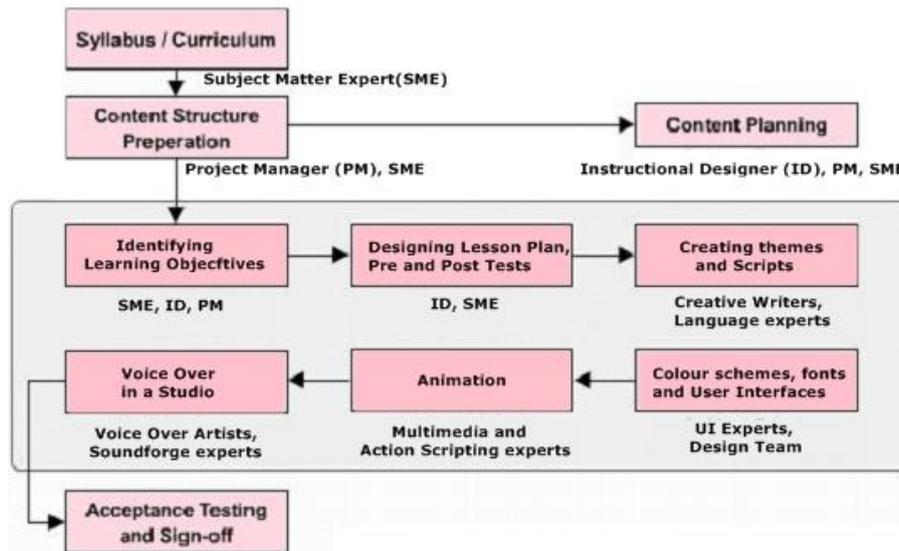


Fig. 1. Structure of an e-learning process (Retrieved from: marchinfotech.com/)

Creating media elements/graphics: Following the specification of the artwork and photos, we want somebody to really produce those pictures. Course media assets should be aesthetically pleasing and designed in a manner that's cohesive to the look of the coaching - whereas still attending to reinforce learner information. Always select stimulating and partaking colors, typography and designs.

Recording and editing voiceover/music: Without associate active educator running the course, having success in a self-paced environment depends on for the most part on however well you'll hold learners' attention. This is where having skilled voice talent, someone who will speak clearly and with a ton of pleasure, emotion and inflection, is of key importance.

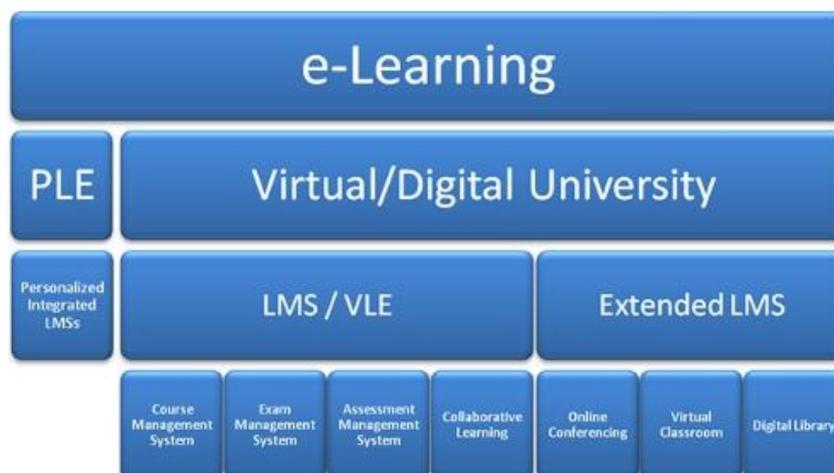


Fig. 2. General concept of e-learning platform

Authoring and combining all elements: When the art has been completed the voice has been recorded and edited, and the content authored, it is required to combine all into a cohesive program. This is where the eLearning Developer comes in. Just as the Instructional Designer is the responsible person behind drafting the course architecture, the eLearning Developer is the heart that brings the course to life by adding animations, building the interactive experiences, and seamlessly flowing together all of the text, artwork, and audio into a complete learning experience.

Quality control: Upon course completion cycle, it is needed to conduct a blind review so any errors, bugs, issues or modifications can be documented that may be needed before releasing it live to learners.

SME/Market Review: Even after the whole thing has been compiled, long gone via, edited, transformed and finalized, you need to make sure your course remains to be useful to the top user and the path creator. Letting subject trained to evaluate the course after you may have completed it's going to either affirm that the course fits the invoice, or permit you to be aware of what areas need extra changes.

III. MODERN E-LEARNING CONCEPTS AND TECHNOLOGIES

As computer possession grows across the globe e-finding out turns into progressively potential and obtainable. Web affiliation speeds are growing, and with that, opportunities for extra multimedia process coaching methods arise. With the colossal development of cellular networks previously few years and in addition the increase in work, taking all of the high-quality options of e-studying on the street is a fact with smartphones and exclusive moveable instruments.

Technologies corresponding to social media are also remodeling schooling continuously. In general, finding out is highly-priced, takes a very long time and the results can vary. E-learning has been making an attempt for years now to counterpoint the best way we study to make it extra strong and measurable. The result now being that there are a number of tools that support create interactive publications, standardize the learning approach and/or inject casual elements to in any other case formal learning methods. A number of e-finding out trends supply us a view to how e-finding out and learning instruments can be shaped in the future are shown further within the textual content [12]-[14]. Micro-learning specializes in the design of micro-learning movements via micro-steps in digital media environments, which already is a day-to-day reality for modern day expertise workers. These events can be integrated into a learner's daily routines. Not like "average" e-learning approaches, micro-learning most commonly tends towards push science by way of push media, which reduces the cognitive load on the novices.

Gamification Is the usage of game pondering and game mechanics in a non-recreation context to have interaction customers and solve problems. This procedure has confirmed strong chiefly for younger students who on this manner undertake abilities much quickly and are more engaged in the finding out the system.

Personalized Learning is the tailoring of pedagogy, curriculum and learning environments to satisfy the needs and aspirations of person beginners. Personalization is broader than simply individualization or differentiation in that it affords the learner a degree of alternative about what's discovered, when it's discovered and how it is realized. This won't indicate limitless choice in view that rookies will still have ambitions to be met. Nevertheless, it's going to provide inexperienced persons the possibility to study in methods that suit anyone for finding out patterns and intelligence.

Multimedia Interactive Learning (MIL) is usual classroom-established training or online course delivery that requires employees to do quite a few classes. The large quantity of material covered, combined with increasingly quick-awareness spans, results in learners now not maintaining adequate know-how to apply it on the job. Even when knowledge is offered in shorter formats, study shows learners will begin to disregard what they realized close to right away after the event. More than ninety percent of the material they realized shall be forgotten in as little as a month. Technology that allows for modern-day learners to take a more active position of their finding out (with the aid of asking them to click on answers to more than one choice questions, fill in the blanks or match responses) drives participation, engagement and long-term memory. It also reinforces the expertise within the brain so learners have a lesser threat of forgetting the material fully.

Mobile Learning (M-learning) is defined as "learning across multiple contexts, through social and content interactions, using personal electronic devices. A form of distance schooling, m-newcomers use mobile gadget educational technological know-how at their time convenience. M-learning applied sciences include handheld desktops, MP3 players, notebooks, cellular telephones and drugs. M-studying focuses on the mobility of the learner, interacting with portable applied sciences. Using cell tools for creating studying aids and substances becomes an essential part of casual finding out. M-learning is handy in that it's accessible from virtually anyplace. Sharing is almost instantaneous among everybody utilizing the identical content, which results in the reception of instant suggestions and recommendations. This particularly active procedure has confirmed to broaden exam scores from the fiftieth to the seventieth percentile, and cut the dropout price in technical fields by way of 22 percent. M-learning also brings robust portability through changing books and

notes with small devices, filled with tailored learning contents.

Automatic learning is a potential outcome and what e-learning in the distant future may look like and so far is only theoretical. It's a kind of automatic studying could sound like a dystopian future for a lot of however it is the place we're heading. And regardless of the ethical questions that can arise, the advantages would be substantial at multiple phases if used correctly. This is how it works: you pick a project that requires excessive performance from your visible cortex such as catching a ball. Then you definitely go find any person who's a professional at catching a ball, location them in an fMRI (functional magnetic resonance imaging) computer and report what's going on in their brain even as they visualize catching a ball. Then you have got obtained your ball catching the program, and you are competent to gain knowledge of.

Next step: put yourself into the fMRI machine, and rig it to set off that professional ball-catching imagery that you simply recorded prior in your brain using neurofeedback. You even ought not to be paying attention whilst this is occurring. Your mind, though, becomes accustomed to that pattern - which is nearly what learning is: the mind becoming accustomed to new patterns. Research has shown that this fMRI sample playback can purpose long-lasting development in duties that require visual performance.

Intelligent Tutoring System (ITS) is a complex, integrated software systems that apply the principles and methods of artificial intelligence (AI) to the problems and needs of teaching and learning. They allow searching the model student level of knowledge and learning strategies used to increase or correction of students' knowledge. They are intended to support and improve the teaching and learning the process in a selected area of knowledge while respecting the individuality of the learner. Adaptive hypermedia (AH) is used in educational hypermedia, information and online help systems, as well as institutional information systems. Adaptive educational hypermedia modifies what the student sees to adjust the content to his goals, abilities, needs, interests, and knowledge of the subject, by providing hyperlinks that are most relevant to the user in an effort to shape the user's cognitive load. The teaching tools "adapt" to the learner. On-line information systems provide reference access to information for users with a different knowledge level of the subject. An adaptive hypermedia system should satisfy three criteria: it should be a hypertext or hypermedia system, it should have a user model and it should be able to adapt the hypermedia using the model.

Social Networks (SN) is e-learning in which students create content, collaborate with their peers in the formation of a network of learning with distributed content creation and responsibilities; e-learning with the

advantage of the many resources the content assembled in the unique experience of learning and e-learning, which uses various tools including online resources, training, and tools for knowledge management, collaboration and research. Methods of learning e-learning based on mutual connections between students, instructors and resources such learning conceived connective theory. The concept of a network that is often used in online learning involves the structure of groups connected to each other people. Derivative term networking means the process by which these links/connections develop and strengthen. In these communities, students participate, create and share activities, learning plans, resources and experiences with their peers and institutions. One of the main features of the network of learning (and its power) is the width of the profile of the network provides a healthy diversity of opinions. Users may be students, instructors, workers in practice, managers and anyone else interested in the activities, resources and experience at its disposal in the network learning.

IV. E-LEARNING IN SERBIA

In Serbia, according to official data, the number of Internet users over three million, but the number of institutions that use and apply distance learning is still small. Since the distance education in our country is still a relatively new phenomenon, for now is more talked about it than it is implemented in practice.

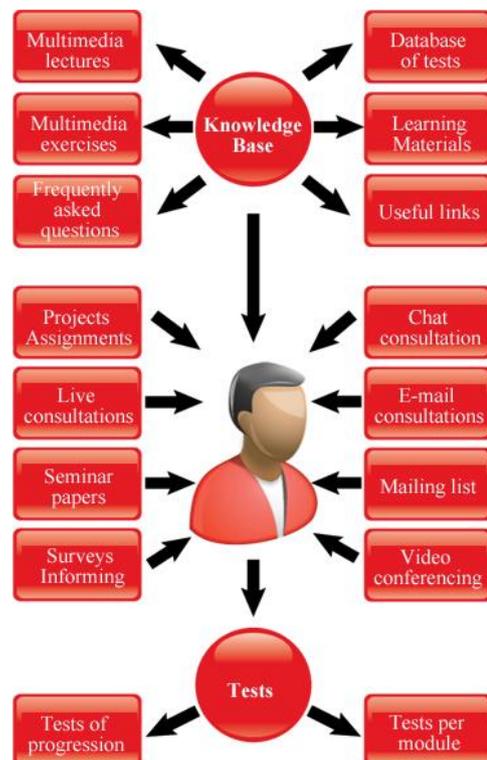


Fig. 2. An example of working DLS of company Link Group from Serbia. (Retrieved from link.co.rs)

We will try to show some ready-made solutions that are successfully implemented, as well as the plans of certain educational institutions for the implementation of distance learning. A pioneer in the application of distance learning in Serbia, Faculty of Medicine in Belgrade, which is 1999/2000. the year started the realization of the first on-line courses.

The development of information technologies Communication Technology (ICT) has made it possible that problems of distance learning disappear. Faculty of Business Studies and Law is modeled on internationally recognized higher education institution has developed its own system of distance learning (Distance Learning System - DLS). In making this learning system is implemented the experience and knowledge of the most eminent international institutions and organizations that prescribe standards and systems of quality assurance for DLS [15], [16].

E-INDEX which was developed by Faculty of Business Studies and Law is the first online and android application to support students in these areas. It provides:

- 1) *Delayed follow lectures via a video (MP4 format). The lecture can be viewed and attend several times.*
- 2) *Deferred listen to lectures in MP3 audio format. Ideal for learning in the transport*

and other situations.

- 3) *Consultation with teachers and lecturers.*
- 4) *Monitoring the terms of lectures.*
- 5) *Monitoring the success achieved.*
- 6) *Electronic exam application.*
- 7) *Communication with students' service.*
- 8) *Using the rich content of e-libraries. Textbooks, books, research and graduate papers are available in a special format.*
- 9) *Monitor all other information relevant to the study.*
- 10) *Monitoring financial liabilities (received data).*

It should be noted in relation to the development of distance learning in Serbia is the formation of the Academic Network of Serbia (Akademska mreža Srbije - AMRES), which is primarily scientific research and education computer network, providing modern information and communication services and Internet connection for its members. In the early nineties of AMRES is created by linking several major colleges, he has become the most advanced computer network in Serbia, with over 150 related scientific research and educational institutions. AMRES today has over 200,000 active users. On Fig. 3 is given a service oriented architecture of an e-learning system.

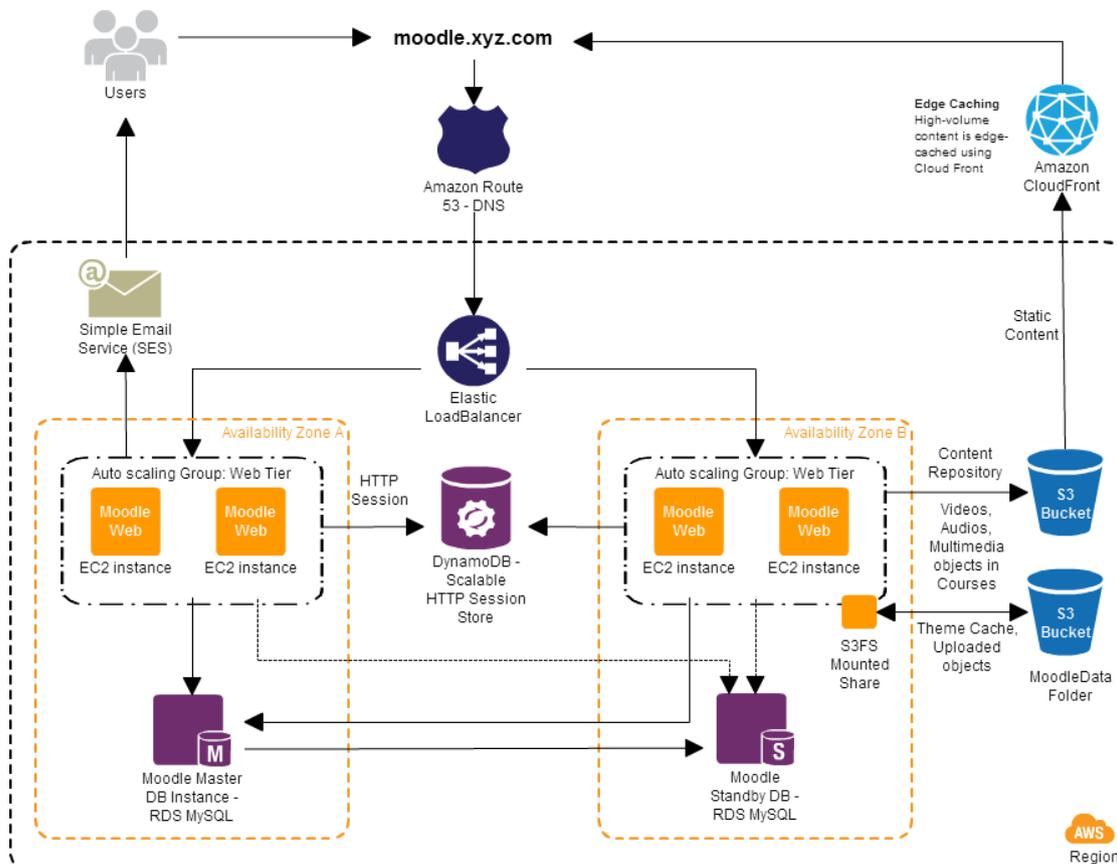


Fig 3. Example of LMS Moodle architecture

AMRES in 2007 launched a project for the introduction of e-education in many colleges. It was decided to apply over open - source platform for distance learning Moodle. A large number of educational institutions went into this project with the aim of increasing the quality of both the teaching and successful study.

Some faculties in Serbia are using free software tools that can be found on the Internet, and some have begun to develop their software to support e-learning. The most popular system for e-learning that has been used in Serbia is certainly a Moodle LMS. About the global popularity of Moodle system tells the number of institutions in Serbia, which now use this platform for developing and improving the teaching process. An example of Moodle architecture is given on Fig 3.

DLS (Distance Learning System) is based on the use of modern information technology in all elements of the learning process [17]- [19]. Internet and Intranet are used to create conditions for users to interact with the content, instructors and other users. DLS allows complete management courses on the Internet as well as the realization of interactive, two-way communication and data exchange. The developers have to develop DLS using PHP, MySQL and JavaScript.

V. CONCLUSION

In today's society it is impossible to bypass the information and communication technologies and their use. Computer literacy is of equal skill of reading and writing. An increasing number of transactions in which one of the main demands computer skills. The generations that are now in school, as well as the generations to come grow with technology. Because of the way the computers and all the technology implemented in our lives are not possible to create a fully supervised environment for it. Students now work independently with computers, bravely and skillfully explore the possibilities of computers, and the pace of their "absorption" must be adapted and teachers. Often the student will hear and read what the teacher does not know. Often there will be many questions for teachers. It is impossible to always be ready for everything. As the authority of the person who leads and directs the educational process, the teacher has to work as much as he can monitor news from the world of technology.

REFERENCES

- [1] M. M. S. Danesh, S. M. Mortazavi, and M. Nahavandi, "Relationship between free e-learning websites and e-commerce," in *2010 International Conference on Electronics and Information Engineering*, 2010, vol. 1, pp. V1-110-V1-112.
- [2] M. A. Elgamal and R. M. Al-Khayyat, "e-learning and individual characteristics," in *Proceedings of the First Kuwait Conference on e-Services and e-Systems - eConf '09*, 2009, pp. 1-4.
- [3] F. Ghali and A. I. Cristea, "Authoring for E-learning 2.0: A Case Study," in *2009 Ninth IEEE International Conference on Advanced Learning Technologies*, 2009, pp. 170-174.
- [4] B. Hilgarth, "E-Learning success in action! A case study research on e-Learning success in international acting organization," in *Proceedings of the IADIS International Conference e-Learning 2010, MCCSIS 2010*, 2010, vol. 1, pp. 348-356.
- [5] B. Hu and Z. Yu, "An E-learning system based on mobile agent," in *2012 International Symposium on Information Technologies in Medicine and Education*, 2012, vol. 1, pp. 207-210.
- [6] M. Y. Ibrahim and C. Brack, "E-Teaching and e-Learning in engineering course design," in *2009 3rd IEEE International Conference on E-Learning in Industrial Electronics (ICELIE)*, 2009, pp. 145-150.
- [7] G. M. Iskander, "Exploring the dimensions of E-learning maturity model," *Int. J. Emerg. Technol. Learn.*, vol. 7, no. 2, pp. 32-38, 2012.
- [8] C. Li and K. Wu, "Integrated E-Learning," in *2009 International Conference on E-Business and Information System Security*, 2009, pp. 1-5.
- [9] B. McCarthy, "Applying e-learning technologies to teach computer programming: A case study," in *Proceedings of the International Conference on Electronic Business (ICEB)*, 2007, pp. 242-245.
- [10] A. Sangodiah, "Integration of data quality component in an ontology-based knowledge management approach for e-learning system," in *2012 International Conference on Computer & Information Science (ICIS)*, 2012, vol. 1, pp. 105-108.
- [11] N. Selviandro and Z. A. Hasibuan, *Information and Communication Technology*, vol. 7804. Berlin, Heidelberg: Springer Berlin Heidelberg, 2013.
- [12] M. Shirzad, M. Ahmadipour, A. Hoseinpanah, and H. Rahimi, "E-learning based on cloud computing," in *2012 International Conference on Cloud Computing Technologies, Applications and Management (ICCTAM)*, 2012, pp. 214-218.
- [13] J. Dašić, P. Dašić, & V. Šerifi, "Evolution of e-learning", in: *Proceedings on 7th International Conference Quality, Management, Environment, Education, Engineering (ICQME-2012)*, 2012, pp. 311-316.
- [14] P. Dašić, V. Nedef, & S. Šehović, "Adaptive hypermedia systems in e-Learning", *Modelling and Optimization in the Machines Building Fields*, 2007, vol. 13, no. 3, pp. 384-395.
- [15] P. Dašić, V. Šerifi, & Lj. Bulatović, "Wisdom in knowledge management strategy", *Annals of the Oradea University – Fascicle of Management and Technological Engineering*, 2011, vol. 10, no. 2, pp. 5.40-5.48.
- [16] Y. Ugurlu and H. Sakuta, "E-learning for graphical system design courses: A case study," in *2012 IEEE International Conference on Technology Enhanced Education (ICTEE)*, 2012, pp. 1-5.
- [17] A. Zamfir, "Management of e-learning services in the European Union," in *Proceedings of the 7th IASTED International Conference on Web-Based Education, WBE 2008*, 2008, pp. 121-126.
- [18] L. Zekanović-Korona, V. Mateljan, and B. Krce Miočić, "Evaluation system for e-learning," in *MIPRO 2012 - 35th International Convention on Information and Communication Technology, Electronics and Microelectronics - Proceedings*, 2012, pp. 1372-1376.
- [19] V.A. Fedorin, P. Dašić, A.N. Fesenko, & S.V. Kovalevsky, "Modern technologies of learning and the control of knowledge". in: *Proceedings of the 7th International Conference Research and Development in Mechanical Industry (RaDMI-2007)*, 2007, pp. 1-14.