

IT sector challenges in the education system

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ABSTRACT

Building a knowledge society requires a modified method of management and knowledge which will affect the future production owing to the information and scientific education system, different from the polytechnic, dualistic education system. Information and knowledge as the new, dominant topics transform a global society into an educational and scientific system. Nowadays, education is considered as the requirement for survival and development of modern societies, and knowledge is frequently perceived as the most powerful weapon of a society. In the area of information and communications technology, the significance of education is proportional to the technological development of a society. It is precisely why, starting from this fact, an increasing number of universities in the world have recognised the significance of acquiring knowledge through the Internet. This type of education is considerably developed worldwide under different names: "learning through the Internet", "distance learning" and "virtual learning". In that regard, today, there are numerous organisations bringing together such higher education institutions. In this paper, the author talks about the significance and challenges of the IT sector in the education system, especially in the higher education system, with an emphasis on distance learning which is today no longer a trend, but a necessity.

Keywords: electronic learning, information and communications technology, the Internet

Introduction

In the area of information and communications technology, the significance of education is proportional to the technological development of a society. It is precisely why, starting from this fact, an increasing number of universities in the world have recognised the significance of acquiring knowledge through the Internet. This type of education is considerably developed worldwide under different names: "learning through the Internet", "distance learning" and "virtual learning". In that regard, today, there are numerous organisations bringing together such higher education institutions.

One of the characteristics related to the contemporary information society is that, upon mainstream education, people have the need to further improve themselves through various forms of formal, non-formal and informal learning. Due to the very dynamics of life and their obligations, many

strive towards professional training and acquiring new knowledge and skills through methods that do not disturb their daily responsibilities. For such people, the need to acquire knowledge through educational activities, regardless of the place and time, arises in and of itself. Such a need points at the fact that distance learning is becoming an inevitability in this day and age.

E-learning

Distance learning is a type of education which originated in the first half of the 19th century. It is believed that an Englishman called Isaac Pitman was its pioneer. It was created in order to overcome different obstacles like time, space or modest financial means, as well as meet the needs of marginalised groups, primarily women, who in the

education system of the day did not have adequate access to educational contents. If we want to determine the beginning of this type of education more precisely, we should accept the year 1858 as its starting point, when the University of London, through their decision to allow people to take exams without previously attending lectures, laid the foundations for the first official type of distance learning in the form of correspondence courses.

When we talk about the contemporary notion of education, the goal is no longer to simply reproduce knowledge, but to strive, as much as possible, to actively include students in the knowledge acquisition process using various sources of knowledge.¹

"Learning through the Internet", that is, the so-called *e-learning* is related to such a form of teaching where the teaching contents are presented to students through the Internet. Thereby, it is important to keep in mind that this is not only about publishing teaching materials from a certain area of the Internet, but an effort is made to resemble classical teaching as much as possible when it comes to its social and other aspects. Likewise, by "teaching through the Internet", we often strive to avoid some deficiencies present in classical teaching like limited availability of information necessary for successful subject matter acquisition, low quality of presenting teaching contents, etc.

Under the notion *e-learning* we imply the execution of the educational process with the help of information and communications technology, i.e., a series of procedures with which it is possible to individually exchange information and acquire knowledge. It comprises numerous learning strategies and requires support from various technologies taking part in the student-content-teacher interaction. Technological support has been continually developed from the learning systems based on large computers, through television, applications adapted to various operating systems on personal computers, as well as videoconferencing, up to the Web-based systems, intelligent tutoring systems and learning management systems.

¹ Branković D., Mandić D., Metodika informatičkog obrazovanja, Faculty of Philosophy in Banja Luka, Banja Luka 2003, p. 35.

M-learning, e-learning, d-learning

At every turn, the Internet and information technologies change many aspects of life in BiH and the world. Thus, everyone is familiar with the fact that, today, information technology is one of the most powerful and flexible technologies ever made. It is precisely why we say that computer science, i.e., technology changed everything: the way we work, communicate, spend our leisure time, learn and acquire new information. And for that reason precisely, we can deem the information revolution not only as technological but also largely sociological and ethical.²

The continuous development and achievements of information technology have significantly raised not only the level of education and information exchange, but also the level of job performance in the business and production functions of companies. It could be pointed out that the most important component of information technology is represented by the computers themselves. They represent the possibility of a fast, easy, efficient and inexpensive way of exchanging different information both in the education and the business sphere, as well as in daily interpersonal communication. The usage of computer information technology enables a completely new organisation of scientific and educational work which is appropriate for the students' individual abilities and interests, provides fast and efficient emission, transfer and absorption of knowledge, connects students with the database, stimulates activity, independence, as well as brainpower and student creativity. Such an opportunity to mobilise students and their independent work is the main characteristic of computer-supported teaching and learning.³ The technical, scientific and technological progress that ensued has had a significant impact on the changes in education and teaching. The changes have arisen in the organisation of educational contents, as well as in introducing and applying new procedures, methods, techniques, resources and media. Contemporary educational technologies have become an integral part of the teaching process with a tendency to not only improve the teaching process, but also fundamentally change it.

² Bogdanović M., Obrazovni softveri, obrazovanje i nacionalno vaspitanje, Tematski zbornik: Mogućnost nacionalnog vaspitanja u vreme globalizacije, pp. 265-282, Teacher Training Faculty, Vranje, 2010.

³ Vilotijević M., Didaktika 3 – organizacija nastave, Školska knjiga, Belgrade, 2007.

Multimedia, as a part of information technology, is often applied in teaching, and therefore, it can be concluded that multimodality is an important feature of the contemporary education system. Considering the fact that the focus of the teaching process has already started to shift (away from the teaching contents and the teachers towards the student), there is no doubt that multimedia greatly contribute in modernising traditional teaching.⁴

When it comes to education and acquiring knowledge, it always started with traditional learning, learning through audio lessons, video lessons, electronic learning, distance learning, up to today's mobile learning - m-learning. Mobile learning is a type of distance learning (d-learning) and electronic learning (e-learning). Application of multimedia is an imperative of contemporary teaching. The effects multimedia have on the teaching process depend upon its usage. If they are implemented and chosen in the right way, multimedia have the capacity to enrich and enhance learning in a way that makes it pleasant for students. The potential of multimedia in a teaching environment is enormous. However, even the cutting-edge multimedia can lead to didactic failures in teaching. Therefore, it is necessary to properly select, organise and apply technology in teaching based upon the necessities, capabilities and goals we have at a given moment in the education system. It is clear that multimedia significantly affect the teaching process. Nevertheless, their application should not be approached in a restrictive manner. It is best to combine multimedia with other means, sources, approaches, and the teacher should manage, organise and monitor the effects of teaching, as well as perform corrections by proportioning certain multimedia. This will lead to more efficient and effective teaching.⁵

Distance learning (DL) has crossed international borders and our country is already entering the international market of electronic learning. The USA are a competitive market in electronic learning and education. The experience of America, Canada and Australia in this field dates back to the 1880s.

⁴ Ibid.

⁵ Krneta D., Metode učenja u svjetlu promena u obrazovanju, Inovacije u nastavi, Belgrade, 2007, 1, pp. 79-89.

Today, electronic learning is a completely natural phenomenon even at the most famous universities (Harvard, Stanford, and MIT) which, in their virtual classrooms, offer a large selection of the most versatile, accredited academic courses.⁶

In the second half of the nineties, there was an expansion of information and communications technology (ICT), resulting in a rapid development of the Internet. Distance learning has transitioned from paper into an electronic form. Such a change has brought forth a new name - electronic learning (e-learning). Lessons are now sent to the user exclusively in electronic form (via electronic mail or *FTP (File Transfer Protocol)*). The completed tests are returned by the user to the educational institution via electronic mail.⁷

Mobile learning (m-learning) represents electronic learning where access to study materials is enabled by using a PDA device (Personal Digital Assistant) and a mobile phone. Typically, electronic learning is described as learning "anytime" and "anywhere", but, with access to a computer and an Internet connection. Mobile learning does not require these connections. Everything a student needs is a PDA device or a mobile phone and a wireless network.

Technology infrastructure

Implementing e-learning at higher education institutions implies the usage of corresponding infrastructure comprised of both the necessary hardware and software components. Some authors point out that the success of the entire e-learning is largely dependent upon the used infrastructure.⁸ The key component of this infrastructure is the *Learning Management System (LMS)*. LMS is a complex software system for administration, documenting, tracking, reporting and delivering online courses.⁹

⁶ Bogdanović, M., Elektronsko učenje, učenje na daljinu, Zbornik radova i deo- peti Međunarodni simpozijum tehnologija, informatika i obrazovanje za društvo učenja i znanja, pp. 299-308, Faculty of Technical Sciences, Čačak, 2009.

⁷ Bogdanović, M., Elektronsko učenje, učenje na daljinu, Zbornik radova i deo- peti Međunarodni simpozijum tehnologija, informatika i obrazovanje za društvo učenja i znanja, pp. 299-308, Faculty of Technical Sciences, Čačak, 2009.

⁸ Shank, P., Precht, L. W., Everidge, J., Bozarth, J. Infrastructure for Learning: Options for Today or Screw - Ups for Tomorrow, The e-Learning Handbook, Pfeiffer, San Francisco, 2008, pp. 113-166.

⁹ Ellis, R. K., Field Guide to Learning Management Systems, ASTD Learning Circuits, 2009.

Therefore, it represents software support for all aspects of the learning and teaching process. Apart from a large number of commercial *LMS*, several open source systems are also in use and the most popular are as follows ¹⁰ :

- Moodle (an abbreviation for Modular Object-Oriented Dynamic Learning Environment) has been around since 2002 and, after over ten years of existence, it is very popular among educators throughout the world. Out of all open source systems, this one is dominant in Serbia
- LRN was developed at the Massachusetts Institute of Technology (*MIT*) and it has over 500,000 users in institutions in over 18 countries.
- eFront offers both a free and a commercial version of the software.
- Apart from a free basic version, Dokeos offers a commercial one, as well as a third version exclusively intended for the field of medicine.
- Sakai was designed by *MIT*, Berkeley and Stanford with the idea to create an *LMS* which they will also use, so that it completely satisfies the needs of a university.

Considering the large number of software solutions, to find the best *LMS* for your needs, make sure you've considered these factors ¹¹ :

1. Who will be the system users? There are differences between the solutions intended for corporate and those intended for academic institutions. So, for example, higher education institutions can immediately eliminate half of the offered software solutions since they will not suit their needs. They should take into consideration only those systems that enable monitoring student progress, grading, etc.
2. Determine the budget. One should know how much money is available for *LMS* in order to see which software solutions are affordable.

3. Prioritise functional features. Since *LMS* has to cover various functions, it is best to create a list of the features the system should possess. Then the *LMS* solutions should be compared according to those features.
4. Plan further growth. You should always choose the *LMS* that can grow with the number of system users in the future.

LMS is not the only software solution used for e-learning. Most *LMS*s do not have the option to create or change the teaching content, so *Content Management Systems (CMS)* are used for that purpose. *Learning Content Management Systems (LCMS)* are also available. These systems focus on teaching contents, their creation, reuse, management and delivery. ¹²

Distance learning challenges of a technological nature

Introducing distance learning in higher education institutions represents a sort of a challenge for all employees, with concern and even resistance often occurring among them. In order to remove them, it is necessary to understand the professors' doubts in relation to this new form of education. Wilson and Christopher point out that they are usually worried about the following issues ¹³:

- Poor technology infrastructure: What kind of infrastructure does my institution have available?
- Internet access: Do students have high-speed Internet connections and other required technology?
- Unreliable technology: How reliable is the technology at our disposal?
- Variable technology requirements: Will I be able to keep up with the always-changing requirements and standards related to distance education technologies?

¹⁰ Chaudhari, S., Top Open Source Learning Management Systems, 2012, <http://elearningindustry.com/topopen-source-learning-management-systems>

¹¹ Barrish, J. How To Choose A Learning Management System, 2013, <http://www.teachthought.com/technology/how-to-choose-a-learning-management-system/>

¹² Advanced Distributed Learning (ADL) Co-Laboratories (2011) Choosing a Learning Management System, http://www.adlnet.gov/wp-content/uploads/2011/07/Choosing-LMS-v.2.4_201104132.pdf

¹³ Wilson, B. G., Christopher, L., Hype Versus Reality on Campus, The e-Learning Handbook, Pfeiffer, San Francisco, pp. 29-54.

Distance education, then, raises numerous questions, and all of them have to be kept in mind when introducing such a form of teaching and learning which greatly differs from the traditional ones.¹⁴

Conclusion

Over the past decade, electronic learning has experienced a sudden expansion primarily because of the advancements in the field of information and communication systems. By keeping up with the global trends and also striving to improve work quality in the domain of education, a large number of accredited higher education institutions in Bosnia and Herzegovina have included this form of learning in their regular programmes at all study levels.

The results of this and other related research indicate that there is great interest and necessity for further expansion and development of such programmes. Their introduction primarily requires the institution to possess technical equipment, however, training and working in the field of general awareness are even more important when it comes to the teaching staff since teachers carry out the process and it is important for them to be familiarised with new technologies and teaching methods (i.e. the advantages that come with them).

¹⁴ Čamilović, D., Visokoškolsko obrazovanje na daljinu, Vitez-Tuzla-Zagreb-Belgrade-Bucharest, Vol. XV, No. 31, 2013.

References

1. Advanced Distributed Learning (ADL) Co-Laboratories (2011) Choosing a Learning Management System, http://www.adlnet.gov/wp-content/uploads/2011/07/Choosing-LMS-v.2.4_201104132.pdf
2. Barrish, J. How To Choose A Learning Management System, 2013, <http://www.teachthought.com/technology/how-to-choose-a-learning-management-system/>
3. Bogdanović M., Obrazovni softveri, obrazovanje i nacionalno vaspitanje, Tematski zbornik: Mogućnost nacionalnog vaspitanja u vreme globalizacije, pp. 265-282, Teacher Training Faculty, Vranje, 2010.
4. Bogdanović, M., Elektronsko učenje, učenje na daljinu, Zbornik radova i deo- peti Međunarodni simpozijum tehnologija, informatika i obrazovanje za društvo učenja i znanja, pp. 299-308, Faculty of Technical Sciences, Čačak, 2009.
5. Branković D., Mandić D., Metodika informatičkog obrazovanja, Faculty of Philosophy in Banja Luka, Banja Luka 2003, p. 35.
6. Chaudhari, S., Top Open Source Learning Management Systems, 2012, <http://elearningindustry.com/topopen-source-learning-management-systems>
7. Čamilović, D., Visokoškolsko obrazovanje na daljinu, Vitez-Tuzla-Zagreb-Belgrade-Bucharest, Vol. XV, No. 31, 2013.
8. Ellis, R. K., Field Guide to Learning Management Systems, ASTD Learning Circuits, 2009.
9. Krneta D., Metode učenja u svjetlu promena u obrazovanju, Inovacije u nastavi, Belgrade, 2007.
10. Shank, P., Precht, L. W., Everidge, J., Bozarth, J. Infrastructure for Learning: Options for Today or Screw – Ups for Tomorrow, The e-Learning Handbook, Pfeiffer, San Francisco, 2008.
11. Vilotijević M., Didaktika 3 – organizacija nastave, Školska knjiga, Belgrade, 2007.
12. Wilson, B. G., Christopher, L., Hype Versus Reality on Campus, The e-Learning Handbook, Pfeiffer, San Francisco.

Izazovi IT sektora u sistemu obrazovanja

SAŽETAK

Izgradnja društva znanja zahtjeva izmjenjen način upravljanja i znanja koji će uticati na buduću proizvodnju, zahvaljujući informacijskom i naučnom obrazovnom sistemu koji se razlikuje od politehničkog dualističkog obrazovnog sistema. Informacija i znanje kao novi vladajući predmet rada pretvaraju globalno društvo u

obrazovni i naučni sistem. Obrazovanje se danas smatra uslovom opstanka i razvoja modernih društava, a znanje se često posmatra kao najmoćnije oružije jednog društva. U oblasti informacione-komunikacione tehnologije značaj obrazovanja je u proporcionalnoj vezi sa tehnološkim razvojem društva. Upravo polazeći od ove činjenice sve veći broj univerziteta u svijetu prepoznao je značaj sticanja znanja putem interneta. Ovaj vid edukacije je uveliko razvijen u svijetu pod različitim imenima: „učenje putem interneta“, „učenje na daljinu“ i „virtuelno učenje“. S tim u vezi, danas postoje brojne organizacije koje okupljaju upravo ovakve visokoškolske ustanove. Autor u radu govori o značaju i izazovima IT sektora u sistemu obrazovanja, a posebno u visokom obrazovanju sa akcentom na učenje na daljinu koje u današnje vrijeme više nije trend nego potreba.

Ključne riječi: elektronsko učenje, informaciono komunikacione tehnologije, internet

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