Technology and Media in Education

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Abstract

The aim of this paper is showing the importance of using modern communication technologies, as well as the media in educational development. The introductory will show importance of technological changes in educational development with special emphasis on the development of online learning and its basic features. Here, the importance of informational infrastructure development will also be shown, as a critical element for Internet learning development. Furthermore, different media used in education, related to their characteristics, will also be analyzed. The paper will use descriptive method, method of analysis, induction and deduction. Conclusion will show current trends and technologies, as well as a critical overview of entire paper. Results will be used as a reference frame for future continuous research.

Keywords: ICT (Information and Communication Technology), E – learning, multimedia, Web 2. 0 tools, M – learning
JEL classification: I21, O31, A20

Introduction

Purpose of this work is emphasizing the importance of implementing information and communication technology (ICT) in education and showing basic distinctions between traditional and digital learning and its advantages.

Today society is heavily influenced by the development and implementation of ICT. Last fifty years it was changing from industrial to informational from which creates a completely new society, society based knowledge. In such society, the economy and the quality of the individual's life depends on the knowledge and on the finding, processing and application of information. The result of that is a continuous growth of human knowledge.

While in the past the process of public information and communication was relied on traditional media such as print media, radio and television, today we depend on the Internet which helps to create a completely different dimensions of communication having in mind receiving, publication and exchanging of information (Ruzic et al., 2009). Information economy is fundamentally different from the economy of natural resources (when we sell a physical product it is no longer in our possession, whereas the information is, and it still can be sold). The physical matter can be copied, but it costs almost as a production of the original. On the other hand, multiplication information's costs are very low. While physical matters wear out in time, information's may become out of date, but also can become more valuable. It is evident that tangible products exist in time and space so it can be founded, quantified, or stock holded, while information can be found anywhere and anytime.

Also, it is necessary to mention three basic distinctions between traditional and digital communication. Traditional communication conducts in relation "one to

many" and the same messages are transmitted to different segments of users. Internet – based communication enables such a personalized and selective communication among subjects, or a group of segmented subjects through conquering market niches ("one to many") in a simple, inexpensive and effective way with the high level of interactivity between the mentioned (the so called "one to one" communication). In the end, Internet media enables "many to many" communication, whether is it interactive or one – way communication, whether it is about individual users or user' s segments in the context of such communication.

Furthermore, in the text, authors will explain the importance of implementing ICT in education, the main tools and media which are used in distance learning with all of its advantages and the basic elements which are necessary for functioning ICT in educational institutions. At the end of the paper the main trends which are happening right now, the limitations and the proposals for future researches will be described.

Methodology

Methods that have been used were obtained by the author's longtime research of relevant professional and scientific literature and the secondary data were used, the method of analysis, synthesis, induction and deduction.

Technology increases the quality of life, tackles with problems and difficulties that people face, creates knowledge, tools and processes to deal with such problems (Baser, 2006). Considering the definition of educational technology it can be said that it is a complex process that involves people, procedures, ideas, tools and organization to analyze problems, select tools and evaluate different points of human learning. Educational technology is actually an act of transforming systematized scientific knowledge in its application. Many authors who have previously occupied with the technology impact on learning emphasizes that it is an important element for effective learning. Above all, the using of technology among the other indisputable factors which itself possesses and implies encourages the development of critical thinking among the basic participants of educational process. Computers successfully ensure effective learning in relation to nature and techniques of learning. Effective learning using technology includes principles that may require new teaching environments (Akbiyik et al., 2006).

Technological tools and instruments used in teaching have brought new methods of teaching and learning, but they require more efficient use of time that now increasingly improves with significant progress of science and technology which create devices more efficient in shorter time.

Speaking about the educational process Bates and Poole emphasize that it is good to make distinction between technology as a physical matter (classroom, book, radio, television, computer) and the media as a medium for transmitting information (voice, text, audio, video, computer). Regardless whether we understand technology as a physical matter or the medium, it definitely affects with its role on educational process (Bates et al., 2003).

Learning via modern information and communication technology with special emphasize on learning via the Internet

Traditional educational approach will not be able to meet growing needs. The use of ICT in the educational process represent a strategic guideline that will significantly affect the future and the development of economy and society in general, and in particular, on the status of the educational institutions (Sinkovic et al., 2006).

The concept of ICT applied in education grew out from the former idea of IT and new technologies and represents a huge area of rapid changes and growth. Regarding this, ICT contributes to highlight new concepts such as information and communication literacy and digital literacy. When we speak about ICT in education, then we use acronym ITLET (Information Technology for Learning, Education and Training), which is a key element in all forms and models of distance learning (Breslauer, 2011).Today, in an effort to equalize the level of student's knowledge many colleges apply knowledge exchange using advanced ICT. Teacher is on his own, parent institution, and the educational contents are transmitting via the Internet, so instead of people ideas travelling and the costs are significantly reduced. Distance learning in its terms appears with the first correspondence courses. Afterwards, technology development conditioned learning by using audio and video equipment (radio and TV channels). Today, distance learning takes place using ICT with the culmination of progress of different forms of online learning.

Speaking about concrete facts it would be impossible to list all the technology and tolls so the review that follows serves only to facilitate understanding. Due to the versatility of using different medias in e - learning process there are also different classifications of its modalities. Considering the media which represents different educational contents, the following modalities appears:

- Multimedia - a multitude of digital formats(text, images, animations, simulations, video and audio materials);
- Communication tools - e - mail, online discussions (Chat Anywhere, Microsoft Chat 2.5, Snitz Forums 2000, Invision Power Board, phpBB), instant messaging (ICQ, IRC, AIM, etc.), videoconferencing (Microsoft NetMeeting, ICQ Pro, FlyConferencing Suite, In4cam);
- Videoconferences – uses for distance learning or meetings. Participants are located in two or more locations that are dislocated and equipped with equipment and tools with which record, transmit and project image and sound (e.g. the project of e- islands in Croatia);
- Learning Management systems (LMS) - programs that integrate publishing material on the Internet with tools for communication, administration and evaluation of participants and a variety of other options. The most useful systems today is Moodle because it is open source. The best-known systems uses today are Moodle, WebCT, Ilias, Claroline etc., but it is believed that their time is passing because LMS has no flexibility and openness;
- Web 2.0 tolls – characterized by dynamic content and Internet applications through which users can create and share content, but its role is changing constantly from passive to interactive.

The key question is which modality is optimal because modality choice depends on specific needs of the subject which approves and adapts the content, material's requirement content and the characteristics of the subject which teaches.

The next classification refers to two modalities:

- Synchronous –teaching takes place in real time;
- Asynchronous – teaching does not require simultaneous action between teachers and students, and students can choose the time when they will adopt the educational content, and therefore this model is much more relaxed.

Speaking about the Internet, above all it is:

- Easily accessible –not technically limited to a narrow circle of specialists in the field of computer science, it is not exclusive in the sense of limitation of information access, and it is financially accessible to a wide range of users;

- Interactive – it doesn't filter the communication through political or economic agents, but quite the opposite, it enables direct communication of individuals, individuals and groups, and groups themselves;
- Diverse – in relation to easy availability, thoughts, ideas and attitudes can be expressed by individuals and groups of different points of view. It is associated with modern culture, but not its substitute, and it allows creation of new cultural forms by merging modern culture and communication technologies;
- Experimental – open to new ideas, applications and processes, and it is determined by its cultural, social and political benefit, and not just only its commercial basis (Foresta, et al., 2003).

Basic advantages of online learning compared to traditional education are reflected in the following:

- In the individualization of teaching process by creating opportunities for students to progress according to their psychological and perceptual abilities, as well as a previous knowledge from the specific educational areas;
- In the combination with other electronic resources of information (encyclopedias, magazines, libraries, www);
- In the activity of students, developing of their critical thinking, and ability of analyzing and reasoning by the continuous or occasional interaction with informational resources;
- Interaction takes place with teachers and students from other higher educational institutions in which knowledge and experience shares and equalize the knowledge level on different institutions of higher education;
- The fluctuation of information instead of people is ensured and the costs are significantly reduced;
- Educational software provides periodic evaluation at a stage of knowledge acquiring, so in addition to knowledge evaluation in interaction with teacher and other students, the self – evaluation is performed;
- The involvement of the best specialists in certain areas is assured, so the quality of educational process is risen to the higher level, and the knowledge level on national and international level is equalized.

In the section of development and integration of technology in education in the last 15 to 20 years we can notice following facts:

- Internet's bandwidth and connection speed has a continuous growth;
- Computers becomes faster, more powerful and cheaper;
- Synchronous and asynchronous forms of communication continuously developing;
- Learning Management Systems (LMS) are developing into the integrated and interoperable systems;
- The growing development of specialized systems for e – learning was noticed, although at the same time the existence of open source and commercial applications often results with a mixture of applications and strategies for support systems development in typical higher educational institutions;
- People, in everyday basis, commercially and privately communicate via networked computer systems, and the global presence of network affects the conditions in which people want to learn, work and play.

Results

In recent years the educational technology was developed by individuals and companies. Therefore many advantages were achieved, especially because different designers, experts in content development and teaching staff used

different approaches, so it led to indisputable progress and innovation. However there have been a numerous problems especially in the field of standardization which will state the following points:

- Progressive and turbulent changes in technology causes that contents made with outdated technology collapsed;
- Commercial software could closed the educational contents in a sort of "silos", so the educational content outside the system in which was created becomes unavailable;
- The lack of standard communications and interoperability protocols disable collaboration and sharing;
- Many resources will never be detected if there is no system which categorizes them and through which their characteristics are described.

To deal with these problems, a variety of organizations are developing and renewing a wide spectrum of interoperable systems by developing technical standards which aims to establish a common framework standard e - learning infrastructure so manufacturers of software and hardware can create a compatible product for the purpose of using materials on different platforms and in different learning environment. In this way, data standards define methods for describing learning resources enabling consistent search for contents and their discovering in various systems.

There are also some based infrastructures that organizations need to effectively maintain programs and courses with the help of educational technologies. This is not just about online courses, but also the integration of the infrastructure that supports learning at all. The overall IT infrastructure of an educational institution is made up of communication infrastructure, hardware, software, applications, databases and infrastructure of people who develop and use it (Hanseth, et al., 1998).

However, there are 4 basic elements which are necessary for functioning of IT on educational institution:

- Networking -part of the communication infrastructure at the educational institution, and is common in the developed world. Educational institutions sometimes take the role of Internet service providers (ISP) in order to reduce costs of Internet access for employees and students. The approach is used in Croatia where CARNet (Croatian Academic and Research Network) co-finance costs of Internet connection to teachers, students, as well as other employees;
- Bandwidth - refers to the amount of data that can be transferred through Internet connection for a certain period. Broadband Internet connections are omnipresent today and the amount of traffic and bandwidth in general is growing due to increased speed of Internet connections and the way people use the Internet;
- Internet speed connection - in the development of materials it is necessary to pay attention to their size in order to gain access to the users that have faster or slower Internet connections. Using medias that require higher data rates such as video streaming we have a possibility to compress the several levels of quality in order to be adapted to different speeds of Internet connections, from modems to cable and other high speed connection. The faster connections enable higher quality transmissions;
- Access - represents access to educational technology, especially hardware and software. If users cannot access the network the implementation of technology will be just an additional barrier that provides access to education. Also it is important to take into account the place where it is expected that users will work. Today, users are able to connect mobile computers on a local network of

educational institutions, and also for mobile and wireless access in all areas of educational institutions by using a device that can connect to the Internet, such as tablets and smartphones.

Table 1
The length of transmission of Internet connection

Internet speed connection	The length of transmission
28,8 Kb/s	6 minutes
56 Kb/s	3 minutes
ISDN - 128 Kb/s	1.3 minutes
Cable/DSL connection - 1,5 Mb/s	7 seconds
T1 linija - 10Mb/s	1 second
T3 line - 100 Mb/s	0.01 seconds
OC3 line - 155 Mb/s	0.05 seconds

Source: Author's illustration

Discussion and conclusion

Today, it is very important to determine how long a certain technological trend in educational environment can be relevant. Indisputably teaching should be design towards the learning outcomes with the student in the centre of attention. Also, the new, so – called net generation increasingly build networks and create communities using social software. In order to track the changes and effectively take its part teachers must strive to lifelong learning and development of its competences, especially in technical – technological sense. Furthermore, the technology itself, as well as students and teachers provide creativity and innovation which are basic drivers of changes.

What is the relation between technology and education? Does the development of technology influence on the development of social and educational trends, or vice versa, the story can be compared with the famous story with the "chicken and the egg". Technological determinists say that society is formed under the influence of technology, while the techno skeptics think similar, although they believe the society is "kidnapped" and replaced by simulation. Radical humanists believe that technology can adapt and use productively, as it is neutral. Transhumanists deny the neutrality of technology and its relationship with the society interpret as a dynamic, changeable and unpredictable (Budic et al.)

However, there are 4 most important trends that are becoming more common, and will be appearing in the future:

- Mobile learning (M – learning) - a term that could be defined as the art of usage handheld / wireless devices for learning purposes. In addition to the mobile phones one of the most commonly used devices are certainly handhelds / PDAs, such as MP3, and MP4 devices (iPods), handheld devices for video games (e.g., Sony PSP, Nintendo DS), smaller notebooks (eg. Asus EEE), and other handheld / portable multimedia handheld and wireless devices (Alumni, 2010). In relation to the implementation of mobile learning it can be pointed out that it is more present in commercial organizations, rather than in a formal educational institutions. Mobile learning in an educational environment that is not only based on technological and pedagogical predispositions, but also on the organizational, cultural, financial and human resources that should be mobilized in the full implementation of mobile learning. For that reason, mobile learning development in the educational sector has been slower than in commercial companies, but it is not questionable.

- Bring Your own device (BYOD) - a version of mobile learning that is organized "from below" by students and teachers, and the administration of educational institutions generally do not resist it. Teaching is not running in the computer room with standard equipment, but wherever, and each participant brings its device (smartphone, tablet, or less often the laptop). Today, students during the teaching hours increasingly use mobile devices, and it should no longer be perceived as a disruption of teaching or their negligence, but on the contrary to take advantage of their possession of such devices (eg. students can involve in searching information on the Internet, and the "two way" and the group interaction so using the applications in classes is provided).In this way, participants adjust the way of life and work at school with those outside of it, acquire new skills for life. Possible disadvantages of the application of this concept could be seen in the unavailability of possessing gadgets of every participant, and that the same educational institutions do not have sufficient funds to purchase a mobile device for each individual student.
- "Immersion", games and virtual worlds - assumes the use of virtual worlds and simulations for learning. The most famous software in this area are Second Life, Habbo, There, IMVU, weeworld, Stardoll and Gaia. In this way we actually "teach all the senses," and so we enter the virtual worlds. Experiencing virtual worlds becomes so mediated twice, the first time through avatars - our virtual characters, and the other through the virtual world. For the purpose of effective use of the mentioned it is very important and maintaining a critical attitude.
- High tech of the future and neuroplasticizam - neuroplasticizam represents the lifelong ability of the brain to reorganize depending on one's experience. Recent studies have shown that our brain is not formed only in childhood, but we are able to create new nerve cells through whole life which is amazing insights that can have far-reaching consequences. Nowadays an experimental interface for communication of the brain and the computer without the limbs are developing (e.g., for people with difficult motor skills represents a fantastic advantage.

Limitations of this study could be seen in larger and faster coming changes, because media and tools become old, but on the other hand it opens space for future researches in order to catch up with time. In this sense, the author's future researches will go further.

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