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## LEARNING IN A VIRTUAL ENVIRONMENT

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**Abstract:** Many e-learning materials and learning management systems are implemented and used in higher education institutes. The learning materials assisting acquisition of knowledge can either be stand-alone or can be available through the network. In recent years, papers were published about the benefits of the involvement of computers and internet in education. One should also note that some say that although the use of modern technology has some potential effects, it is difficult to turn them into actual ones or to measure them. This paper attempts to give an overview of the most important concepts of e-learning (the virtual learning environment, the learning management system etc.), the main benefits, the disadvantages, the guidelines, rules (the heuristic evaluation instrument and protocol for e-learning programmes, the learning management evaluation tool user guide etc.) and standards that ought to be followed when creating such systems. University of Szeged is using Coospace as an e-learning system. Although Coospace has its limitations (for example it cannot record the student's progress in acquisition of the curriculum), it has become a popular and a widely used system at the university.

**Keywords:** virtual learning environment, e-learning, learning management system, Coospace

### 1. INTRODUCTION

The purpose of this publication is to give an overview of the most important concepts of e-learning, the main benefits, the disadvantages, the guidelines, rules and standards that ought to be followed when creating such systems.

We are living in a digital economy where information and communications technology (ICT) knowledge is essential for everybody to succeed in almost all areas. The European Commission places a great emphasis on the development of information society. To support the idea, several programmes were launched in the past few years: the Lisbon Strategy (2000), eEurope (2000), the i2010 initiative (2010) and the Digital Agenda for Europe (2010) etc. (Petákné 2013).

To get along in an information society, one has to possess all six forms of literacy (Budai 2009):

- ✓ Basic literacy is the ability to read and write which is absolutely necessary (for example to browse on the World Wide Web).
- ✓ Functional literacy is reading and writing skills that are necessary to manage daily living and employment tasks that require reading skills beyond a basic level.
- ✓ Workplace literacy is the required ability – including professional and communication knowledge – to perform workplace tasks.

- ✓ Technological or digital literacy is the ability to use ICT devices and software which enables the user to handle the infrastructure of the information society.
- ✓ Information literacy covers the skills to identify, evaluate and effectively use information.
- ✓ Adaptive literacy is the capability to keep track of technological innovations and take advantage of novelties.

New educational methods, techniques have emerged which use computers and networks extensively. Technologies seemed futuristic a decade ago like virtual and augmented reality (Cirulis, Brigmanis 2010) also start to infiltrate education. Just as many new methods and technological advancements, e-learning was overhyped at the beginning of its life-cycle. Many electronic learning materials were created along with their management systems in the different areas of education. In the past two decades, the methodology of implementing and evaluating such systems has also improved; guidelines were set up to ensure the success of this new type of learning. Several researches have been conducted to assess its effectiveness and somehow determine the advantages or disadvantages compared to traditional face-to-face education.

Today the question is not whether ICT should be used, but how it should be used. Higher educational institutions are investing in e-learning systems to support their traditional teaching and to improve the students' learning experiences and performance (Tarhini et al. 2013). There is a growing belief that the use of e-learning systems may lead to improvements in efficiency of education considering the number of enrolled students, students' achievements and costs (Castillo-Merino, Serradell-López 2014).

There are basically two types of teachers concerning e-learning: who focus on information transfer and those who focus on student learning (González 2012; Owens 2012). Other researchers identified four types of tutors (Bliuc et al. 2012):

- ✓ those who use the new technological possibilities for information transfer only,
- ✓ those who use it for clarifying concepts as well,
- ✓ those who exchange and develop ideas, too and
- ✓ those who use ICT the most extensively to explore, share and use it for collaborative knowledge-creation, for developing awareness and skills.

## 2. THE MAIN CONCEPTS OF E-LEARNING

E-learning is a new method to understand the learning process in which the basic elements remain the same as in traditional learning, but this is supplemented with the means and possibilities of ICT which modifies the knowledge exchange, the assimilation of knowledge and it also brings freedom to learn anywhere (Alecú et al. 2011). It includes several types of activities like courses, informal and indirect networking education, community integration, knowledge management and learning by doing (Alecú et al. 2011).

According to Dillenbourg (Dillenbourg 2000) a virtual learning environment is a designed information space which is not restricted to distance education; it is a social space which integrates multiple tools where the space is explicitly represented, it also overlaps physical environment where the students are not only active, but also actors.

One can speak of blended learning (or combined, mixed learning) when the traditional educational form is used and combined with the facilities provided by ICT (Alina-Mihaela et al. 2012).

Experience shows that blended learning is more effective than face-to-face teaching or using the e-learning method by itself (Hobackova, Semradova 2013). Suitable learning tools have to be created that complement each other (Castillo-Merino, Serradell-López 2014). These learning tools are called the Learning Management System (LMS). The LMS is essential to manage a virtual learning environment. The main task of this system is to identify, to record and to follow the students participating in the educational process and to connect the users (tutors, students and other administrative staff) to their respective courses according to their roles and competencies (Gaceu et al. 2009). Schoonenboom gives a detailed list of the tasks an LMS can be used for (Schoonenboom 2014):

- ✓ Hold fixed office hours for students;
- ✓ Answer questions of students in irregular time;
- ✓ Hold group meetings, discussion on a subject matter;
- ✓ Video conferencing;
- ✓ Probe students' knowledge during group meetings;
- ✓ Examine and comment on the students' acquired knowledge and skills based on evidence put together by the students;
- ✓ Provide self-test for students to practice;
- ✓ Administer examinations;
- ✓ Provide tutor feedback for students after exams;
- ✓ Make references for further reading;
- ✓ Peer feedback; comment on and judge each other works;
- ✓ Write blogs or tell about experiences during the course;
- ✓ Make (PowerPoint) presentations available;
- ✓ Make references available to video presentations with further information;
- ✓ Record own lectures, instructional videos and make them available;

To choose and then operate a proper system, adequate infrastructure (computers with multimedia capabilities and high bandwidth internet) are required on the technical side. Aspects as technical flexibility (hardware and software requirements and support, licence costs, authentication), learning tools (materials, social network capabilities, student tracking and

evaluating) and usability (user interface, ready templates, followed standards, supported languages) are the main factors of the evaluation during the selection of the system (Herdon, Lengyel 2008).

The first step of the implementation of LMS is technology acceptance. It is difficult to implement any e-learning without the acceptance of the new ICT. The second step is innovation which is required as new technology is combined with learning techniques to create good quality e-learning materials. The third step is called inductive learning. While traditional courses are most often taught deductively where under-motivated students apply the learnt material to real-world scenarios, inductive learning techniques require the active participation of the students: for example they offer motivation through the challenge of completing a project, interpreting data or solving a case. The fourth step is the enhanced online classroom where the students are encouraged to solve complex problems with inventing their own solution instead of the tutors' detailed step-by-step procedures (Forrer et al. 2014). So, LMS offers various tools to assist work in a virtual learning environment. According to research these systems are mainly used for distributing materials, less frequently for communication between course participants and even less frequently for online assessment or collaborative learning (Schoonenboom 2014).

On the personal side, key competencies are also required to participate in e-learning course. Students (and tutors as well) must possess competencies like: digital skills, self-motivation, self-driven learning capacity, good communication skills, knowledge of foreign languages, cultural awareness etc. (Muresan, Gogu 2013).

### 3. THE DISADVANTAGES, BENEFITS AND SUCCESS FACTORS

According to experts it is highly probable and desirable that the use of ICT in e-learning will change educational theories and methodologies and people developing e-learning material will have to acquire new skills to achieve success in creating e-learning material (Aharony, Bronsein 2010). It is also highly probable and also desirable that social technologies will improve e-learning experiences

since these create the atmosphere of cooperation and provide easy interaction among the students and tutors. Mobile technologies may also contribute to this experience (Aharony, Bronsein 2010).

It should be clear that modern technology is not a panacea, as – for example – the summarizing paper of Workshop on Virtual Learning Environment (Dillenbourg 2000) states: It has some potential effects, although it is difficult to turn it to actual ones, or at least to measure the positive effects. So, there is hardly any scientific proof of the superiority of the modern technologies.

There may be major challenges for implementing an e-learning material, including the lack of advanced computer skills among the academic staff, little awareness on instructional design techniques, time constraints and security concerns as well. Other disadvantages are that access to computers, smartphones, tablets and computer network is necessary on the students' part (Dissanayeke, Wickramasuriya 2010) (Alecú et al. 2011)

One should also note that there are studies concluding that online students perform worse than students attending face-to-face classes. There are studies that say that the difference between the two groups of students is not significant. There are also studies that show that the use of digital tools with the appropriate teaching method has a significant positive effect on students' achievements (Castillo-Merino, Serradell-López 2014). Studies show evidence of positive effects on students' performance from the adaptation of ICT innovations in teaching and learning (Castillo-Merino, Serradell-López 2014).

Despite the controversial results, in recent years papers were published about the benefits of the involvement of computers and the internet in education (Sideridis et al., 2010). According to publications multimedia materials can enhance enjoyment and engagement of learning which enables users to pay attention for a long time without feeling bored (Dissanayeke, Wickramasuriya 2010). E-learning systems are considered to be successful if they can replicate the classroom experience and consider students' needs. Students will use the system when they think that using the e-learning system will improve their

quality of life by saving time, money and effort (Tarhini et al. 2013). Based on the study of Alecu et al. (2011), the benefits of e-learning systems are:

- ✓ It is less stressful than the traditional type of learning;
- ✓ Increased collaboration and interactivity among students;
- ✓ Allows self-phased learning;
- ✓ Modular information architecture which allows progressive learning;
- ✓ Students can be easily monitored during their learning process and the tutor can intervene if necessary;
- ✓ Tutors and students do not need to be at the same place, this is more convenient and also reduces costs;
- ✓ Spreading and updating the curriculum on the network makes it easy for students to access the latest materials

To measure the acceptance of these systems, the technological acceptance model can be used (Tarhini et al. 2013), which models how users accept and use a technology. According to the model perceived usefulness ("the degree to which a person believes that using a particular system would enhance his or her job performance") and perceived ease-of-use ("the degree to which a person believes that using a particular system would be free from effort") (Davis 1989).

#### 4. GUIDELINES TO DEVELOP A VIRTUAL LEARNING ENVIRONMENT

To find and use good quality resources to build an e-curriculum is fundamental. Finding out how to employ these resources is still evolving (Littlejohn et al. 2006). According to literature (Collis, Strijker 2004) the resources can be:

- ✓ Pure: Unedited, most commonly used materials (articles, book chapters, PowerPoint slides, animations etc.);
- ✓ Pure, combined: unedited resources combined with other resources (unedited materials with on-line or face-to-face discussion, or essay);
- ✓ Adapted: adapted, repurposed resources to fit teaching contexts;
- ✓ Dynamic: electronically assembled and structured and allows interaction and contribution (materials which can be edited and commented by students)

The usability of resources is determined by many features including durability, maintainability, availability at an appropriate cost and size, in a proper accessible format without legal restrictions that can be repurposed and reused (Littlejohn et al. 2006). When creating the learning materials and their learning environment, the learning management system, it is suggested to follow some rules or standards which may more likely lead to success. The range of different technology should be carefully selected by weighing several factors (Gaceu et al. 2010).

Implementing a successful e-learning environment requires high integration, availability, security, scalability and reliability which have to be provided in the whole life-cycle of the system. To describe this, the steps of software development life-cycle can be used: (1) program planning, (2) requirement definition, (3) design and development, (4) integration and testing, (5) installation and maintenance (Paulins 2010).

Since we are talking about software, ISO 9126 standard assuring software quality (functionality, reliability, usability, efficiency, maintainability and portability) can be taken into consideration (Al-Qutaish, 2009).

Computer systems have been evaluated for a long time based on ergonomics and ease-of-use, i.e. usability (Hornbaek 2006).

- ✓ UseLearn method is one of the methods to evaluate e-learning systems. It is a comprehensive checklist containing quality and usability evaluation perspectives. The UseLearn is a quantitative assessment model consists of dimensions like error prevention, visibility, flexibility, course management, interactivity, feedback and help, accessibility, consistency and functionality, assessment strategy, memorability, completeness, aesthetics and reducing redundancy each dimensions contain many checklist questions the persons evaluating the system have to answer (Oztekin et al. 2010).

Other useful tools and criteria are also available to maintain the quality of e-learning programmes, including:

- ✓ the Heuristic Evaluation Instrument and Protocol for E-learning Programs (Benson et al. 2001): This instrument lists twenty evaluation

factors and each of them can be assessed by answering specific questions. The factors are: the visibility of system status; match between system and the real world; user control and freedom; consistency and standards; error prevention; recognition vs. recall; flexibility and efficiency of use; aesthetics and minimalist design; help of users to recognise, diagnose and recover from errors; help and documentation; interactivity; message design; learning design; assessment opportunities; media integration; access to resources necessary to effective learning; access to performance support tools; learning management to monitor students' progress; feedback capabilities; content organization;

- ✓ the LMS Evaluation Tool User Guide (3waynet 2004) lists thirteen viewpoints to evaluate the e-learning management system: cost of ownership; maintainability; usability; vendor profile; openness; compliance with standards; integration capacity; Learning Object Metadata integration; reliability and effectiveness; scalability; security; hardware and software specifications; multilingual support.

## 5. COOSPACE

About eight years ago an administration system for teachers and students was introduced at all the faculties of University of Szeged which was later expanded with a system named Coospace (Cooperation Space). This e-learning framework operates as the biggest virtual collaboration space for students and tutors in Hungarian higher education. Coospace is used as a LMS and social media – an Internet-based application built on the foundations of Web2.0 that allow the creation and exchange of user generated content (Kaplan, Haenlein 2010) – mainly to

- ✓ store and distribute curriculum in different formats including plain to formatted text, video and audio files;
- ✓ provide one-way tutor-student communication with a billboard, tutor-student, tutor-tutor and student-student communication with forums, e-mail, questionnaire, voting and a text messaging system;
- ✓ manage attendance sheet of face-to-face and virtual classes;

✓ knowledge verification with exercises and tests; Although Coospace has its limitations (for example it cannot record the student's progress in acquisition of the curriculum), and student-tutor, student-student communication is not yet as extensively used as it could be, it became a popular and widely used system at the university.

## 6. CONCLUSION

We should take advantage of ICT and the opportunities offered by the new teaching methods utilizing e-learning techniques. To use e-learning effectively at the University of Szeged, the following things have to be taken into consideration:

- ✓ The network system and the servers are mostly up to date, but the workstations of the academic staff have to be modernized to be able to create e-learning content.
- ✓ Tutors should be motivated to digitize their materials and they should be enabled to use the LMS services more extensively.
- ✓ The LMS and the e-learning materials should be evaluated. There are several methods to do this. This can be even done by involving the students; Coospace has services which can be used to achieve this goal.
- ✓ Students have to be persuaded to use the social media services of Coospace. They can discuss the subjects, exchange ideas or cooperate while solving a task.
- ✓ Further development of the University LMS is necessary. It should be capable to follow students' progress of knowledge acquisition.

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