Factors regarding teachers' competence which influence the acceptance and use of e-learning technologies in higher education

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Abstract. Implementing the e-learning technologies into the teaching process by higher education teachers is one of the primary strategic goals at many higher education institutions. Numerous studies have indicated the problem of teachers' slow acceptance of e-learning technologies in higher education, as well as the manner in which the technologies are used. The latter depends on the teachers' competencies for online learning and teaching, and they can be viewed from different aspects (pedagogical, technical, organizational, etc.). The aim of this paper, based on the results of earlier studies, is to show the factors regarding teachers' competence for learning and teaching in an online environment, which influence the acceptance and use of e-learning technologies in higher education.

Keywords: teachers' competence, acceptance of e-learning technologies, higher education

1 Introduction

Due to the complexity of the application of e-learning technologies, their implementation at numerous higher education institutions has certain stages. This implementation can be considered from technical, organizational and pedagogical aspect.

The aim of introducing e-learning technology into the higher education system is to improve certain education processes for reaching better results and satisfaction among students, as well as making them more competitive on the job market.

The efficacy of the e-learning can be made by promoting and implementing the mechanisms for controlling the e-learning quality [3].

The quality of e-learning includes the whole process, from planning and analysis of the educational content, designing the digital material, to its delivery.

The framework of the educational quality control so far was focused on the relation between teacher's competence on one side, and grades and student's satisfaction on the other side. During that process the educational environment was of no importance [3].

The introduction of the e-learning technology into the educational process changes the role of the teacher and his or her responsibility for the quality of the educational process. Modelling of the online educational environment is one of the aspects for the e-learning quality assessment. The higher education teacher becomes a part of the team for carrying out the e-learning educational process, and which involves different number of members – experts in various fields. The number of members depends on the institutional educational context, and can involve a teacher – expert in the field, an instructional designer and an IT expert.

Since the development of e-learning is closely connected with its educational context, there are numerous models for e-learning quality assessment, on the institutional, regional and international level.

Ensuring the quality can be seen as a dynamic, iterative and continuous process [3].

For coordination of the e-learning quality models on the international level, the ISO/IEC 19796-1:2005 standard was developed as a general modela and the first step towards coordinating the frameworks for the e-learning quality. The model involves a referential e-learning quality framework, it gives general guidelines for coordinating the existing models according to the common e-learning quality model. The improvement of this standard is defined in the ISO/IEC 19796-2 standard, and the description of the methods and the metrics required for the implementation of the quality control and the system for ensuring the quality are offered in the ISO/IEC 19796-3 standard,

called 3rd part – referential methods and metrics [1].

The European higher education system has the aim of promoting the quality of education, and the value of introducing the e-learning technologies in the educational process, as a step towards the information society, has been acknowledged. On the other hand, the need to improve the quality of e-learning has also been recognized.

As a part of the European Quality Observatory (EQO) project, based on the numerous researches, the general guidelines have been reached as recommendations for ensuring and developing the e-learning quality at the European higher education institutions [20].

At such institutions, teachers are also involved in scientific research which serves as the basis for their advancements.

Numerous authors emphasize the importance of integrating the use of e-learning technologies into the teachers' advancement system, as one of the key methods to motivate staff to introduce innovations.

In general terms, the quality of lessons in the educational process depends on the teachers' competencies and their motivation for the enhancement of the lesson.

In the models for ensuring the e-learning quality, the importance of strategic approach to developing the competences of the academic staff has been emphasized, in terms of continuous professional advancement.

The teacher's competencies are the key factors for the successful implementation of e-learning at the higher education institution.

In Europe, the most common type of lessons in higher education is hybrid model and learning management system (LMS) with integrated different synchronous and asynchronous e-learning technologies. LMS enables us to create the content using the principles of instructional design, deliver the content to the students, communicate and collaborate, monitor and conduct the learning process and perform administrative tasks.

Furthermore, the increasing number of teachers have lately been introducing the web 2.0 technology, creating new virtual learning environments and implementing the new technology in the existing e-learning system.

2 Competence of the higher education teacher for working with e-learning technology in the blended learning environment

Blended learning (hybrid learning, mixed mode) is the type of education process which combines activities involving e-learning technologies with the traditional, face-to-face type of education (f2f). The environment for hybrid learning consists of four equally important components: tutor/teacher, student, pedagogy, technology (Fig 1) [14]. This kind of learning involves lesson materials presented 30% - 79% in an online format, with an online discussions as the typical activity [4].

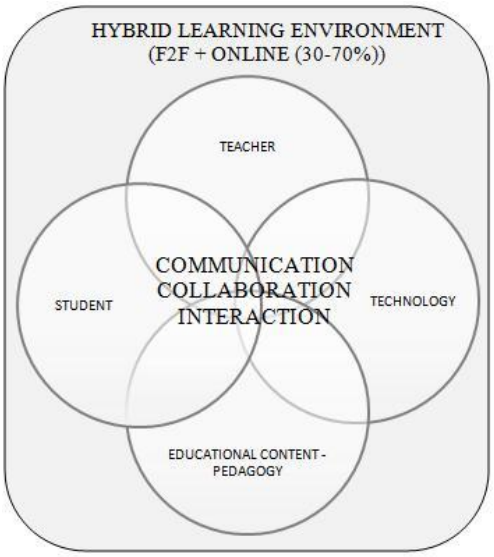

Figure 1: Components of the hybrid learning environment (modified according to [14])

By combining the various e-learning technologies with the elements of the traditional education, different hybrid models are formed for different educational environments, on the basis of students' needs and their learning styles. The models' aim is the successful acquisition of the lesson content. The process of evaluating and creating e-learning technology has to be based on the foundations of the theoretical aspect of learning [11].

Designing e-learning technologies presents a challenge even for creators of software.

2.1 Computer literacy

Successful use of e-learning technologies requires certain knowledge and skills, i.e. certain level of computer literacy. Regarding the needs of the particular educational scenario, the teacher will possess different level of computer literacy.

Hughes [15] defines computer literacy as the ability to use hardware and software for specific tasks and it includes knowledge and skills from different aspects (Fig 2): rational expectations from hardware and software, ability to upgrade software, working with files, identifying the problem and seeking assistance, the problem of security, understanding the ethical standards and copyright issues.

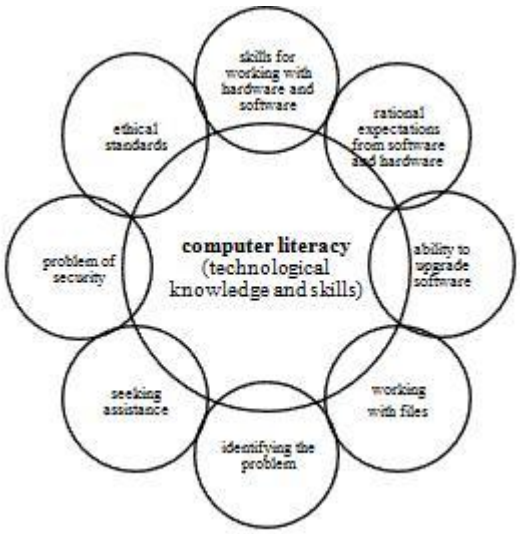

Figure 2: Computer literacy: knowledge and skills from different aspects

Higher education teacher is also a researcher, which means that he or she possesses information literacy skills. To use ICT for searching and dispersing information, teachers need to have additional skills and knowledge.

Koltay [18] points out the importance of communication aspect of the information literacy. Communication can be achieved through textual, graphic, audio, video or multimedia messages. Numerous authors define new types of literacy, with special emphasis on media and visual literacy.

The latter refers to the ability to communicate through visual elements, pictures, which involves understanding the meaning of visual messages [7].

2.2 Pedagogical competence

In general, the basic stages of teaching in higher education are [12]: analysis of the environment and students' needs, pedagogical creation of the lessons, realization of the educational programme and monitoring and assessing the students.

Introducing e-learning technologies into the educational process presents new tasks for teachers, such as [12]:

- analysis and selection of the virtual learning environment based on the needs of the target group of students,
- creating the digital educational content,
- carrying out the online lessons with the selected e-learning technologies,
- using different communication tools, keeping track of students' cooperation and analyzing it,
- creating tests for formative and summative assessment of knowledge using e-learning technologies,
- analyzing the information regarding evaluation of students acquired through the appropriate online tools.

Educational plan and programme is set by predetermined learning outcomes and is therefore not flexible. However, educational activities and content can be organized variably using different teaching theories [11].

Pedagogical, didactical and, in the narrow sense, methodical knowledge have all grown in importance in higher education with the introduction of e-learning technologies.

For combining the components in the hybrid learning model, the teacher can use different models of instructional design or seek help from an instructional designer who possesses the knowledge of didactics, methodology but also the technological knowledge.

Salmon [22] singles out cooperation as the key feature of online teaching, where the learning aspect is directed towards the student, and the teacher becomes moderator/coordinator of the communication. The latter has the task to enable productive and purposeful collaboration, as well as develop the skills to work, interact, moderate and tutor online for various purposes and on different levels.

The aim of this cooperation is to give support to acknowledging and being informed about the activities of others, but it also emphasizes the

transparency as the factor which improves the e-learning quality [11].

Dalsgaard et al. [10] stress the following favorable effects of the transparency (actions familiar to students and teachers) on the e-learning quality: preventive quality improvement, constructive quality improvement and reactive quality improvement.

The design of the educational process affects the quality of learning [5], and the choice of technologies in the virtual learning environment depends on the selected educational theory.

The traditional educational theories are: behaviorism, cognitivism and constructivism. In online education, the Piaget's constructivism is of the highest importance, but Laurillard [19] also mentions the following theories: Dewey's inquiry-based education, Vygotsky's social constructivism, Bruner's discovery learning, Pask's conversation theory, Schank's problem-based learning, Marton's deep learning and Lave's socio-cultural learning. In addition, he also points out the importance of perceiving the online education as active learning.

Siemens [23] developed a new educational theory, connectivism, which integrates the principles of chaos, networks (people, technology, learning community), complexity and self-organization, and it is considered "an educational theory for the digital age".

Although connectivism was based on the limitations of traditional education paradigms, numerous authors stress the importance of using these traditional paradigms in combination with connectivism; they are also considering the advantages of the paradigm application with regard to the requirements of the educational environment.

Teachers involved in higher education need to be familiar with various learning approaches so they can choose the most appropriate teaching strategies to "motivate students, simplify the cognitive process, help develop students' character, take into consideration personal differences, encourage sensible learning and interaction, offer feedback, make learning in the environment easier and offer support during the learning process" [5].

For the hybrid learning process to be successful, the higher education teacher needs to have certain competencies. Regarding different designs of the hybrid learning model, i.e. different technologies that are used, numerous authors have grouped teachers' competences in various ways.

Salmon [22], [6] generalizes these key competencies: understanding of online process, technical skills, online communication skills, content expertise, personal characteristics, and points out specific qualities of an "online teacher": confidence, constructiveness, orientation towards development, support/encouragement, ability to exchange knowledge and creativity.

3 Factors relating to teachers' competences which influence the acceptance of e-learning technologies

The quality of education and students' satisfaction are closely connected to teachers' competencies and their motivation to enhance their lessons. In higher education, teachers have "academic freedom" while designing educational process.

However, higher education institutions are afflicted by social, economic and political changes in the global environment, and therefore, the need has occurred to alter the way of designing the educational process.

The teachers who are more inclined towards the approaches of constructivism accept e-learning technologies more readily, and the changes in teachers' beliefs and attitudes bring about the changes in their plans and programmes [8].

Information literacy is the important factor related to the teachers' competences, which influence the acceptance of technology. The development of computer literacy is closely connected to the computer anxiety, which refers to the lack of computer skills.

Research results have shown that the computer anxiety can be the mediator between the factors of perceived ease of using e-learning and its actual use. Bearing in mind that numerous research results about the factors influencing the acceptance of e-learning technologies by the higher education teachers state two crucial factors, ease of use and expected utility [13], [24], the anxiety plays the key role in the process of accepting the e-learning technologies.

The teacher's conviction of self-efficacy reduces the anxiety [25].

Acquisition of new technology requires the change in the attitude towards technology and a carefully chosen educational method [9].

E-moderating is one of the key teachers' competencies which influences the success of online education, and the success of e-moderating is affected by the following factors [22]:

- number of participants in the "online classroom",
- time required for the education,
- complexity of different scenarios in asynchronous communication,
- professional online communities.
- the mentioned factors are closely connected to the institution's policies and strategies.

The research results have shown that teachers stress the importance of support from colleagues and professional help to overcome the lack of time and knowledge of pedagogy and technology, as well as the lack of encouragement from the institution, which is a factor in extrinsic motivation [17].

Organizational culture has a great influence on the use of e-learning technologies, as well as traditional education and teacher's "academic freedom", which is an important factor in the use of e-learning technologies [16].

The results have also shown that the majority of teachers find the e-learning technologies too challenging [17].

Praxis and the results have illustrated that teachers, after they had acquired the knowledge of technology, use it in different ways.

The minority use technology according to the principles of instructional design, the small number use it for communication and collaboration, and the majority of teachers use the technology for presenting the educational content in the form of PowerPoint presentations, pdf files, etc.

Teachers use e-learning technologies mostly for administration, and less for pedagogical purposes [17].

Therefore, teachers can be divided into groups according to the level of technology use. The research shows there is a difference in teachers' competencies, depending on the group they belong to. The teachers who use technology following the rules of instructional design, transform their way of teaching, and the factor of pedagogical competence is related to the formal education and teacher's experience; the more experienced teachers often use instructional design [21], [6].

The teacher's attitude towards the e-learning technology and the support from the institution do not affect the level of technology use [21].

4 Conclusion

The development of the "knowledge society" is connected with the quality of higher education, which is one of the priorities of Bologna declaration.

In general, the quality of education depends on the teachers' competences and motivation to enhance the educational process. One way to improve the quality of education is to introduce e-learning technologies. Because of the way the educational process is being carried out, the optimal learning model is the hybrid learning model.

To model the educational process using e-learning technologies is very complex and technological and pedagogical (didactic and methodical) skills are required.

Numerous higher education institutions help the teachers in their professional development in terms of lifelong education. Higher education institutions are working hard to implement e-learning and the results show that the teachers are the ones responsible for the delay of the implementation.

In Croatia, we can single out the example of the E-learning Academy (CARnet), founded in collaboration with the The University of British Columbia from Canada, which offers three year-long programmes: E-learning Management, E-learning Tutoring and E-learning Course Design [2].

By creating the critical mass of experts in the field of e-learning, the base for the further development of e-education on the institutional, regional and international level has been set in Croatia.

It is interesting that the results show that the process of accepting the e-learning technologies is related to the support from the institution, while the level of the technology is not.

Despite the numerous studies done in the field, there is still the need to analyze the factors influencing the acceptance of e-learning technologies by higher education teachers in different contexts. The reasons for that are different ways the educational process is modelled in different educational contexts.

This paper contributes to the theoretical part of the research which studies the factors

influencing the development of the teachers' competencies for the use of e-learning technologies in the educational process.

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