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# TRANSFORMATION OF ORGANIZATIONAL CULTURE IN HIGHER EDUCATION OF SERBIA IN TERMS OF SMART LEARNING ENVIRONMENT

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## *Abstract:*

*Learning and education in higher education in the conditions of the Fourth Industrial Revolution (Industry 4.0) are experiencing rapid transformation. New technologies, first of all the Internet of Things (IoT), Big Data technology, Virtual and Augmentative reality (VR and AR) and Artificial Intelligence are creating the conditions for radical changes in the learning and education landscape and boost the transition towards the next paradigm of learning and education, presented by smart learning environment. These technologies not only accelerate, facilitate and intensify the learning and education process, but also transform the learning and education process, penetrating the essence of the relationship between the teaching staff and the students and have a far-reaching impact on the role of teachers and the overall organizational culture in higher education institutions. The paper explains the concept, division and dynamics of organizational culture in*

*higher education in Serbia, analyses the smart learning environment, compares the advantages and challenges in relation to e-learning and explains the possible model of smart learning environment from the aspect of interaction with organizational culture at universities. The aim of this paper is to determine the opportunities, challenges and perspectives of a smart learning environment and its impact on organizational culture in higher education institutions.*

**Keywords:** *Organizational culture, smart learning environment, higher education institutions, Industry 4.0, smart organizational culture, Serbia.*

## **1. INTRODUCTION: THE NOTION, CHARACTERISTICS AND SIGNIFICANCE OF THE ORGANIZATIONAL CULTURE CONCEPT**

The concept of organizational culture is one of the most complex concepts we are dealing with, when talking about managing an organization. There is a wide range of different attitudes and definitions of organizational culture. Simply put, the organizational culture is the culture that can be found in an organization, which is consisted of all its employees. In other words, by organizational culture we mean the common spirit and way of thinking of the members of an organization. This is what makes the essence of an organization's uniqueness and how one organization differs from others. Understood in this way, this term is not entirely new, as Henri Fayol, one of the founders of the science of management and organization, also used the term "spirit of organization".

The concept of organizational culture originated in the late 1970s, more precisely the first paper on organizational culture was published in

1979, and it is an article by Andrew Pettigrew, published in *Administrative Science Quarterly*, entitled “On Studying Organizational Cultures” (Pettigrew 1979). Pettigrew took the concept of organizational culture from anthropology and adapted it to organizational science and management.

According to the comprehensive definition of Stephen P. Robbins and Mary K. Coulter, the organizational culture is “a system of shared meaning and beliefs held by organizational members that determines, in large degree, how they act toward each other and outsiders” (Robbins & Coulter 2005, 8).

Živka Pržulj uses the terms corporate culture, organizational culture and company culture equally, considering them as synonyms. She also points to the abundance of definitions of organizational culture and believes that all these definitions can be divided into two general groups, with cognitive components or dimensions in one group of definitions and symbolic ones in others (Pržulj 2000, 14).

Cognitive components include assumptions, values, norms of behavior, attitudes, beliefs and other elements that make up the content of the so-called collective spirit or mind of the organization. Unlike cognitive elements, which are relatively difficult to notice and measure, symbolic elements imply the content of organizational culture that can be perceived, measured and interpreted. These include patterns of behavior or practice, various ceremonies or rituals, certain rules and directions, language and its derivatives, such as narratives, metaphores, myths, symbols and artefacts (Janićijević 2013, 33).

Pointing to the problem of heterogeneity in defining the term organizational culture, Nebojša Janićijević says, “The problem is that the lack of a unique definition of organizational culture actually speaks of the absence of consensus on its essence and content” (Janićijević 2013, 28). Recognizing the great contribution of this author to the affirmation of the concept of organizational culture in theory and practice, we will use his definition, which he devised based on his exhaustive analysis of numerous literature, as well as

on his own research. Thus, under the term organizational culture, Janićijević means “a system of assumptions, values, norms and attitudes manifested through symbols, which members of one organization developed and adopted through their common experience and which helps them determine the meaning of the world surrounding them and how to behave in it.” (Janićijević 2013, 35).

As can be concluded, Janićijević equally respects the two main dimensions that together make up organizational culture – both cognitive and symbolic, and therefore his view is balanced and synthetic. N. Janićijević gave his model of organizational culture, which has three key elements: origin, content and effects (Janićijević 2013, 36). Factors that lead to the creation of organizational culture in the proposed model are national culture, leadership and the sector in which the organization operates. The effects of organizational culture show in the behavior of members of the organization, in the form of decision-making, actions or interactions, and such types of behavior manifest in the area of organization and management, where organizational culture affects strategy, control, motivation, performance assessment, leadership, knowledge management, power, organizational change, etc.

## **2. THE ORGANIZATIONAL CULTURE PROPERTIES IN HIGHER EDUCATION INSTITUTIONS IN SERBIA**

The higher education institutions (hereinafter: HEIs), as the basic organizational form within the higher education sector, are special and specific organizations. The higher education in Serbia is regulated by the Law on Higher Education (Law on Higher Education 2020). According to the law, the goals of higher education are the following, a) transfer of scientific-

ic, artistic and professional knowledge and skills; b) development of science and promotion of artistic creativity; c) providing scientific, artistic and professional youth; d) education of the creative population that continuously adopts and creates new knowledge; e) providing equal conditions for the acquisition of higher education and lifelong learning; f) a significant increase in the number of people with higher education; g) promoting the international openness of the higher education system. The law defines the following institutions as the basic subjects of higher education: university; faculty; faculty, i.e. art academy within the university; academy of vocational studies; college and higher school of vocational studies.

Higher education is a service industry, and HEIs mainly provide services of education, training, professional development, but also other kind of services, such as consulting, agency and support services. In addition, HEIs can perform tasks in the field of publishing.

The transitional changes that followed the change of government and the establishment of a new government structure that has taken a clear and pro-democratic and neoliberal course since 2001 on the path of profound reforms in Serbia's faltering economy and society have also affected the education sector. The turning point was in 2003, when the Republic of Serbia, then part of Serbia and Montenegro, in September of the same year, signed the Bologna Declaration and officially accepted the Bologna Process. However, only with the adoption of the new Law on Education in 2005, the complete transition to the new higher education system has started, harmonized with the Bologna Process and Serbia's pro-European political program at the state level. With the implementation of the Bologna Process in the system of higher education in Serbia, which followed the changes in the countries of the European Union due to its commitment to the EU accession process, the entire system of higher education has undergone transformation. These radical changes have also affected the organizational culture of the higher education institutions.

The essence of the inclusion of Serbian higher education in the Bologna process is the harmonization and standardization of the educational process within the creation of a united European educational space, marked as the European area of education and science. In fact, entering the Bologna Process, higher education in Serbia left the previous education system and accepted a new, three-cycle system of study (basic academic studies, master's academic studies and doctoral academic studies). Serbian higher education also accepted new way of evaluating students' commitment and success based on European scoring system (ECTS - European Credit Transfer System) and structuring student obligations into pre-examination and examination obligations.

The Bologna process was supposed to contribute to achieving greater mobility of students and teachers, more efficient studying during the semester, better coordination between educational and scientific-research work and higher general quality of education. According to O. Gajić, M. Andevski and B. Lungulov: "The goal of Europe is to form a society based on knowledge and education, which means that ensuring the quality of higher education, but also scientific work is essential. This question has so far been mainly on the margins of theoretical studies, empirical research and practical achievements. In essence, the quality of higher education is determined by the quality of the study program (curriculum), the quality of the teaching-scientific process, the quality of learning outcomes or the competence acquired by staff who complete study programs" (Gajić et al. 2009).

Organizational culture in higher education includes some special features and characteristics that business organizations do not have. Thus, the organizational culture in higher education includes both teaching and non-teaching staff (employees in the faculty administration, security guards, cleaners, temporary employees, etc.). The clients or consumers are students and other parties interested in transferring knowledge and skills, which is highly complex and involves a number of other components. Teaching staff

should be responsible and dedicated, teachers should possess special qualities and abilities as individuals, they should be exemplary and with a high awareness of ethics and true values. In addition to knowledge, skills and abilities, to students and other interested parties they should deliver “certain values, beliefs and norms of behavior, which are characteristic of the academic environment, future profession and active role in society, to lay the foundations of their professional culture, as well as to influence students’ personal development and readiness for lifelong learning” (Nastasić 2016, 45).

According to Leonard Salai (Salai, 2005, p. 55), the typical organizational culture of our HEIs is a combination of several types of organizational culture (according to Handy’s categorization, see: Handy 1979). Three types of organizational culture are the most recognizable among them: the role culture, culture of existence and culture of power, considering that the general pattern of organizational culture in our country does not exist.

HEIs are primarily educational organizations, but alongside teaching, they are also engaged in scientific research, and also act as business organizations because they perform their activities and services in the education market, where they place and sell their services, competing with other, competing HEIs, aiming to attract as many students and other interested parties as possible and gain their loyalty. Hence, their specificity is that they incorporate three different activities: teaching, scientific research activities and business activities. Especially in higher education, the focus is on the quality of teaching. In that sense, the literature talks about the culture of quality in higher education, as an integral part of organizational culture.

The Strategy for the Development of Education in Serbia until 2020, adopted in November 2012, pointed out that the existing education system in Serbia has a number of weaknesses, and concluded, “There is a significant opposition between short-term economic interests on the one hand and the development mission of education on the other. The tensions that characterise this opposition are one of the biggest obstacles to the further valid

development of the education system” (The Strategy for the Development of Education in Serbia, 2012).

These tensions stem from the fundamental opposition between short-term economic interests (desire for profit and market conquest, above all) and the mission of education, which should be the development of knowledge, skills, education, training and preparing the population for employment in various sectors and branches of economy and society, are also reflected in the organizational culture of the HEI. Thus, the HEIs profile themselves not only as educational organizations, but also as business organizations, whose interests are not only in the sphere of public good, but also in the sphere of purely economic, commercial issues. The organizational culture of HEIs is increasingly taking on the spirit of that dialectical hostility of goals and interests, which is expressed through fiercer competition and development of a competitive climate among engaged and employed teachers, who struggle to maintain their position within the HEI organizational structure, for the benefit of their own professional and scientific advancement within the community of teachers within the HEI. In that way, the organizational culture of HEIs is significantly influenced by the radical changes brought by Bologna process.

Writing about what an organizational culture should be, I stressed the need to build a supportive organizational culture: “Organizational culture should be such as to enable and stimulate communal spirit and teamwork, in order to encourage open, direct communication, creation and exchange of information and knowledge among employees in organization. Such an organizational culture can be called a supportive organizational culture”. (Radun 2008, 269). Under the influence of more and more comprehensive and intensive use of ICT (information and telecommunication technologies) in education, especially in higher education, e-learning is introduced, in different levels, phases and modalities, which results in the educational process changes, modifications of the attitude of teaching staff and transformed organizational structure and culture.

### **3. CHANGES IN HIGHER EDUCATION UNDER THE INFLUENCE OF DIGITALIZATION AND TECHNOLOGIES OF THE FOURTH INDUSTRIAL REVOLUTION**

Digitization, understood as a universal digital transformation of the economy and society, supported and empowered by new technologies within the waves of the Fourth Industrial Revolution (alternatively: Industry 4.0) is radically changing education as well. This digital transformation has especially affected higher education, which should be the source, incubator and generator of new, young, scientifically qualified and professionally trained staff for current and upcoming jobs that the new technological breakthroughs of the Fourth Industrial Revolution will enable in the near future.

According to the World Economic Forum's Annual Global Risk Report, published in 2017, 12 key Industry 4.0 technologies are listed: 3D printing; advanced materials and nanomaterials; AI (Artificial Intelligence) and robotics; biotechnology; energy sources, storage and transmission; blockchain technology; geoengineering; Internet of Things; neurotechnology; new computer technologies; space technologies; Virtual Reality and Augmentative Reality" (World Economic Forum 2017).

The Strategy of Higher Education until 2020 (Strategy, 2012) sets out two key concepts, which represent the goal and focus of higher education in the age of digital transformation. These are: a) the concept "student in focus" and b) the concept of lifelong learning. The Strategy emphasizes the application of technologies in education and in that sense it suggests: "7) to introduce new methods and information technologies in the implementation of existing and development of new study programs, and to support HEIs in modernization, procurement and implementation of state-of-the-art software and hardware; 8) to support greater use of e-learning methodology

and technologies as a supplement to traditional learning, through the development of study programs that are conducted in parallel (in classical form and as distance learning) and study programs that are implemented only as distance learning and to harmonize quality standards for distance learning studies with the practice in the world and the EU, especially taking into account the standard that defines the workload of teachers” (Strategy, 2012).

Today, the organizational culture of HEIs in Serbia and in the world faces many demands and pressures imposed by the strategic need for inclusion in the unified European space of education, as well as modern scientific and technological trends. Among these demands and pressures, the following ones stand out: greater mobility of teachers and students, faster circulation of knowledge and skills within the educational and scientific-research process in higher education, faster and wider application of new knowledge, innovations and various methods of improving and advancing teaching and research, greater openness to change, constant growth of demands and pressure on teachers and students for self-improvement, a requirement for teachers to be ready to quickly and efficiently move from one subject to another, as well as requirements for knowledge and skills in the field of ICT technology, i.e. training to work on computers, the Internet and various software and applications that indicate the requirement for information and digital literacy and competencies.

The new technologies that the process of digital transformation bring with it penetrate to the core of the educational process and change the role of teachers and students, as the basic subjects of higher education. According to the UNESCO ICT Competency Framework for Teachers, “the successful integration of ICT into the classroom will depend on the ability of teachers to structure the learning environment in non-traditional ways, to merge new technology with new pedagogy, to develop socially active classrooms, encouraging cooperative interaction, collaborative learning, and group work.” Then, “the key skills of the future will include the ability to develop inno-

vative ways of using technology to enhance the learning environment, and to encourage technology literacy, knowledge deepening and knowledge creation.” (UNESCO, 2008, p. 9).

The *demand for digital literacy and digital competence* (i.e. competencies) has become a necessary precondition for the acquisition of new knowledge, skills and competencies required by the digital economy in the age of overall digitalization of society. It is also an integral part of the new, reformed portfolio of knowledge, abilities and skills of the teaching staff engaged in higher education. The digital literacy and digital competence, as demonstrated by Maria Spante et al. (Spante et al. 2018) in their comprehensive research of literature and public policies, somewhere appear as synonyms, they are not clearly conceptually differentiated and are often confused. Digital literacy is at the heart of the EU’s digital strategy.

In the document entitled “Recommendation of the European Parliament and of the Council on key competences for lifelong learning” published in 2006, the European Parliament recognized digital competence as one of the eight key competences to be mastered by every EU citizen (European Parliament 2006) and as one of the four fundamental learning skills. According to this document, digital competence “involves the confident and critical use of Information Society Technology (IST) for work, leisure and communication. It is underpinned by basic skills in ICT: the use of computers to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the Internet.” (European Parliament 2006).

In the EU strategy entitled “Digital Agenda for Europe”, the European Commission singled out eight key lines of action, including “Enhancing digital literacy, skills and inclusion” (European Commission 2010). The European Literacy Policy Network - ELINET advocates for a clear differentiation between the two concepts and takes the position that a shift should be made from digital competence to digital literacy as a more comprehen-

sive and complex concept. According to ELINET, the concept of digital literacy includes three interdependent dimensions: a) operational dimension, which “includes the skills and competences that enable individuals to read and write in diverse digital media...; b) the cultural dimension, which refers to developing a repertoire of digital literacy practices in specific social and cultural contexts (such as constructing and/or maintaining effective social, educational and/or professional relationships online) and c) the critical dimension, which recognises that meaning-making resources are selective and operate as a means of social control”. (ELINET).

Mastering digital literacy by teachers becomes a *conditio sine qua non* of the learning process. It should be borne in mind that digital literacy for teachers enables them to use ICT easily and efficiently and work smoothly on computer equipment and digital platform within a certain type and modality of e-learning.

UNESCO (UNESCO, 2011) defines three interdependent thematic areas defined as broad curriculum areas that form the framework of the media and information literacy (MIL) curriculum. These are: a) knowledge and understanding of the media and information for democratic discourses and social participation; b) evaluation of media texts and information sources and c) production and use of media and information. These three areas are linked to six key areas of general education and development of teaching staff (policy and vision, curriculum and assessment, pedagogy, media and information, organization and administration and professional development of teachers) and result in seven key teacher competencies or MFA competencies, namely: a) understanding the role of media and information in democracy; b) understanding the content and use of the media; c) effective and efficient evaluation of information; d) critical evaluation of information and information sources; e) application of new and traditional media formats; f) distribution of socio-cultural context of media content; d) promoting MIL among students and managing the required changes.

Industry 4.0, emerged within the wave of digital transformation, has given a new strong impetus to the development of technologically enhanced education, i.e. learning, which is promoted in the digital era of the global economy. The concept of technologically enhanced learning (TEL) is used here in a more general sense, to denote an education or learning process that is supported, aided and improved by technologies – ICT and/or technologies of Industry 4.0. According to Adrian Kirkwood and Linda Price, this term means “the application of information and communication technologies to teaching and learning”, but “it is not evident that a shared understanding has been developed in higher education of what constitutes an *enhancement* of the student learning experience” (Kirkwood & Price 2012, 8).

Within the technologies of industry 4.0, according to its intensity, pace of development and comprehensiveness of influence, artificial intelligence (AI) is the most distinguished one. Countries have recognized the transformative power of AI and other 4.0 technologies and their all-encompassing impact on the economy and society. Therefore, the governmental support for AI development is crucial and a strategic priority. On December 26, 2019, the Government of Serbia adopted the Strategy for the Development of Artificial Intelligence in the Republic of Serbia for the period 2020-25 (Strategy 2019). The Government of Serbia has declared the following key priorities in the Strategy: economic growth, digitalization and education. Among the five proclaimed goals, the Strategy set as the first goal “the development of education oriented toward the needs of modern society and economy conditioned by the progress of artificial intelligence” (Strategy 2019).

The enormous potential of AI as a comprehensive transformation technology “rests on its power of intelligent automation. AI radically pushes the boundaries of automation and is able to make breakthroughs in various areas of the economy, automating and accelerating the way of collecting and analyzing data, business processes, ways of organization, decision-making, prediction capabilities, etc. From this point of view, the effects of AI are not

only direct, through the direct implementation of a particular AI application in business, but also indirect, which are in the unimagined possibilities of creating completely new products, services and industries in the future, which will result from the application of AI as universal set of capabilities of an intelligent, self-learning factor” (Radun 2019, 138).

The key areas suitable for the development of AI are education, science and research and the sector of information, computer and telecommunication services in the economy. In addition to its weaknesses, the education and science sector, in terms of human, technical and institutional preparedness, represents a solid base (Strategy 2019). As can be concluded, the Strategy pays special attention to education, as well as science and research, and hence the great responsibility for education and especially higher education, as a fundamental framework that should prepare society for well-timed and full involvement in the dominant processes of the ongoing 4<sup>th</sup> Industrial revolution.

#### **4. SMART LEARNING ENVIRONMENT AND TRANSFORMATION OF THE LEARNING PROCESS AND ORGANIZATIONAL CULTURE IN HIGHER EDUCATION**

The impact of Industry 4.0 technologies, which builds on the process of universal digitization of the economy and society, has a huge potential for the transformation of sectors of education and science & research, especially the sector of higher education.

This transformational potential of Industry 4.0 technologies is reflected in the creation of a new educational and learning environment, which is recognized as a Smart Learning Environment – SLE. Although the Smart Learning Environment (SLE) originated within the e-learning system

and is another offshoot of the technologically enhanced learning model, this model differs significantly from other types of e-learning in its characteristics and functions. It is important to point out that the concept of a smart environment, from which the term SLE is derived, is still incomplete, i.e. it is a concept that is still upgrading and improving. Hence, there is still no clear and complete definition of SLE, and this new learning model faces major challenges.

According to Begona Gros (Begona Gros 2016, 3), the smart learning is based on two different types of technology: a) smart devices and b) intelligent technologies. Smart devices “refer to artefacts that exhibit some properties of ubiquitous computing, including (although not necessarily) artificial intelligence; for instance, the Internet of things, wearable technology in the form of an accessory such as glasses, a backpack, or even clothing.” (Gross 2016). Intelligent technologies, which include cloud computing, learning analytics, or big data, “focuses on how learning data can be captured, analysed and directed towards improving learning and teaching, and supporting the development of personalised and adaptive learning.” (Gross 2016). Although a distinction is made between smart devices and intelligent technologies, these two types of technology are closely related to each other.

The SLE can include many components, among which the main ones are: the learning process, students, teachers (or instructors), learning system with the technologies that make it up, the environment in which learning takes place (classroom, laboratory, living space, etc. .), the support staff, which includes technical staff, designers, etc., the institution in which the SLE is implemented, its organizational culture, etc. The SLE can perform anytime, anywhere and at any pace.

Designing an SLE system can take many forms. According to Gwo-Jen Hwang (Hwang, 2014) the SLE framework can have seven main modules or areas:

1. *Learning status detecting module*. This module serves to detect student status in the “real world”, which includes collecting data on location, some main personality characteristics, learning style, behavior, student movement, etc.

2. *A learning performance evaluation module*, which serves to evaluate and record student performance in learning, by solving tests online or live.

3. *An adaptive learning task module*, which should assign students learning tasks, based on their learning progress, learning success, personal factors and learning goals.

4. *An adaptive learning content module*, which serves to provide learning materials to students based on learning progress, learning success, personal factors and the real status of each student individually.

5. *A personal learning support module*, which provides learning support to students based on their learning needs.

6. *A set of databases for keeping the learner profiles, learning portfolios, learning sheets, learning materials, test items and learning tools*, which is used to store student profiles and portfolios.

7. *An inference engine and a knowledge base for determining the “value” of the candidate learning tasks, strategies and tools as well as their possible combinations*. The knowledge base is a repository in which teaching and learning experiences are stored and which may contain decision-making rules, while the inference system is a computer decision-making program that analyzes the current case on the basis of rules in the knowledge base.

There are different views in the literature on the main characteristics of smart learning environment. According to Zhu et al., ten key features that determine smart learning environment are the following (Zhu et al. 2016, 11):

1. *Location aware.*
2. *Context aware.*
3. *Social aware.*
4. *Interoperability.*
5. *Seamless connection.*
6. *Adaptability.*
7. *Ubiquitous.*
8. *Whole Record.*
9. *Natural Interaction.*
10. *High Engagement.*

The first feature – *location awareness* - means that student location is important to the SLE. The SLE system uses special sensors to collect student location data, in real time, to determine the spatial and temporal specificity of the student, and based on that it adjusts the content, dynamics, level of complexity, duration and other dimensions of learning to the student's situation.

*Context awareness* means to “explore different scenarios and information of activity.” That's what J. M. Spector defines it as “context sensitivity” i.e. “the ability to recognize specific situations, including those situations in which a learner might be in need of assistance.” (Spector 2016, 2731).

*Social awareness* means to “sense social relationship.” *Interoperability* means to “set standard between different resource, service and platform”. *Seamless connection* implies the existence of a continuous connection, online and between devices, which is provided through IT. *Adaptability* is defined as the ability to adapt learning resources to the availability, preferences, interests, and needs of students, teachers, and the learning process. *Ubiquitous* means the ability to

cover all relevant factors, components and changes that occur during learning, as well as the ability to fully access all learning resources and services. *Whole record* means “record learning path data to mine and analyze deeply, then give reasonable assessment, suggestion and push on-demand service.” *Natural interaction* means “transfer the senses of multimodal interaction including position and facial expression recognition, explore different scenarios and information of activity.” *High Engagement* means “immersing in multidirectional interaction learning experience in technology-riched environment.” (Zhu et al. 2016, 11).

Reflecting critically on the definitions of the term, whose common feature is to refer to an ideal or perfect SLE model, which has not yet been realized in practice. Abtar Darsham Singh and Moustafa Hassan define SLE as “an adaptive system that puts the learner at the forefront; improves learning experiences for the learner based on learning traits, preferences and progress; features increased degrees of engagement, knowledge access, feedback and guidance; and uses rich-media with a seamless access to pertinent information, real-life and on-the-go mentoring, with high use of AI, neural networks and smart-technologies to continuously enhance the learning environment.” (Singh, Hassan, 2017).

SLE can use a multitude of smart and intelligent technologies, which should form a unique learning system, a kind of portfolio of technologies, tightly connected and interdependent. Many of these technologies, which form the technological core of SLE, are still in development phase and their potential and capabilities have not yet been fully realized. Such technologies are: Internet of Things (IT), Artificial Intelligence (AI), Virtual Reality (VR), Augmented Reality (AR), Brain-Computer Interface (BCI), exoskeleton, holographic technology, etc. With the development of these and other, “young” technologies, the capacity and capabilities of SLE grow and develop, gaining new, differentiated forms and modalities.

SLE, in its entirety, provides a completely different approach to learning and gives new dimensions and experiences to the learning process. The

possibilities that these technologies can provide are still being explored. Some technologies, such as VR or AR, give a completely different perception of reality and allow the student to experience layers and levels of reality that are spatially or temporally inaccessible to him. VR and AR give the possibility of “immersion” in the object (Psotka 1995, 405) which is the topic of learning, thus usually giving spectacular effects and a new impetus to learning through independent research and experimentation.

In order to review the characteristics of this new, transformed learning environment, it is necessary to make a retrospective of the previous evolution of e-learning, and then present the SLE model and analyze its advantages and possibilities in relation to earlier types of e-learning.

The evolution of TEL, concerning the development of learning technology, has so far passed the following stages:

- 1) **E-learning: Electronic learning**
- 2) **M-learning: Mobile learning**
- 3) **U-learning: Ubiquitous learning**
- 4) **S-learning: Smart learning**

E-learning is defined as “a learning mode that takes advantage of the use of information and communication technologies in all levels of training, being seen as the dissemination of training using a network. In this context it means the capacity to follow a teaching program at distance, being it personalized or accompanied, individually or in group.” (Mesquita et al., 2016).

Mobile learning or m-learning originated from e-learning as its upgrade or extension, so that it has now become possible for learning to take place via mobile devices (smart mobile phones, laptops and other mobile devices).

The next step is ubiquitous learning or u-learning. U-learning, or ubiquitous learning, is defined as “an amalgam of e-learning and m-learning,

allowing learning to take place independantly of time and place” (IGI Global 2020). According to Ogata et al. (Ogata et al. 2009, 338) ubiquitous learning is “defined as an everyday learning environment that is supported by mobile and embedded computers and wireless networks in our everyday life.”

The fourth phase of e-learning – the smart learning or s-learning – is a completely new learning model, which represents a significant improvement and expansion of the possibilities of previous types of e-learning so that learning is now completely free and can take place any time, anywhere and at any pace, without any restrictions. A smart learning environment (SLE) is created, through the application of ICT and industry 4.0 technologies, which can be continuous, and which enables various forms of learning and pedagogical approach, fully adapted to the needs, conditions and status of students, equally individually and in groups. This type of learning gives the student the freedom to choose the way of learning, allows him to perform self-assessment, monitor and analyze his progress and success in learning and provides learning based on testing, research, collaboration with other students and teachers, and creating new knowledge, skills and competencies that meet the needs, goals and interests of the student. S-learning radically changes the role of students and teachers and gives a completely new role to smart technologies that form the technological platform of the SLE system.

All these phases and models can be incorporated under the concept of e-learning in a broader sense. However, in the current, fourth phase, the foundations have been laid for the construction of a completely new form of learning, which, in terms of its characteristics, performance and possibilities, surpasses the previous three forms or types. It is too early to conclude what all the advantages and possibilities smart learning can bring, but already at this early stage it is clear that a new learning model is being created, which will be radically different from the previous three types of e-learning. Hence, we can talk about two different models of technologically enhanced learning: a) e-learning model and b) smart learning model, which is updated at this stage through the form of SLE.

The SLE model, as a form of s-learning, represents a qualitatively new leap in the development of e-learning and brings a new paradigm of education. Changes in this model affect all three elements of the learning process: teacher, student and technology, in their interactions. One should keep in mind what John Dron says (Dron, 2018): “What makes an environment smart, not-smart, or stupid is, primarily, the configuration of its parts - human and others - and their interactions.”

The impact of technology on learning and teaching is radically different in the SLE model compared to this impact in the e-learning model. This is a system in which technology strives to take a leading role in the learning and teaching process, not only as an intermediary, but also as an intelligent, flexible, adaptable, personalized, highly autonomous system, capable of making decisions, giving initiative, finding creative and innovative answers and solutions, adaptable to the requirements and to fine shades and differences in interaction with the student. In the e-learning model, the technology is one that supports, accelerates and improves the learning process. Here, the technology is considered an instrument or tool used to improve and enhance the learning process.

In the SLE model, technology no longer serves as an instrument or tool. SLE technologies, based mainly on Internet of Things (IT), AI, machine learning, Big data, VR/AR and some others, which form a smart technology core, create a smart, digital environment capable of continual self-learning and improvement. Therefore, in this model, the SLE has the following features: a) high adaptability; b) full interactivity; c) creative responsiveness; d) sensitivity to content and meaning; e) autonomy of the learning system and f) personalization of the learning system.

The smart learning environment is capable of independent decision-making and taking initiative and action. In such an environment, the traditional roles of both teacher (professor) and student are changing radically. Here, technology now takes on an autonomous, proactive role in the

learning process, which is reflected in a number of new or reformed functions, among which are: connective, integrative, coordinating, controlling, anticipatory, etc. This does not mean that the roles of teachers and students become secondary, but they should be modified in accordance with the requirements and needs of the learning system as a whole, where lifelong learning is established as a new paradigm of learning and education.

Which is the impact of the SLE on the organizational culture of the HEI? Based on the insight into the design, structure and functioning of the SLE model, we could conclude that SLE can have huge repercussions on the role, evaluation of teachers and organizational culture at HEI.

The organizational culture can change in a negative and potentially risky direction – too much opening of the organization to SLE systems and uncritical and enthusiastic acceptance of the technologies that make up the core of SLE can put teachers in a subordinate and undesirable position. Teaching staff are the main capital, since they are the carriers and generators of the teaching and learning process in HEIs and their role must not be allowed to be derogated or abolished in favor of an autonomous and adaptive SLE system. That would mean leaving education exclusively to technology, and HEIs would be transformed from educational and scientific-research institutions, the knowledge organizations, into a totally technological organizations. The image and recognition of HEIs and higher education would be lost. Therefore, HEIs must not allow SLE systems, as far as they can perfectly perform educational and teaching activities, to push teachers out of the learning and teaching process and put them in a passive role. In order to prevent this, it is necessary to rediscover the role and importance of teachers, as lecturers, analysts, researchers, innovators, mentors and producers of critical scientific, argumentative, tested knowledge.

Organizational culture should be transformed into one that is open to the implementation of SLE in education, but it should be stimulating for the exchange of ideas, experiences and knowledge among teachers. It is also

crucial that teachers, by connecting and exchanging their ideas, experience and knowledge about new features of the learning process empowered by SLE systems, should explore the interaction with students, striving to find out what are the reactions and responses of the students within SLE, what is the degree of success in learning, what is the level of freedom in taking the initiative and deciding on the ways, dynamics and specifics of learning, etc.

If we look at any type or model of e-learning as a form of knowledge management system, then the key is organizational culture, which should be a *supportive organizational culture* - in terms of supporting the learning or education process.

Most authors agree that the possibilities provided by technology are not enough in themselves to define an environment as smart. In the learning process, the key role is played by pedagogy, i.e. an appropriate interactive, intelligent teacher-student relationship that enables the student to acquire knowledge in an effective and efficient manner. Technology is still not able to imitate pedagogy or to create artificial pedagogy in the learning process, but it is certainly approaching the ideal. Diana Laurillard, considering the future of learning in the context of new technologies, points out that, “without a clear understanding of pedagogy, predictions for the future of learning and teaching will tend to be driven by what the technology makes possible, rather than what learners need.” (Laurillard 2008). Analyzing the essence of learning, Lorillard finds out that learning is an active process: “the role of the teacher is not to transmit knowledge to a passive recipient, but to structure the learner’s engagement with the knowledge, practising the high-level cognitive skills that enable them to make that knowledge their own.” (Laurillard, 2008).

This in-depth analysis of the essence of learning leads us to determine the true role of technology in the learning process. Lorillard concludes that “it is unlikely that learning will be found to require something radically different in the near future. Learning complex concepts and mastering difficult

procedures and processes, will always require effortful thinking. Technology will probably not change what it takes to learn, therefore, but it may change how the process of learning is facilitated.” (Laurillard, 2008).

The role of teacher in the digital and smart learning environment, whatever it is called - mentor, tutor, controller, supervisor, facilitator, instructor, manager, etc., is increasingly turning to mediation, coordination, supervision and encouragement. But one should not fall into the trap of admiring the wonders of digital transformation and Industry 4.0 and one should not go towards the promotion of technology while avoiding analytical and critical thinking. The teacher of the digital age and within smart learning environment must preserve his critical attitude and intellectual integrity. In this sense, new technologies and the creation of a smart learning environment should only enable him to improve his critical thinking and give him a new perspective, from which he will be able to better understand the whole and contribute to deepening and expanding knowledge about the relevant research subject in his scientific, research and study domain.

Opposing the promotion of a “new” model of “opinion leader”, which should replace the role of the traditional public intellectual and which should be more suited to the new digital age, Markus Giesler notes that “the challenge in becoming a digital professor is not finding an audience of interested readers. The real challenge is withstanding the temptation of letting neo-liberal agendas compromise your scholarship’s rigour, complexity and criticism. The real challenge, in other words, is NOT becoming a thought leader.” (Giesler 2018).

In a turbulent technological environment, on a wave of euphoria due to the unimagined possibilities of technologies that create a smart learning environment, we must not allow HEIs to disorient and give technology a leading place and role, and to turn higher education into a testing ground for technology opportunities. The teaching staff withdraws, becoming an “invisible instructor” and turning into a passive operator who only knows how

to properly use technologies in the service of teaching. We must not allow ourselves to lose the intellectual, scientific-research core in higher education, which first consists of prominent teachers, professors and assistants, because they are still expected to play a responsible role of pedagogue, creative intellectual, researcher, who should guide students and to educate them and teach them ethics and true values.

Writing on the evolution of the role of instructor (i.e. teacher) in the digital age, Michael F. Beaudoin emphasizes that right now, in e-learning, the role of teachers should come to the fore: “online education demands, now more than ever, mentors who are compassionate of heart, who are committed to academic rigor, and to competent practice, they must serve a critical purpose as partners with students in the teaching-learning process, certainly no less so in online venues than in face-to-face settings. Institutional providers of online offerings must expect and insist that their instructional personnel orchestrate the learning process, creating conditions for what might be called ‘guided discovery.’ Education works best when student and teacher both learn together. To do anything less is to compromise our professional integrity, to do a disservice to our students, and to demean online education, even as it assumes a more central role in the digital age.” (Beaudoin 2013).

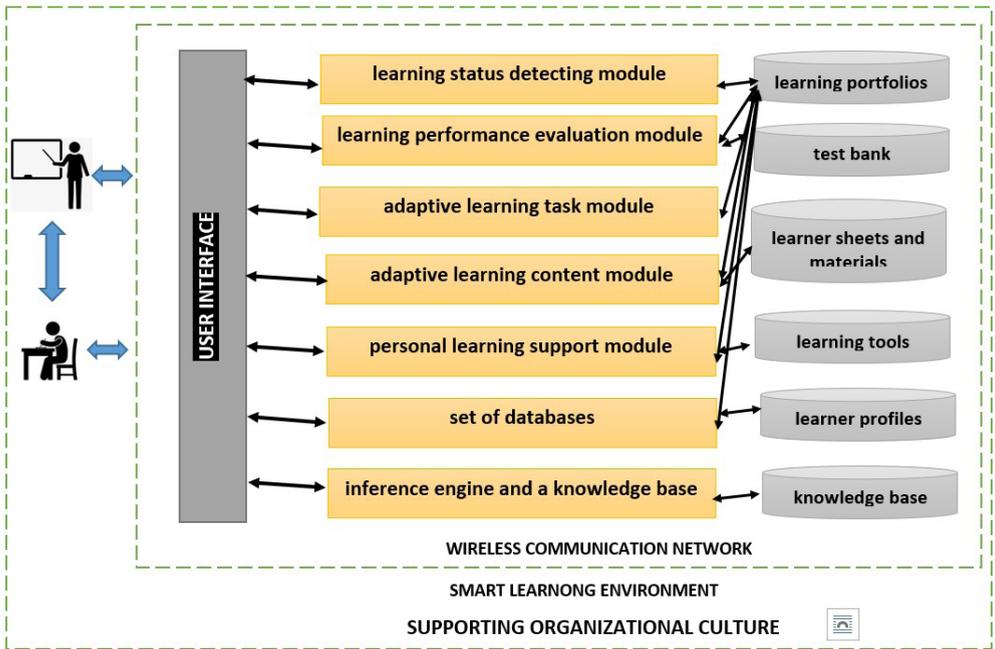
Recognizing these changes in the roles and nature of the teaching and learning process, but also striving to preserve the intellectual, scientific and research integrity of the academic community, the organizational culture of HEIs must be transformed, and will necessarily be, not in the direction of losing an objective, scientific research portfolio. and the consequent disappearance of the critical, analytical, pedagogical and ethical-normative function of teaching staff, and certainly not in the direction of withdrawing academic integrity and freedom of creative thinking and creating new technologies, but in the direction of enhancing and advancing all these unique comparative advantages of higher education on new technological and pedagogical bases.

The availability of an autonomous, adaptable and interactive technological platform of the SLE system for students enables the realization of the concept of lifelong learning and the concept of learning anytime, anywhere and at any pace.

On the other hand, the proactive role of the student, who is in continuous contact with the teacher through the SLE technology platform, brings great challenges to pedagogical principles and learning rules and encourages the design of innovative pedagogical approaches to learning – “smart pedagogy”, based on existing theories such as constructivism, as well as some new theoretical concepts, such as connectivism and network learning (Gross, 2016). According to Gross, “besides the use of technology, new pedagogies emphasise the active engagement of students in their own learning, learner responsibility, metacognitive skills and a dialogical, collaborative model of teaching and learning”, among which are very important methods of self-assessment and peer assessment. (Gross, 2016).

The creation of a new smart pedagogy, which would correspond to a smart learning environment, should be viewed as a component of the new smart organizational culture of the HEI. Within a smart organizational culture, four special cultures would stand out: a) a culture of quality teaching and learning; b) a culture of technologically enhanced learning; c) a culture of encouraging and developing scientific research and innovation of teaching staff and d) a culture of mutual support, commitment, exchange and collaboration both among teachers and between teachers and students.

Based on the previous analysis of the design and performance of the SLE system and smart organizational culture, a possible model of SLE and supporting smart organizational culture at HEIs can be proposed, (Figure 1), which should ensure effective and efficient functioning of SLE in higher education and thus respond to new requirements: the challenges posed by Industry 4.0 and the need to restructure HEIs.



**Figure 1:** Model of interactions of the SLE system within supporting organizational culture in HEIs.

Source: According to Hwang, 2014., modified.

The center of the proposed model is the platform of the SLE system, with defined modules and outcomes. The learning process takes place interactively, between students, teachers and the SLE system. The student in his learning is guided by his goals, as well as needs and preferences, and he enjoys the support of the teacher. The teacher has the roles of mentor, facilitator, learning coordinator; he helps, encourages and cooperates with the student in the process of teaching and learning, but he is also someone who is consistently engaged in scientific research and other jobs and places necessary within the entire system of higher education. These complex processes and interactions between the basic subjects and components of the teaching and learning process according to the SLE model take place under the influence of a *supportive organizational culture*.

There is a certain fear that the impact of a technologically supported learning environment will radically change interpersonal relationships and behavior, which are the backbone of organizational culture. In line with the tendency towards the creation of a rapidly progressive automated, intelligent and autonomous learning system, the place and role of teaching staff will change radically. Such an autonomous, hyperintelligent, interactive, sensitive and adaptable learning system increasingly requires the participation of teacher as a provider of an adequate body of knowledge to the target consumer - the client - who is presented here as a student.

However, the problem that is likely to be raised and actualized with the intensification and acceleration of Industry 4.0 technologies, implemented in creating a smart learning environment, which interests us in this paper, is to what extent organizational culture is now being transformed in the opposite direction to essential human needs and interests? Whether and to what extent organizational culture would lose human elements, and how much it would be modified in terms of acceptance and adoption of non-human components and elements, moving further away from the needs and interests of the human, anthropogenic environment, while approaching a complete, self-sufficient technological system that creates its own, parallel organizational culture, which could be called a technological organizational culture?

## 5. CONCLUSION

This paper analyzes the transformation of organizational culture in higher education in Serbia that could lead to the introduction of a smart learning environment (SLE). The SLE model emerges with the advancement of the digitalization of the economy and society and the development of new smart and intelligent technologies within the Fourth Industrial Revolution (Industry 4.0). The SLE represents a radical step forward in e-learning and

marks a new paradigm of learning because it offers unimagined learning opportunities, expanding it, providing a new learning environment and experience, and transforming the roles of teachers, students, and technology.

The paper analyzes the evolution of e-learning and shows that SLE is a new model of e-learning, which can have far-reaching effects on the organizational culture of HEIs and higher education in general. Based on the analysis of the proposed model of interaction between SLE and the supporting organizational culture at HEI, conclusions were made about possible directions and dynamics of transformation of the role of teachers, students and technology, as well as interaction with organizational culture at HEI. The great responsibility of teachers was pointed out, who should use this great transformation of higher education in the direction of rediscovering their role as a subject of truly critical thought, the role of teachers as a consistent critical thinker and researcher, who should dedicate themselves to students and together with them, through collaboration and cooperation, express their creative and empirical capacity, which will result in mutual benefit and success, both students and teachers and HEI as an institution within which the learning process is performed through the SLE model.

The possibilities provided by new smart and intelligent technologies within the SLE system exceed the technological capabilities of previous types of e-learning. Higher education institutions, given their orientation to scientific research activities, production of new knowledge, innovation and design of new scientific methodology, should play a leading role in transmitting and sharing the results and innovations brought by the turbulent wave of the Fourth Industrial Revolution.

The organizational culture of the HEI must be set up as a sanctuary, incubator and generator of new ideas, concepts and technologies. Teachers, who are both scientists and researchers, should play a key role in this process of overall technological transformation. However, one should avoid falling into the trap of compromise and care to escape turning into excessive enthusiasm and apologetic-

ics, under the assault of these truly radical technological interventions in the field of education and learning, or in opposite direction, which would adversely affect the role of teachers, and imposed the key need to reconsider the position and role of HEIs and higher education in the future.

## References:

- Accenture. 2019. *Technology Brief: A Board Primer on Artificial Intelligence*. [https://www.accenture.com/\\_acnmedia/PDF-1110/Accenture-A-Board-Primer-AI-Final.pdf#zoom=50](https://www.accenture.com/_acnmedia/PDF-1110/Accenture-A-Board-Primer-AI-Final.pdf#zoom=50), accessed: 12.09.2020.
- Beaudoin, M. 2013. "The Evolving Role of the Instructor in the Digital Age." In: Katz, Y. (ed.), *Learning Management Systems and Instructional Design: Metrics, Standards, and Applications*. Charlotte, NC: Information Science Publishing. doi: 10.4018/978-1-4666-3930-0.ch012, [https://www.researchgate.net/publication/285998573\\_The\\_Evolving\\_Role\\_of\\_the\\_Instructor\\_in\\_the\\_Digital\\_Age](https://www.researchgate.net/publication/285998573_The_Evolving_Role_of_the_Instructor_in_the_Digital_Age), accessed: 06.10.2020.
- Dron, J. 2018. "Smart learning environments, and not so smart learning environments: a systems view", *Smart Learning Environments* 5:25, <https://doi.org/10.1186/s40561-018-0075-9>, [https://www.researchgate.net/publication/328391437\\_Smart\\_learning\\_environments\\_and\\_not\\_so\\_smart\\_learning\\_environments\\_a\\_systems\\_view](https://www.researchgate.net/publication/328391437_Smart_learning_environments_and_not_so_smart_learning_environments_a_systems_view), accessed: 08.10.2020.
- ELINET, [http://www.elinet.eu/fileadmin/ELINET/Redaktion/Amsterdam\\_conference/ELINET\\_Position\\_Paper\\_on\\_Digital\\_Literacy.pdf](http://www.elinet.eu/fileadmin/ELINET/Redaktion/Amsterdam_conference/ELINET_Position_Paper_on_Digital_Literacy.pdf) (accessed: 20.10.2020.)
- European Commission. 2010. *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, A Digital Agenda for Europe, Brussels, 19.5.2010 COM(2010)245 final*, <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0245:FIN:EN:PDF>, accessed: 15.10.2020.
- European Parliament. 2006. *RECOMMENDATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 on key competences for lifelong learning(2006/962/EC)*, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex-%3A32006H0962>, accessed: 15.10.2020.
- Gros, B. 2016. "The design of smart educational environments", *Smart Learning Environments* 3:15, DOI 10.1186/s40561-016-0039-x

- Giesler, M. 2018. *The professor of the future: Digital and critical*, June 25, 2018, The Conversation.com, <https://theconversation.com/the-professor-of-the-future-digital-and-critical-98746>, accessed: 05.10.2020.
- Handy, C. 1979. *Gods of Management: The Changing Work of Organizations*. London: Pan Books.
- Hwang, G. 2014. "Definition, framework and research issues of smart learning environments - a context-aware ubiquitous learning perspective", *Smart Learning Environments* 2014,1:4, <http://www.slejournal.com/content/1/1/4>, accessed: 06.10.2020.
- IGI Global. 2020. *Dictionary. U-learning*. <https://www.igi-global.com/dictionary/u-learning/30799>, accessed: 11.10.2020.
- Janićijević, N. 2013. *Organizaciona kultura i menadžment*. Beograd: Centar za izdavačku delatnost Ekonomskog fakulteta u Beogradu.
- Kirkwood, A., Price, L. 2014. "Technology-enhanced learning and teaching in higher education: what is 'enhanced' and how do we know? A critical literature review", *Learning, Media and Technology*, Volume 39, 2014 - Issue 1, pp. 6-36. DOI: 10.1080/17439884.2013.770404
- Laurillard, D., 2008. "Technology enhanced learning as a tool for pedagogical innovation", *Journal of Philosophy of Education, New Philosophies of Learning*, Special Issue 2008, Edited by Ruth Cigman and Andrew Davis, 42(3-4):521 – 533, DOI: 10.1111/j.1467-9752.2008.00658.x, [https://www.researchgate.net/publication/227627458\\_Technology\\_Enhanced\\_Learning\\_as\\_a\\_Tool\\_for\\_Pedagogical\\_Innovation](https://www.researchgate.net/publication/227627458_Technology_Enhanced_Learning_as_a_Tool_for_Pedagogical_Innovation), accessed: 08.10.2020.
- Mesquita, A.; Moreira, F. and Peres, P. 2016. "Customized xLearning Environment". *Proceedings of the ICERI 2016 – Transforming Education, Transforming Lives*. 14 – 16 November, Seville, Spain. DOI: 10.21125/iceri.2016.1191, [https://www.researchgate.net/publication/310300500\\_CUSTOMIZED\\_x-LEARNING\\_ENVIRONMENT](https://www.researchgate.net/publication/310300500_CUSTOMIZED_x-LEARNING_ENVIRONMENT), accessed: 12.10.2020.
- Ogata, H., Matsuka, Y., El-Bishouty, M. M., & Yano, Y. 2009. "LORAMS: Linking physical objects and videos for capturing and sharing learning experiences towards ubiquitous learning". *International Journal of Mobile Learning and Organisation*, 3(4), 337–350. DOI: 10.1504/IJMLO.2009.027452, [https://www.researchgate.net/publication/228664059\\_LORAMS\\_Linking\\_physical\\_objects\\_and\\_videos\\_for\\_capturing\\_and\\_sharing\\_learning\\_experiences\\_towards\\_ubiquitous\\_learning](https://www.researchgate.net/publication/228664059_LORAMS_Linking_physical_objects_and_videos_for_capturing_and_sharing_learning_experiences_towards_ubiquitous_learning), accessed: 09.10.2020.
- O. Gajić, M. Andevski i B. Lungulov. 2009. „Podrška darovitim studentima – stvaranje društvene elite i razvojnog resursa“, 15. međunarodni naučni skup „Daroviti i društvena elita“, Zbornik visoke škole strukovnih studija za obrazovanje vaspitača „Mihailo Palo“ - Vršac, p.196-202.

- Paragraf. 2020. *Zakon o visokom obrazovanju*, [https://www.paragraf.rs/propisi/zakon\\_o\\_visokom\\_obrazovanju.html](https://www.paragraf.rs/propisi/zakon_o_visokom_obrazovanju.html), accessed: 22.09.2020.
- Pettigrew, Andrew M. 1979. "On Studying Organizational Cultures." *Administrative Science Quarterly* 24, no. 4: 570-581, accessed: 11.09, 2020. doi: 10.2307/2392363.
- Pržulj, Ž. 2000. *Kultura i preduzetništvo*. Beograd: Zadužbina Andrejević.
- Pсотка, J. 1995. "Immersive training systems: Virtual reality and education and training." *Instructional Science* 23, 405–431. <https://doi.org/10.1007/BF00896880>
- Radun, V. 2008. *Konkurencija na nišanu*. Beograd: Hesperia edu.
- Radun, V. 2019. „Mogućnosti i izazovi veštačke inteligencije u transformaciji ekonomije i društva u Srbiji“, *Limes Plus*, br. 3/2019.
- Robbins Stephen P, Coulter M. 2005. *Management*. Pearson Prentice Hall.
- Salai, L. 2005. „Evropske kulturne vrednosti i razvoj organizacione kulture akademskih institucija“, *Anali ekonomskog fakulteta u Subotici*, 14/2005., <https://www.tandfonline.com/doi/pdf/10.1080/2331186X.2018.1519143?needAccess=true> accessed: 11.10.2020.
- Spante, M., Sofkova, Hashemi, S., Lundin, M. & Algers, A. 2018. "Digital competence and digital literacy in higher education research: Systematic review of conceptuse", *Cogent Education*, 5:1, DOI: 10.1080/2331186X.2018.1519143, <https://www.tandfonline.com/doi/full/10.1080/2331186X.2018.1519143>, accessed: 10.10.2020.
- Spector, J. M. 2016. "Smart Learning Environments: Concepts and Issues". Conference: SITE 2016 - Savannah, GA, United States, March 21-26, 2016.
- Стратегија развоја образовања у Србији до 2020. године. 2012. *Ministarstvo prosvete, nauke i tehnološkog razvoja*, <http://www.mpn.gov.rs/wp-content/uploads/2015/08/STRATEGIJA-OBRAZOVANJA.pdf>, accessed: 12.09.2020.
- Стратегија развоја вештачке интелигенције у Републици Србији за период 2020–2025. године. 2019. „Службени гласник РС“, бр. 96/2019, [https://www.srbija.gov.rs/extfile/sr/437304/strategija\\_razvoja\\_vestacke\\_inteligencije261219\\_2\\_cyr.pdf](https://www.srbija.gov.rs/extfile/sr/437304/strategija_razvoja_vestacke_inteligencije261219_2_cyr.pdf), accessed: 12.09.2020.
- UNESCO. 2008. *ICT competency standards for teachers. Policy Framework (156210)*. Paris, France: United Nations Educational, Scientific and Cultural Organization. <https://unesdoc.unesco.org/ark:/48223/pf0000156210>, accessed: 10.10.2020.
- UNESCO. 2011. Wilson, C. et al., *Media and Information Literacy Curriculum for Teachers*, Paris, France. <https://unesdoc.unesco.org/ark:/48223/pf0000192971>, accessed: 03.10.2020.
- World Economic Forum. 2017. *The Global Risks Report 2017*, 12th Edition, [http://www3.weforum.org/docs/GRR17\\_Report\\_web.pdf](http://www3.weforum.org/docs/GRR17_Report_web.pdf), accessed: 19.09.2020.

- Wu, H K., Lee, S. W. Y., Chang, H. Y., and Liang, J. C. 2013. "Current status, opportunities and challenges of augmented reality in education." *Computers & Education*. Vol. 62, pp. 41-49.
- Zhu, Z. T., Yu, M. H., and Riezebos, P. 2016. "A research framework of smart education." *Smart Learning Environments*. Vol. 3, No. 1, pp. 1-17.

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## TRANSFORMACIJA ORGANIZACIONE KULTURE U VISOKOM OBRAZOVANJU U PAMETNOM UČEĆEM OKRUŽENJU

### Rezime:

Učenje i obrazovanje u visokom obrazovanju u uslovima Četvrte industrijske revolucije (industrija 4.0) doživljavaju rapidnu transformaciju. Nove tehnologije, pre svega Internet svega (IS), tehnologija masovnih podataka (Big Data), virtuelna i augmentativna realnost (VR i AR) i Veštačka inteligencija stvaraju uslove za radikalnu promenu ambijenta učenja i obrazovanja i podstiču prelaz ka sledećoj paradigmi učenja i obrazovanja, koju predstavlja pametno učeće okruženje. Ove tehnologije ne samo što ubrzavaju, olakšavaju i intenziviraju proces učenja i obrazovanja, već transformišu proces učenja i obrazovanja, zadirući u suštinu odnosa između nastavnog osoblja i studenata i utiču dalekosežno na ulogu nastavnika i celokupnu organizacionu kulturu u visokoškolskim ustanovama. U radu je objašnjen pojam, podela i dinamika organizacione kulture u visokom obrazovanju, analizirano je pametno učeće okruženje, upoređene su prednosti i izazovi u odnosu na elektronsko učenje i objašnjen je model pametnog učećeg okruženja u interakciji sa organizacionom

**kulturom na univerzitetima. Cilj rada je da se utvrde mogućnosti, izazovi i perspektiva pametnog učećeg okruženja i njegovog uticaja na organizacionu kulturu na visokoškolskim ustanovama.**

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***Ključne reči:*** Organizaciona kultura, pametno učeće okruženje, visoko obrazovanje, visokoškolske ustanove, industrija 4.0, pametna organizaciona kultura.

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