TECHNOLOGICAL CHANGE IN HIGHER EDUCATION, CASE STUDY: THE ROLE OF DIGITAL TECHNOLOGY IN THE PROCESS OF TRANSFORMATION IN HIGHER EDUCATION IN REPUBLIC OF SERBIA

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Abstract
For centuries, civilizational development was achieved through the improvement of science and technology to improve the quality of life and acquire knowledge. At the end of the 20th century, significant global changes occurred in the world: social, economic, political, legal, technological, etc. Existing research shows that the present environment is characterized by technological changes and discoveries, but also by their rapid obsolescence. In the period of technological change, the digital transformation and the application of digital technology in higher education have attracted the attention of the scientific and professional public. These changes are becoming particularly significant for transition countries (e.g., Serbia), bearing in mind that the online platforms phenomenon for learning in the educational process expands the boundaries of traditional teaching and learning. The research deals with key issues related to the application of digital technologies in the transformation of higher education at universities (private and public) in the Republic of Serbia. The purpose of this paper is to consider how new tools can be applied to simplify the educational process and improve the learning process. The aim is to identify the potential for integrating social media through the student's perception of higher education in Serbia. Data were collected using a structured questionnaire based on the research questions: "How can higher education institutions integrate social media as an essential tool in the transformation of teaching and learning methods?" and "How and to what extent do students use digital technologies in the learning process?" The research involved students (300) from three faculties. Results indicated that students agree that social media should be used in the teaching process.

Keywords: technological change, digital technology, social media, higher education, Republic of Serbia

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1. Introduction

"*We live in a world of change*"

("*Engineering and Our Way of Life*", Augustus Braun Kinzel)

Today, man lives in a digital era characterized by the presence of accelerated scientific-technological and socio-economic development (Industry 4.0 and Society 5.0). According to this, new knowledge, advanced technologies, technology transfer and diffusion of knowledge, unrestricted global access to information, inclusion and circulation of qualified personnel in the global scientific-technological, economic, educational, and cultural integrative processes, have become imperative for development. Ideas, information, and knowledge are becoming the essence of the new economy and the basis for economic growth. Thus, the importance of factors such as the culture of work, entrepreneurship, and the "invention of invention" is discussed by Landes [1], analyzing the industrial revolution and the diffusion of technology. In addition, the author states that at the end of the twentieth century, with the scientific and technological revolution, the wealthiest country in the world had a higher per capita income than the poorest in the amount of 400:1, compared to the beginning of the fourth industrial revolution, when this ratio was only five times higher. Finally, considering that technological progress is an indicator of economic development, Landes analyzes the relationship that exists between technology and society, emphasizing that "... *disparities in wealth between certain countries are narrowing, but at the global level these disparities remain large;* "*…the import and export of jobs has a greatly different impact on the human ...*"*;* "*and that comparative advantages of countries can and do change.*"

Digital transformation (DT) is becoming a new paradigm in organizations that leads to reshaping the way they function, communicate, do business, and provide services in the environment. Thus, some authors see DT as an organizational change enabled by digital technologies that has the potential to modify every aspect of the organization. In addition, in recent years, DT has become a subject of interest to researchers and business managers as the concept is widely accepted. It is worth noting that in practice, numerous companies and individuals have supported DT and the application of digital technology with the possibility of substantial business changes (e.g., changes in products and organizational structures; optimization and automation of processes, etc.). Accordingly, DT is defined as "*the profound transformation of business operations and organizations, procedures, qualifications, and models, in a corporate strategy for optimum conversion of the changes and possibilities of a new tech variety and its incredibly rapid influence on the society*" [2], [3].

From a global perspective, the advancement of digital technology has led to significant transformations in communication and to unlimited access to information. Thus, Nikola Tesla predicted a new way of communication (cellphones) in 1926:

> "*When wireless is perfectly applied, the whole earth will be converted into a huge brain, which in fact it is, all things being particles of a real and rhythmic whole. We shall be able to communicate with one another instantly, irrespective of distance*."

The development of information and communication technologies (ICT) has influenced the evolution of existing and the emergence of new business and social communications. Namely, as two-way communication is established, new users are conquered, and their respect becomes the most significant determinant of successful communication (e.g., most people access information through mobile phones, tablets, and other devices).

Social media became a significantly important part and integral part of everyday life and one of the new channels of communication. The state of social media is best described by Siegel [4], a New York writer and critic of technology:

> "*The Internet has penetrated our lives more deeply than any other medium…[it] is now a permanent part of our civilization*." S druge strane, "*There are other social media platforms worthy of discussion and inclusion in education programs.*"

In this regard, they differ from mass media such as newspapers, television, and film, being relatively inexpensive, accessible, and providing the possibility to users to publish or access information. Communication with an increasing number of users is achieved through a service platform, whereby opening an account becomes a simple and free procedure. In contrast, the mass media require considerable resources to publish information.

Modern knowledge has confirmed the thesis that knowledge, learning, education, and social development are directly related categories. Knowledge manifested through new technologies, more efficient and quality processes, and a higher - quality workforce becomes the main driver of growth promotion. Education represents the main form of human capital formation. Higher education institutions (HEIs), public or private, have a mission to create, transmit, and use knowledge. They promote learning, teaching, research, and creativity in science, technology, the arts, and sports for community development and the well-being of society and its users. Accordingly, a survey of nearly 15,000 universities in about 1,500 regions in 78 countries from 1950 to 2010 showed that "*...increases in the number of universities are positively associated with future growth of GDP per capita.* "*...a 10% increase in a region's number of universities per capita is associated with 0.4% higher future GDP per capita in that region*"[5].

The modern era and way of life and habits are vastly different from those in which the current educational system was created. Considerable emphasis in the literature has been devoted to the technological changes that have occurred over recent decades in education. In this sense, the academic community has turned its attention to digital technologies and their integration into higher education institutions. Namely, digital technologies are becoming a tool for expanding the boundaries of traditional learning - conducting classes

with students, developing students' competences and skills (e.g. workforce for the modern labor market), improving educational methods (e.g. online learning platforms; combined learning models, etc.) and to increase the educational activities efficency (e.g. supervision, control, management) to obtain simplification of the organization of the educational process [6].

By reviewing literature and practice, researchers have attempted to answer the questions: “What happens when social media is integrated into academic purposes?” and “How did social media, from a tool for social interaction, become part of educational methodologies and practices across the planet?”

In the age of social media and smartphones, universities and colleges have the opportunity to choose their users (students) with a new “online environment", as was done traditionally. Therefore, their usage becomes significant in the promotion of higher education institutions. Additionally, the integration of social media into higher education institutions has contributed to the advancement of digital literacy, increasing experience and learning outcomes, as well as the development of critical thinking skills. Otherwise, in practice, the main problem becomes adapting this tool to higher education and improving student satisfaction.

The Republic of Serbia, as a transition country, has actively engaged with the European Research and Education Area in order to create a knowledge-based society. General education, as well as digital education and technological change, are gaining significant importance in the transformation of the economy and civilization (e.g., the terms “digital economy”, “digital market”, “digital society”, and “digital education” are increasingly present). In particular, numerous analyses have shown that the introduction of digital technologies into the educational process is necessary for the transition from traditional to modern forms of education. Moreover, the strategic goal of the Government of the Republic of Serbia has become the digitalization of education (e.g., introduction of informatics as a compulsory subject from the first grade of primary school; introduction of electronic services, e-books, and online classrooms; e-enrolment in primary and secondary schools; etc.). Furthermore, the strategic goal of the Government of the Republic of Serbia has become the process of digitalization of education (e.g., introduction of informatics as a compulsory subject from the first grade of primary school; introduction of electronic services, electronic books, and online classrooms; e-enrolment in primary and secondary schools, etc.).

In accordance with the state development strategies, by mid-2023, Serbia had introduced fast, secure internet access in 1.843 schools (which educate more than 730.000 students and employ over 100.000 teachers and professors). Over 1.000 facilities have ultra-fast optical internet speeds of 300 Mbps. In fact, considering that digitization is a long-term process and requires continuous effort and work, it is primarily due to the pervasive nature of significant inequality between rural and urban education institutions. At the same time, the

Unique Educational Number (UEN) was implemented as a key tool in education. In general, the UE number follows pupils or students through their entire schooling and serves to archive data from preschool to university level, thus avoiding various abuses - for example, students concurrently enrolling in academic programs while being funded by the state budget [7].

This paper aims to recognize the potential for integrating social media into higher education in Serbia, and the purpose is to consider the role and importance of new digital media tools to simplify the educational process and improve the learning process. In particular, the research is directed toward students' perception of social media use at three faculties during the 2024-2025 academic year in Serbia.

2. Literature Review

Theoretical Background

"*We shall be able to witness and hear events... just as though we were present.*"

(Tesla, N. on the technology, 1926)

Due to technological progress and development, human have changed their nature and thus satisfied their own desires and needs. At the beginning of the development of civilization, the concept of technology was related to the transformation of natural resources into simple tools, then to their further development and adaptation to the aspirations and environment. Accordingly, it was understood that the educational process can contribute to further progress, for example, by improving a person's creative, social, cultural, psychophysical, and ethical potentials. At the same time, further technological progress (Industry 4.0) has contributed to the application of digital technologies in education. It is important to emphasize that new forms of academic teaching, learning, and knowledge have been acquired outside of higher education institutions due to the phenomenon of information overload and knowledge in the digital sphere. The use of innovative media and technical infrastructure to reshape teaching and learning methods (e.g., individualization and flexibility; use of digital teaching and educational resources; distance learning; 'virtual mobility'; digital exams; adaptation of teaching plans and programmes to the affinities of specific target groups, etc.) is beginning. In reality, there is a change in the physical learning environment. However, despite the fact that the process of transformation of teaching and learning can differ significantly from one higher education institution to another, such developments do not indicate the disappearance of the classical (traditional) mode of academic education. Therefore, for the further effective development of higher education institutions, it is crucial to analyze the impact of the integration of digital technologies on the educational process.

2.1 Digital transformation and higher education institutions (HEIs)

"*We live in a 'digital age' where niche technology products and practices can rapidly become mainstream features of day-to-day life.*" [8]

Digitalization and technological change are the hallmarks of modern education. Digital transformations are becoming imperative in higher education institutions (HEIs) during the second decade of the 21st century. Selwyn [8], in his book "*Education and Technology, Key Issues and Debates*", emphasizes that transformational changes are beneficial, but also require a certain degree of departure from the already well-established ways of comprehending behavioral patterns. Contrary to the fact of the existence of a standard concept of education, many authors have a different view on the process of "education" and the definition of that term. Therefore, Illich [9] emphasizes that "to learn" means to acquire new knowledge or a new skill. In order to gain new knowledge and skills in an informal environment, the author proposes and recommends alternative schooling, which he calls "network learning". Namely, Illich's theory "provides access to references to educational objects and resource persons, skills exchanges and peer-matching approaches to learning", indicating readiness for: learning or unlearning, accepting criticism, and adapting to the contemporary environment. On the other hand, for Bloom [10], the process of learning can be observed through three forms: I "doing" - mechanical and physical skills (the psychomotor domain); II "feeling" - feelings and arguments (the affective domain) and III "thinking" - mental abilities and knowledge (the cognitive domain).

Aristotle, the ancient Greek philosopher and scientist, viewed the entire process of learning as "a holistic process aimed at achieving eudaimonia (human flourishing) through the development of both intellectual and moral virtues". Moreover, through the prism of philosophy, he viewed the relationship between ethics and education and concluded that "self-actualization through learning and cultivation of a virtuous character". As early as antiquity, Aristotle pointed to the importance of education and stressed that the possibility of acquiring new knowledge and expanding the knowledge had the consequence of "transforming" children into free and thinking citizens, while on the other hand, unfortunately, into the lowest strata of society, into slaves. As Russell [11] states "the state aims to produce cultured gentlemen who combine the aristocratic mentality with love of learning and the arts". Furthermore, Aristotle's quote "Those who know, do". Those who understand, teach", points out the distinction between "superficial knowledge" and "deep understanding".

In recent times, numerous studies have examined the impact of digital technologies on the higher education environment. For this purpose, research into its integration became an area of study for many researchers considering the opportunities to improve the quality of education and support new concepts and strategies for the development of the education

system. Namely, it was essential to determine how and to what extent digital technologies work, to align higher education institutions with future concepts and techniques in teaching and management. Furthermore, it is essential to understand and examine the role and importance of digital technology (e.g., online platforms and media communicative tools) in changing educational paradigms and knowledge management. For example, in the research conducted by Castro Benavides et al., an overview of the literature and references related to the terms “digital transformation”, “higher education institution”, or “university” from 1980 to 2019 is presented. [12] The authors emphasize the peculiarities that unite certain universities in an effort to integrate digital technologies. Furthermore, the advances made in marketing and attracting new students stand out. Finally, they conclude that staff members in many relate digital technologies to functions in HEIs (e.g., infrastructure, education, etc.).

On the other hand, research conducted in public HEIs in Greece has shown that DT marketing is gaining a dominant role in the integration of digital technology. The study aimed to ascertain the perceptions and attitudes (explicitly or implicitly) of the heads of administration at Greek public universities on the relationship between the application of digital marketing and the animation of students. Incidentally, the study's attendees were the rectors and vice-rectors of ten representative Greek universities [13].

Digital learning brings together digital technology and teaching practices. Accordingly, digital learning facilitates the possibility of using various digital learning materials. In this way, the use of digital tools and software increases the flexibility of learning and the possibility of providing a quality education level, especially in rural and remote regions (e.g., face-to-face, blended, online). Nowadays, Google Classroom is becoming an effective means for better understanding (improving the access and attention to learning) [14]. Furthermore, an important place in online learning development, are dominated by numerous digital platforms: Zoom, Google Meet, Skype, etc. [15].

Digital technologies and their integration into HEIs have changed in the way the educational system develops. For example, an online questionnaire survey was conducted with a sample of 69 respondents across 16 public and private universities in Kazakhstan to define trends and opportunities in application of digital technologies - social media tools, online platforms, and digital learning platforms [16]. The survey results covering the administration of universities and faculties (rector, vice-rectors, deans, directors, heads) for six thematic outcomes in the teaching process and five thematic outcomes in the emerging challenges indicated the possibility of applying digital technology in the educational process. Namely, their application would lead to improvement in the quality of management, growth of motivation, easier access to electronic resources, materials, and routine tasks, distance learning, and a greater degree of objectivity in evaluation. On the other hand, numerous problems related to security, technical errors, reduction of communication, as well as dependency and evaluation complexity are included. Finally, the

authors conclude that the key obstacles and challenges in redesigning and digitizing the education system are the teaching staff (insufficiently trained), infrastructure (unsatisfactory development), and the internet (uneven access and data security) [16].

Digital transformation and far-reaching changes in higher education are becoming strategic goals in Romania [17], [18]. Namely, the process of digital transformation and increased use of new technologies began before 2020. Ciurea [19] attempted to highlight the state of affairs in higher education at the time, starting with the digitalization trend of "the new digital era ", citing the Government's efforts to find a contemporary solution for practical application, starting with the National Strategy for the Digital Agenda Romania 2020. Furthermore, she pointed to a project that Romania developed with the Executive Unit for the Funding of Higher Education, Research, Development, and Innovation (UEFISCDI), which is unique in terms of its technological approach and European-wide scope. However, it's worth noting that a group of authors [20] analyzed which digital tools are used daily in higher education institutions in Romania. Incidentally, higher education institutions had minimal prior experience in the use of digital tools and services before Covid-19. Accordingly, the research included interviews with IT chief officers at the top five universities and a survey of the 15 most important Romanian universities to understand and clarify the changes that occurred in teaching and procedures resulting from the integration of digital technologies. In particular, Moodle and Microsoft Teams tools have become very important in the college and university environment (e.g., hybrid learning models).

2.2 Social media and higher education

> "……*while it is true that social media promises to enrich the learning experience, the question is clearly about the many ethical and practical issues it raises and therefore requires a most considered and strategic planning for integration within educational setting*."
>
> (Selwyn, 2016, p. 137)

Nowadays, social media has become the initiator of the transmission of information, knowledge, and promotion in educational institutions, especially after the crisis caused by Covid-19. There has been a change in the way of communication and the relationship between users and institutions. In fact, new technologies are being integrated at an incredible rate, allowing "every person to have a platform to engage with others and give feedback easily" [21].

Conducted research indicates that higher education institutions (public and private colleges and universities) are showing particular interest in social media and its integration into higher education. Additionaly, perceived usefulness, ease of use, social impact, and facilitating conditions become essential elements for the adoption of social media in the

digital learning environment. In principle, new opportunities in teaching and learning have been created, considering that social media platforms are becoming the most important channels of communication with current and potential students. Moreover, numerous social media platforms (Facebook, Skype, WeChat, Google Drive, YouTube, TikTok, Twitter, Instagram, WhatsApp, websites, and blogs) enable the production, use, and sharing of educational content.

Previous research and available literature have highlighted the existence of a certain level of confusion in defining social media. Some authors underline that social networks and media are free spaces for students to critically evaluate content and information, make different assessments of available information and data, and actively participate in discussions on platforms, and to promote critical thinking [22]. In contrast, other authors highlight "as practices, activities, and behaviors among societies of people who collect online to participate in information, opinions, and knowledge using conversational media" [23]. Dabner defines social media as a technologically advanced tool and devices (internet and mobile-based) representing a combination of technology, telecommunications, and social interaction in one. This type of integration enables the creation, co-construction, and further dissemination of written words, images, and sounds [24]. In contrast, Boyd & Ellison defined social media platforms as a service (based and available on the web) available to an individual to create open or semi-profiles on applications, to communicate with a list of users with whom they wish to communicate and share content, and conversely to view their content located in the monitored system [25].

Numerous authors point out the existence of a positive impact of social media on the learning process (e.g., greater success, increased interaction and collaboration; greater engagement; increased motivation). Unfortunately, social media has also shown to have certain drawbacks (e.g., privacy issues, technical issues, data security, student interference, etc.).

In 2013, a study was implemented at universities in Poland to determine the factors that are crucial for establishing communication in the relationship of higher education institutions - the external environment through social media. The obtained research results indicated the importance of using social media in order to further develop relations with the internal and external environment. [26]. Also, during the 2017-2018 academic year, a study was performed at Spanish universities (at different levels of study) related to the students' perception of the usage of social media in classroom education. The research project "*Media competencies of citizens in emerging digital media in university environments*", supported by the Ministry of Economy and Competitiveness of Spain, involved 897 students and four focus groups in Seville, Madrid, Huelva, and Barcelona. The conclusion was that students' usage of social media in education and creativity is at a very low level (mainly WhatsApp, then Facebook and Instagram); they value direct and immediate communication, although there are concerns about security (distraction; violation of

privacy by teachers, etc.) [27]. Furthermore, in Malaysia, research was conducted on HEIs via social media regarding the impact of their content on student enrollment, using 231 questionnaires (provided via Google Forms to prospective students). Analysis of metrics (likes, comments, retweets, etc.) and evaluation of the effectiveness of social media content for student enrollment indicate their essential importance [28]. At the same time, a study from Greek universities analyzed the usage of social media, with the aim of improving the curriculum after the Covid-19 pandemic. At the same time, a study conducted at universities in Greece analyzed the use of social media with the aim of improving the curriculum after the Covid-19 pandemic. The author also intended to contribute to the literature in this field. The pilot study data were collected by surveying forty-eight (48) students via a structured questionnaire (consisting of 11 questions) using Microsoft Forms. The results indicated students' agreement that social media should be applied in the classroom, with teacher guidance (it would create conditions for innovation and help in sharing knowledge). Facebook, YouTube, and Instagram were the most popular social media platforms, and would also help teachers in the classroom [29]. Incidentally, in Saudi Arabia, based on the research done (including 221 marketing educators from HEIs; group using social media tools; control group with traditional approach) on the benefits of social media in transforming marketing education, the results indicated their effect in significantly increasing student participation and retention of knowledge. Also highlighted are ease of use, institutional support, and effectiveness in achieving instructional goals. The relevant condition included the preparation and support of HEI members [30].

2.3 Digital transformation and higher education in Serbia

Technological advancements and digital technology have led to changes in the education system that are crucial for transition economies such as Serbia. Thanks to modern trends and innovative solutions, there has been a digital transformation, with methods and tools creating positive changes in e-learning. The process of integrating digital tools has been accelerated during the Covid-19 pandemic (e.g., use of e-learning, virtual reality, smart boards, 3D printing, etc.) [31].

Today, digital literacy is gaining increasing prominence. Therefore, some authors point to its variability and dependence on numerous factors such as the state of infrastructure, the age group of users, the area or region, and the state of the educational system. Others point out that the inclusion of digital technology in the educational system requires constant innovation, both for users (e.g., students, pupils) and for teaching staff (constant training, data protection, maintaining balance). Moreover, particular authors conclude that digital technologies are present not only in the teaching process (leadership), but also in its organization (learning) and other activities (supervision, control, monitoring). In fact, they indicate that the benefits of digital education are realized through an innovative approach and mitigation of future problems in the educational process (e.g., technical barriers,

reduced interactivity). Finally, some research results indicate the need to apply continuous measures for more efficient and effective digital education, including the pupils' education in primary schools [32].

In accordance with the strategic goals defined by the Government of the Republic of Serbia, *the Ministry of Education*, from 2018 to mid-2023, the project, entitled "Connected Schools Programme", was implemented. Operating along with other ministries (especially the Ministry of Information and Telecommunications, which was the leader of the project), the project aimed to provide almost 100% wireless internet coverage and to connect all primary and secondary (high) schools on the territory of the Republic of Serbia to one safe and secure network. The digital transformation was accomplished by ensuring reliable and good quality internet connections, which was in essence the main prerequisite for the further digital transformation and implementation, and providing implementation of the E-textbook, student information system - electronic student register, and digital virtual classrooms. During the implementation of this project, the Ministry has been working on establishing a PPP (public-private partnership) model, which was also supported by international financial institutions such as the International Bank for Reconstruction and Development (IBRD). The public-private partnership was organized in the following way: [33].

- The Republic of Serbia has built the necessary network infrastructure - the so-called "mid-mile network" (optical network) to central points (primary schools, local self-government units, and local communities);
- Private partners (telecommunication operators in Serbia), who further expanded their network ("last-mile segment") to rural geographical areas, offering their services and products - internet, mobile, and fixed telephony services.

Operators are selected through public tenders and calls issued by the Ministry of Information and Telecommunications. The rights and obligations of the operator are regulated by the contractual relationship for a period of 25 years. This approach, with the participation of the largest operators operating in Serbia (Telekom Srbija, Telenor/Yettel, and A1 Srbija), has enabled competitiveness and network coverage of different regions in Serbia. [33].

Furthermore, driven by technological advancements and digitization, and based on reliable data (from official institutions such as the *Ministry of Education and the National Body for Accreditation and Quality Assurance in Higher Education* - NEAQA), the study was performed that examines the development of e-education. The research covered all universities, faculties, academies of applied studies, and colleges in the Republic of Serbia. The combined results showed that technological progress and digitization have a great importance and positive impact on the development of E-education in Serbia [34].

Observations in Serbia concerning the use of various tools of "technology-enhanced learning" (TEL) have called attention to the need to modernize and improve educational processes through technological progress. For example, *the Faculty of Sciences* in Novi Sad, for just over two decades, has been implementing numerous modern educational software systems and tools. Accordingly, students were able to use the Moodle platform with broader personalization functions (in general for accessing shared knowledge sources; exchanging educational material, other students' activities, and resources, etc.), as well as during laboratory exercises. Likewise, students at *the Faculty of Technical Sciences* in Čačak and *the Faculty of Pedagogy* in Sombor were able to use this platform in their educational process [6].

Some studies' findings suggest that there is an increase in the daily use of social media (platforms) in the process of education among the student population, and also among primary and secondary school students since 2005. The Vidas-Bubanja [35] study indicated that Serbia was at the beginning of the development of the information society and digital economy. The author, in particular, speaks about the role and importance of education in the process of digital transformation and states that the advantages of new technologies bring stable and profitable business and long-term development of the national economy.

Between 2020 and 2025, a wealth of research has been performed concerning the implementation of social media platforms in education at HEIs in Serbia. According to Trajković [36], a survey conducted among journalism and communications students (100 students) on the use of Instagram for educational purposes at *the Faculty of Philosophy*, University of Nis, in 2020, indicated that Facebook is the most convenient platform, while Instagram is not so important for studying, education, and learning. Notably, almost all students were active on social media on a daily basis (most had a Facebook account, although they used Instagram more frequently).

Primarily, to determine the role of social media in teaching, at the *Academy of Technical - Art Professional Studies in Belgrade - the Department of Management, Design and Textile Engineering* in Belgrade - the Department of Management, Design and Textile Engineering conducted a pilot study on the effects of online teaching in the field of information technologies during the Covid-19 pandemic. The teaching process was performed via Google Meet, Google Classroom, and Zoom platforms. The research aimed to determine and analyze students' attitudes about online teaching in the field of IT. Bulatovic [37] states that the analysis performed yielded answers to the questions: "Is the material of information technologies explained interestingly, through social media?" "Do students recognize social media and communication channels as useful tools for learning materials?", "Does the use of educational social media in the classroom change the way of communication and collaboration among students, but also between students and teachers?".

In fact, the survey results showed the existence of a certain degree of student satisfaction with teaching (IT) realized on the social platform Google Meet (for 24.9% of respondents,

there was a high degree of quality; 35.7% of respondents consider Google Meet a useful tool for online learning; 8.4% of respondents easily followed online classes). The author highlights the positive effects of online teaching, recommending further enhancement and elimination of shortcomings.

In 2022, students' perceptions of digitization and the current situation at five state faculties of the University of Belgrade and Tirana were examined [38]. A total of 71 students participated in the survey, 31 from Serbia from *the Faculty of Political Sciences*, *Faculty of Organizational Sciences*, *Teacher Education Faculty*, *Faculty of Economics*, and *Faculty of Philosophy*. It has been shown that more than half of the students have difficulties in understanding digitization. Also, students believe it is necessary to improve the faculty's digital infrastructure and to implement training to develop and enhance digital skills among all active members of higher education (e.g., students, teachers, administrative staff, etc.).

In 2023, the perception of students (314 students) regarding the use of social media on undergraduate studies (all bachelor years) at the Faculty of Philosophy in Niš was examined in the study programs Psychology, Pedagogy, Social Policy and Social Work, Communication and Public Relations, and Journalism. It is shown that students can communicate and exchange ideas, materials, and resources through platforms such as Facebook, Twitter, LinkedIn, and many others. Analysis and discussion of the survey results indicate the existence of a positive attitude among a greater number of students toward the use of social media in higher education. In fact, there are no statistically significant differences in respondents' responses to independent variables such as years of study, study program, average grade, and time and frequency of use of social media platforms. In this sense, the results obtained can be the foundation for future research and the subject of interest in practice in this field [39].

Accordingly, the Strategy for digital skills development in the Republic of Serbia from 2020 to 2024 (*"Official Gazette of the Republic of Serbia", No. 21/20*) was adopted, which does not list "digital education" as one of the main priorities. As stated, the strategy offers the implementation of digital technologies to improve the quality of teaching and learning. On the other hand, the Strategy for the development of information society and information security in the Republic of Serbia for the period from 2021 to 2026 (*"Official Gazette of the Republic of Serbia", No. 30/18*) mentions "E-education", and initiatives have been implemented or launched for its improvement in the areas of higher education.

In this sense, the National Youth Strategy for the period from 2015 to 2025 *("Official Gazette of the Republic of Serbia", No. 22 of February 27, 2015*) also does not mention the development of "digital education" and "digital skills" of students. It is worth noting that neither the Law on Higher Education (*"Official Gazette of the Republic of Serbia", No. 88 of September 29, 2017, 27 of April 6, 2018 - other law, 73 of September 29, 2018, 67 of September 20, 2019, 6 of January 24, 2020 - other laws, 11 of February 12, 2021 - Authentic Interpretation, 67 of July 2, 2021 - other law, 67 of July 2, 2021, 76 of September 7, 2023,*

19 of March 6, 2025) contains provisions concerning "digital education". Finally, "digital education", in addition to the implementation of digital technologies to improve the quality of teaching and learning, the Strategy for the Development of Education and Upbringing in the Republic of Serbia until 2030 *("Official Gazette of the Republic of Serbia", No. 63 of June 23, 2021*) also integrates measures focused on digital competencies of teachers and students.

3. Methodology

The appropriate methodology and data collection strategy are defined. The research data were collected using questionnaires. The paper applies a descriptive method familiar in the social sciences that involves describing concepts based on collected and processed data. The data were analysed and interpreted using SPSS, and appropriate tests (ANOVA, T-test) were used to better understand the collected data.

3.1. Data

In order to collect the data, a survey questionnaire was designed that included three groups of questions: the first group - demographics (age structure, gender); the second group - students' perceptions of social media use; and the third group - exploring the role of social media in HEIs.

The survey was conducted electronically.

This research included 300 students from three faculties (Faculty A, Faculty B, Faculty C) during the 2024-2025 academic year. The participation in research was on a voluntary basis and provided conditions of anonymity, which the students were informed of in advance.

3.2. Limitations

Several limitations were identified during the research.

The first restriction is related to the number of higher education institutions that are the subject of the research (not all universities in the Republic of Serbia are covered by the research). For this reason, the obtained results cannot be generalized, and the existence of critical thinking regarding social media is highly challenging to prove. It also makes it difficult to compare with studies conducted in other countries. This limitation refers to the chosen research method, which has its own limitations due to the (dis)honesty of the respondents. The restriction may also apply to poor-quality questionnaire completion that objectively requires a long time. A disadvantage may be that some respondents did not answer all the questions, especially those requiring "more time to respond".

The second limitation relates to social media knowledge and literacy. The universities being surveyed have a public relations and communications department. In fact, knowledge and understanding of social media differ among different groups (both from the students' and from the university's side).

The third limitation is connected with the source of data on this topic, which is new and so far insufficiently researched.

A fourth limitation is related to the organization of data collection (one of the weaknesses of quantitative data analysis). This limitation relates to the available resources and knowledge of new trends and innovations (a decreasing trend exists, if the respondents are well informed and prepared about the subject of the research). The risk is accidental questionnaire filling or guesswork. To avoid this type of risk, the questions are structured in a way that they are simple and easy to understand for users.

The fifth limitation relates to AI technology. How is AI utilized to transform the HE and influence Enrollment Management?

4. Results and discussion

The study encompassed an average of 65% of male respondents and 35% female respondents for all three faculties (more men participated). The demographic profile of the respondents is shown in Table 1, and the results of the respondents who participated in the survey by age group are shown in Table 2.

	Faculty A	Faculty B	Faculty C
Male (%)	62	66	67
Female (%)	38	34	33

Table 1. Demographic characteristics of the respondents
Source: Created by authors

	18-20	20-29	30-35
Faculty A	12,30	49,20	38,40
Faculty B	12,40	52,20	35,40
Faculty C	15,30	65,30	19,40

Table 2. Age structure of respondents
Source: Created by authors

Most of the respondents were in the 20 to 29 age group. In the second group, the subjects were aged 30-35, and in the third, they were surveyed in the 18-20 age group. The proportions of respondents by gender and age group for all three faculties are similar.

Figure 1 shows the results of the analysis of the students' perception of social media: 56.3% use for social networking, 30.19% for social targeting/scheduling/strategy, 20.13% use only as an “entertainment” tool (sharing/comments/engangement), and 16.10% indicate their most significant role/impact (role of social meddia), supported by theoretical analyses (literature data).

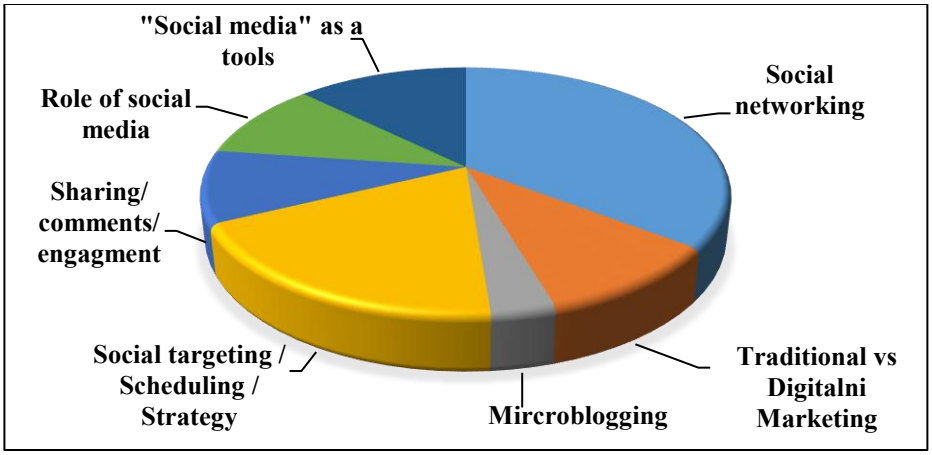

Diagram 1. Students' perception of social media
Source: Created by authors

The results showed that 92% of respondents used some form of social media: Instagram was the most popular, followed by Facebook, Twitter, and lastly Google. Other networks, such as LinkedIn, were mainly used for professional purposes and to learn about new trends (microblogging).

After identifying the type of media that respondents use the most, the research sought to establish the reasons for and the motivations behind their use (Diagram 2). Three categories are presented: only 5% of respondents use it for research, slightly more than 15% for studying and connecting with other professional matters, and the biggest part 80% use it for personal reasons.

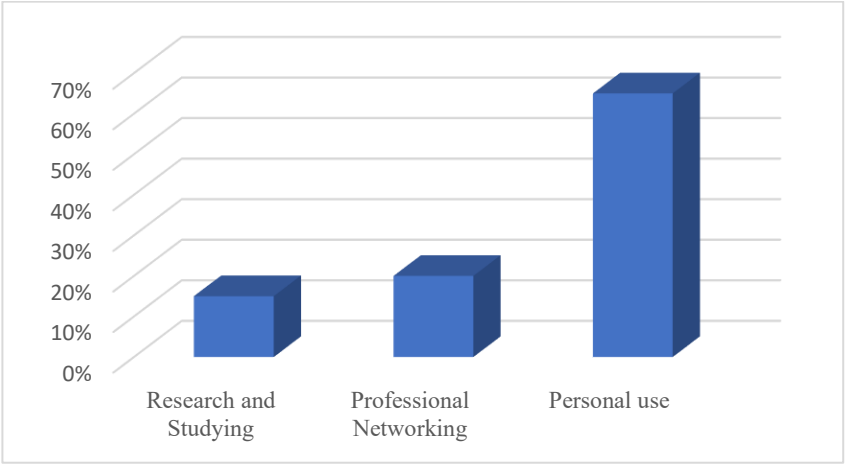

Diagram 2. Reason for using social media
Source: Created by authors

In response to one of the questions, "*Where would you like to use social media in teaching?*" 25% of the respondents answered that they would like to use it for exercises within the teaching process, about 20% for seminars and courses, and 15% for lectures. However, less than half of the participants stated that they would not like to use social media for research, exercises, or similar situations.

Furthermore, approximately 45% of respondents indicated that they would like to engage with educational content via social media, while 65% of respondents approved social media usage for the purpose of promotion, recruitment, and building a better image of the faculty. Thus, some social media tools, such as Twitter, would be beneficial for exchanging new ideas and having better interaction with the teaching and administrative staff (24 hours). Also, only 20% of respondents pointed out that universities need to train their employees to exploit the maximum potential provided by social media (advantages and prospects). In this sense, the technological difficulties that arise due to the lack of technical training would significantly reduce the efficiency of the learning process and academic interaction.

To facilitate a better understanding of results, the ANOVA test was performed for all three faculties. The data are shown in tabular form (Table 3). The results helped to understand the current situation on the use of social media for academic purposes and the extent to which they contribute to the development of higher education institutions (whether they enable improvements in communication and services provided to current and potential students). They also provided an understanding of the statistical differences between groups and how significant they are.

ANOVA Summary for 3 Faculties						
Question	**Faculty A (F)**	**Faculty A (p)**	**Faculty B (F)**	**Faculty B (p)**	**Faculty C (F)**	**Faculty C (p)**

Q14	0.412	.580	0.545	.445	.003	.954
Q15	0.371	.171	0.312	.523	.930	.634
Q16	1.451	0.033	6.607	.003	.078	.028
Q17	1.000	0.010	0.689	.019	1.014	.047
Q18	4.101	.075	.459	.043	1.765	.019
Q19	.500	1.023	0.689	.346	.570	.812
Q20	0.615	.318	0.516	.145	1.432	.024
Q21	1.515	.028	1.516	.012	8.374	.005
Q22	0.771	.690	.312	.590	.399	.153

Table 3. ANOVA test - all three faculties
Source: Created by authors

Table 3 shows the F-value and p-value values for Q14-Q22 questions of relevance to social media from a faculty perspective. Based on the data, the authors concluded that there are statistically significant differences in the respondents' responses as well as similarities between the groups studied. For all three faculties, the differences between the groups were not statistically significant, meaning that the answers to questions Q14-15, Q19-Q20, and Q22 were relatively similar. Based on this, it was concluded that the respondents gave identical answers as to how and in what way they communicate with the faculty departments, and how satisfied they are with the social media provided by their faculty. Regardless, there was a difference in the given answers to questions from Q16 to Q18. and on Q21, indicating the existence of statistically significant differences between the groups (for each faculty), indicating that the respondents' answers differed significantly.

There was a change in the respondents' attitude towards the idea that social media is just a tool for advertising and entertainment. Furthermore, it is indicated that social media is a key factor in the efficiency of communication between universities and students, in the overall process of transforming the learning process.

The respondents felt that some issues required special attention, and were concerned about integrating social media into higher education. For issues related to ethics, data privacy (cybersecurity), and potential cyberbullying, HEIs must define rules and provide support for social media to be promoted and used responsibly [40]. Respondents pointed to the way the faculty uses social media and incorporates it into its “daily activities”, including appropriate staff training and resources available to the faculty. In general, keeping in mind that there are positive and negative influences of social media on the academic educational space, the process of implementation itself is very complex. Most respondents believe that social media has a positive impact on their “academic growth” (support in the studying process). On the other hand, the positive research outcome emphasized the importance of maintaining a balance and a “personalized strategy” between social media and HEIs, but

also the fact that HEIs themselves can influence students' academic success in different ways (e.g., through the offer of innovative techniques) [41].

The research showed that the age group of respondents from 20 to 29 years old, students of Generation Z, use social media the most (also known as "Zoomer", born between 1997 and 2012). In fact, they are considered digital natives, adults in the digital age (the age of the Internet, smartphones, social media). Throughout their early childhood, members of Generation Z are conversant with modern technology, its role and meaning in practice (technologically savvy), its application (they use mobile applications), the way of communication (open to conversation on social media platforms such as Facebook, Instagram, and YouTube), and a pragmatic approach (financial matters). Considering the fact that this group has unlimited access to information through the media, their attitude reflects an innovative approach to learning: technology becomes an integral part of their education and a key resource for effective learning (e.g., interested in participation and collaboration in content creation) [42].

5. Conclusions

Based on the available literature and conducted research and studies, attention has been drawn to the rapid technological changes and the need for highly technologically competent and skilled people. In practice, the results point to the existence of barriers to the reform of the educational process in higher education, and refer to the insufficient development of infrastructure, untrained teaching staff, and uneven provision of Internet access. Specifically, the transition from the traditional to the innovative method of teaching requires the integration of digital technologies into the teaching process.

Today, social media is becoming an integral part of everyday life. The digital age of social media and smartphones gave universities and colleges the capability to choose to use the new "online environment" to select their users (students), which had previously been done traditionally. Also, the use of digital technologies is becoming significant in the promotion of higher education institutions. Regardless, the main problem is how to adapt this tool to higher education and, in the meantime, improve student satisfaction.

This study included 300 students from three faculties during the 2024-2025 academic year in Serbia related to the students' perception of the usage of social media in education. The research encompassed an average of 65% of male respondents and 35% female respondents for all three faculties (more men participated).

The results indicated students' agreement that social media should be applied: 25% of the respondents answered that they would like to use it for exercises within the teaching process, about 20% for seminars and courses, and 15% for lectures. However, less than half

of the participants stated that they would not like to use social media for research, exercises, or similar situations. 92% of respondents used some form of social media: Instagram was the most popular, followed by Facebook, Twitter, and lastly Google. Other networks, such as LinkedIn, were mainly used for professional purposes and to learn about new trends (microblogging). The age group of respondents from 20 to 29 years old, students of Generation Z, use social media the most.

Future research should focus on finding solutions to improve infrastructure, teaching staff training, and data security, as well as getting comprehensive answers on how universities in Serbia will enhance social media tools and what benefits will be realized by their application in the future.

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