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DIGITALIZATION OF HIGHER EDUCATION IN REPUBLIC OF NORTH MACEDONIA

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Abstract

As digitization becomes more prevalent in the field of education, it is transforming the way we approach traditional teaching methods and redefining the role of educators. Electronic and online learning resources facilitate educational processes, enable time savings and contribute to the sustainability of knowledge. In this sense, with digitization in education, students are expected to be active participants in the educational process. Depending on the development of technology and technological capabilities, the application of e-learning is being strengthened in all countries worldwide, which means that online teaching is being implemented in the educational system at all levels.

To effectively implement digitization in the educational process, it is crucial to develop digital skills among students and educators. These skills include competencies for coding and software creation, as well as the ability to effectively use digital devices, computers and the internet. By acquiring these digital skills, individuals can fully utilize the benefits of digitization in education and contribute to a more efficient and effective learning experience.

Recognizing this, the purpose of this paper is to emphasize the importance of digital transformation in education at all levels, with a focus on digital transformation in higher education, as it can enable more efficient use of resources and help the RN Macedonia keep up with technological advancements, ultimately leading to a global competitive advantage. The paper analyzes the process of digital transformation in higher education in Macedonia, highlighting the importance of digital transformation through positive examples from several leading countries in this process. Additionally, the paper addresses concerns that have arisen as a result of the digital transformation of higher education, including digital learning models, digital teaching, and the digital university model and provides suggestions for more effective digital transformation in higher education.

Key words: Higher Education, Digitalization, Digital transformation

1. Introduction

The most important characteristic that makes the 21st century different from previous ones is the significant development of technology and the rapid transformations it brings. In the past, transformations were slow, cumulative and arithmetic. However, in this century, technology is

advancing at a dizzying pace. One of the dimensions of the transformation that is happening in this time is digitization.

If we examine the transformation of technology at a sectoral level, we will see that innovations are mostly transferred in the education sector. The Organization for Economic Cooperation and Development (OECD) regularly reports on the use of innovation in education and training. With digitization, resources in educational institutions (schools, universities, training centers, educational publishers, etc.) are changing, e-learning opportunities are increasing, and different approaches are being developed in postgraduate education. The OECD's Innovation Measurement Report is very important in terms of showing changes in the classroom and educational institutions, how teachers are developing pedagogical resources in the digital age, and the effects of innovations on educational outcomes.

Therefore, special attention will be paid to the development of digital skills as one of the main factors for accelerating economic growth. Thus, the country will continue to focus on developing and implementing new technologies, encouraging innovation in relation to digital transformation in education, and accelerating the development of digital skills during the period 2023-2027. The overall assessment in all areas of digital skills according to the ITU15 report (Image 1) shows that the majority of respondents have a basic level of digital skills (55.4%), followed by 38.6% who have above-basic level of digital skills. Only 6.0% of respondents have a lower level of digital skills, specifically low (4.5%) or no skills (1.5%) in the digital domain.

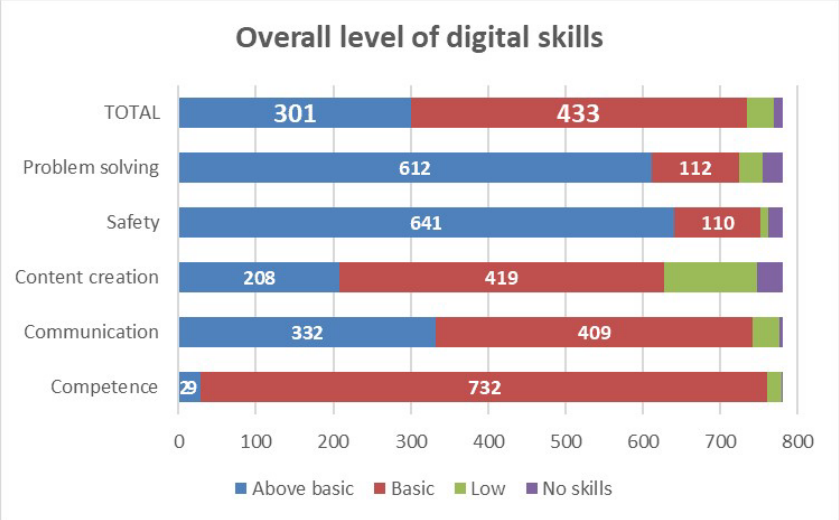


Image 1.Overll level of digital skills in RN Macedonia

2. Literature review

The digital transformation of education in the United States of America (USA), within the framework of the National Education Technology Plan (NETP), with the development of 21st-century technology, led to a change in the model of lifelong learning, which previously involved strict adherence to the learning process through schools. Gradually, a new educational approach began to be applied, which does not place the teacher at the center as the primary source of knowledge.

In that sense, in order to achieve digital transformation in education, it is necessary to accept the fact that learning is a lifelong process that is not limited to the time spent in school or in the classroom, and the application of technology provides a much wider and more flexible tool for

learning than what is offered in classrooms, connecting all actors in education (teachers, parents, experts, mentors). In this sense, personalized, simulated educational programs will help students solve complex problems. Additionally, experts point out that lectures on history and natural sciences that are delivered with the help of virtual methods will make the learning processes of students more lasting. Hence, some of the goals for digital transformation of the US Department of Education, which offer a broader educational framework fueled by technology, are:

- Development and use of learning resources and sources that utilize the flexibility and power of technology to reach all students anywhere and at any time;
- Simulations, environments, and virtual games that can be used to capture students' attention and enable their greater motivation for learning and solving complex problems in the learning process;
- Use of technologies and social networking platforms to create communities within the school, among the teaching staff, students, and enable exchange of knowledge and experiences, as well as career development;
- Each student and teacher should have at least one device for accessing the internet and appropriate software, resources for research, communication, and creating multimedia content for use inside and outside the classroom.

The countries that have successfully implemented digital transformation in education have climbed to the top of global educational performance assessments such as PISA. For example, in India, one of the countries that has successfully achieved digital transformation in education, more than 80 million hours of content have been created for informal, formal, undergraduate, and postgraduate education, and this educational content is provided free of charge. Furthermore, in Singapore, which is renowned for its impressive results in PISA, information and communication technology infrastructures for teachers and schools are continuously being developed. As part of the digital transformation in education, e-learning platforms for learning Malay, Mandarin, and Tamil, the country's mother tongues, have been established. Access to digital educational content is facilitated by providing free internet throughout the country in Taiwan. In this sense, according to projections for global education transformation from 2015 to 2035, the following digital innovations are expected in educational systems by 2035: Globalization in education: the development of global learning platforms; Personalization: collective transition to lifelong individual learning; Collective learning: the rise of communities as the dominant form of education; Playful learning: learning through games as the dominant form of education and work; and NeuroWeb: Communication from neural devices to connected brains (Luksha & Peskov, 2015).

2.1. The development of digital transformation in higher education

The global world is now digitizing. Digitization can also be considered a continuation of the globalization process. With Industry 4.0, interaction with technology has increased and the reflection of this interaction in the field of education/training was inevitable. The role of education began to be defined as providing a flexible and qualified workforce needed for the economy. It is argued that the qualified human resources that Industry 4.0 requires can only be provided by universities that have completed their digital transformation.

Computer science emerged as a scientific discipline in the 1960s. During these years, efforts to digitize education and higher education began in Japan. The Japanese government first started the transformation by establishing a network system on campuses. In 1986, Japanese

private companies began using the internet. By the 1990s, the internet was being used in Japanese universities. The transfer of printed resources to the virtual environment in the process of digital transformation was one of the first achievements. The Japanese government made an important step in digital transformation by making printed articles and educational resources available to the scientific community in digital form. By the 2000s, it was noted that more than 30% of Japanese citizens had acquired their own computer (Funamori, 2016).

PLATO, which is a computer educational application at the University of Illinois in the 1960s, was accepted as the beginning of the use of information technology in scientific studies. This program is also considered as the basis of online learning platforms. With the widespread use of computers in the 1980s, it became common to conduct educational activities through the use of these technological innovations. The introduction of modern computers in the 1970s and their use in the 1980s was one of the events that accelerated the process of digitization in education. However, until not too long ago, only a limited number of universities and scientific centers had access to computers. With the sale of computers at more affordable prices, higher education institutions were able to access computers. The first benefits of digital transformation in higher education were that it allowed academic staff to write their papers more easily and quickly, and to communicate with each other through email. Over time, the transfer of academic publications to the virtual environment was also a factor that facilitated access to information and expanded knowledge. In this context, electronic academic journals can be considered as one of the first fruits of the digital transformation of higher education. Electronic academic publications have enabled the sharing of information on a global level. The higher education system in the world underwent radical reforms after the 1990s. One of the most important steps for harmonizing the higher education system is the Bologna Process (Funamori, 2016).

One of the important phases of digital transformation in higher education on a global scale is the definition of the impact factor by Eugene Garfield (2005) and the ranking of articles in academic journals based on the number of citations. The inclusion of academic journals in indexes also facilitated access to scientific information. The digital transformation of universities has made it easier for them to adapt to innovations. Universities began to have standardized content and equivalent curricula. Equivalency enabled comparison between universities and increased competition. Increased competition among universities has forced universities to use all types of technological innovations that can provide them with a competitive advantage.

The steps that universities need to take in order for digital transformation to be successful are (PwC, 2018 annual report):

- Raising awareness of digital transformation in all units within higher education institutions;
- Linking digital transformation with the vision and strategies of the university;
- Allocating resources and funds to encourage talented digital innovators;
- Developing a design approach based on the needs of the university and the surrounding environment it addresses.

The goal of digital transformation in higher education is to redefine education/teaching services and to redevelop operational processes (Sandkuhl & Lehmann, 2017). Three different transformations have been defined to achieve this goal:

- Service-focused transformation: The focus is on changing and redefining the services offered;
- Operations-focused transformation: Targeting new and improved digital processes to redefine the services provided;

- Combination of services and operations: Aiming for an integrated transformation in terms of both services and operations.

Although the US and Japan completed their digital transformation in education and higher education very early, there are still many developed and developing countries that have not yet completed their digital transformation. One of these countries is China. The Chinese Ministry of Education set the goal of achieving digital transformation in education for the period 2010-2020. In accordance with this goal, objectives were established such as the expansion of broadband internet applications, increasing internet speed, establishing broadband internet infrastructure in every school, providing online study rooms for everyone, and establishing an educational resource platform for public services. These objectives aim to achieve digital transformation in 530 thousand educational institutions and a total of 270 million students in China. The progress of China's digital transformation in education and higher education has brought this country to a respectable position in software and e-commerce platforms. The fruits of the digital transformation in China bore fruit in a very short time. Online education companies and online education platforms became quite common in China, and since then an average of 2.6 online education companies have been established on a daily basis. Additionally, since 2015, nine online training programs have been published daily (Huang, 2015). In order to ensure digital transformation in higher education in China, many online educational portals have been launched, and online courses in undergraduate and graduate subjects, especially in Chinese, have been prepared and shared for free.

99.4% of students who attend schools in Germany have computers at home and spend an average of 144 minutes on educational/training activities using technology on weekdays. The time spent learning with technological tools at school is 14 minutes. It has been found that more than 99% of students in higher education in Germany have access to the internet and are well-equipped with digital devices at home (Bond et al., 2018).

Russia initiated a movement for digital transformation in education during the period of 2013-2020 (Rozhkova et al., 2019). Within this transformation project, goals were established such as the modernization of the education system and the transformation of educational programs into digital needs. Additionally, the goal is to implement digital transformation in the economy within the framework of the "Development of the Strategy for an Information Society in the Russian Federation 2017-2030." Different models for digital transformation of higher education institutions in Russia were developed in 2019, and special resources were allocated for this purpose. In accordance with the goal of a digital university, objectives such as establishing information systems for managing the university in Russia, providing online support during the educational process, preparing courses online and in accordance with augmented reality, and providing personalized educational experiences through the use of established artificial intelligence were set. The digital transformation of universities in Russia is planned to be realized by 2024 (Rozhkova et al., 2019).

2.2. The university reforms and the era of University 4.0

The reforms implemented at universities cannot be evaluated independently of technological innovations. The function, purpose, and role of universities have changed from the Middle Ages to the present day. Today's universities are referred to as University 4.0. The mission of University 4.0 is to train employees according to the needs of the era in which we live.

This includes, University 1.0 - Corporate University; University 2.0 - Research University; University 3.0 - Innovative University; and University 4.0 - Digital University.

2.2.1. University 4.0 (Digital University)

The latest stage in the evolution of universities is the subject of this seminar, that is, the concept of the digital university, also known as University 4.0. Essentially, the process of the digital university is still considered a blueprint process. This concept is related to digital platforms and the development of analytical applications and the new industrial revolution. University 4.0 should not be evaluated independently of Industry 4.0. In this time when universities began to digitize, educational centers, teaching programs, and educational resources are changing. The huge changes and development in technology have made it necessary for universities to adapt to this era. In the era of University 4.0, the physical space disappears, educational resources become more accessible, and virtual classrooms begin to take shape. In University 4.0, the old methods of storing, processing, and finding information are changing. Even the physical existence of libraries has become debatable.

The University 4.0 is based on interaction in physical, digital, and biological fields (Schwab, 2017). Higher education is moving towards cloud, personalized, and distance learning. Periodic education and training are being replaced by the concept of lifelong learning.

The University 4.0 model contributes to raising the quality of higher education institutions, producing skilled professionals according to the needs of the labor market, and influencing the economic and social development of society.

The University 4.0 model includes (Bilyalova et al., 2019):

- Development of a new business model (matrix structure, working with new markets);
- Formation of new values and attitudes;
- International cooperation;
- Promotion of entrepreneurship;
- Establishment of e-learning infrastructure and information technology.

The University 4.0 represents a new university structure. In the process of University 4.0, continuous opportunities for education are offered through various channels, whether traditional, multiple or online, short-term educational programs for acquiring various professional qualifications, development of skills for managing student careers, and continuous communication between industry and students (Dewar, 2017).

3. The model of a digital university

The concept of a digital university refers to the use of modern digital technologies and the restructuring of previous educational processes. There are many models in the world for realizing the digital transformation of universities. The common goal of these models is to design universities as part of an integrated global academic network. The first phase of digitization of higher education institutions involves involving internal and external stakeholders of the university and developing the curriculum according to the needs of these affected parties. Applications for wireless networks within universities, the establishment of online libraries, and access to international databases are some of the necessary steps for the digital transformation of universities.

The concept of a digital university is also considered a tool for strategic development. For digital universities, "literacy" is considered information literacy. There are many models and

approaches being discussed in the world on how digital universities should be. One of these approaches and models, and the "most reasonable" one, is that of McNell et al. (2013).

Digital participation refers to digitization that contributes to the teaching processes at universities. Information literacy is one of the outcomes of digital participation. It is also important to organize learning environments in a way that enables the development of information literacy. It is accepted that these elements have an impact on the design of curricula and models.

Employability, creativity, degree of digital literacy, and digital skills of graduates from universities and postgraduates are of great importance in the era of University 4.0. The development of these skills and competencies will be possible not only through updating learning environments but also through developing curricula and pedagogical approaches suitable for this era.

The transfer of knowledge resources into the virtual environment also brings into question the role and existence of libraries in higher education. Although the general trend supports the use of internet resources, a study including the views of academics on this topic provides impressive data. According to the research, 80% of the members of the faculty of humanities, 70% of social sciences, 80% of sociology faculties, 30% of economists, and 60% of scientists have the opinion that the role of libraries should continue (Housewright, 2008).

4. Models of learning that arise as a result of digital transformation

Technological changes and developments, the rise of social media applications, the increased use of multimedia content, the creation of interactive content, and faster and easier sharing are changing the models of learning in higher education institutions. The goals of education and knowledge direction, which Vermont (2007) called "process-oriented education", are also changing, and the expectations of the teaching staff in higher education institutions are changing as a result of digital transformation. As a result of this digital transformation, the expectations of the teaching staff are becoming more complex, and they are expected to structure their teaching processes according to the needs of this new era.

The learning models are also updated with digital transformation in the scientific teaching process. The learning models that emerge as a result of digitization can be explained in the following way (Davidson & Goldberg, 2009):

- Hybrid learning model: A learning model that takes place both in the classroom and on online platforms;
- Rotation model: A model that allows students to perform their learning processes at their own pace with one-on-one lectures in the classroom environment and includes online learning support;
- Flexible model: A model in which a large part of the training program is carried out online and teachers can respond immediately online when needed;
- Individual Model: A model in which one or more lectures are offered online according to students' needs, as well as learning in the classroom;
- Online-laboratory model: A model based on teaching all programs on online platforms, but allowing students to call on their teachers when they have difficulty understanding;
- Enriched virtual model: A model where students are not physically present in the school environment and education is provided by an online platform;

- Connected learning model: A model that deals with what students learn, emphasizing the momentary or non-instantaneous learning processes;
- Networked learning: A learning model that focuses on the network dimension;
- Social learning model: A learning model aimed at acquiring competence for social groups;
- Situational learning model: A learning model based on games and collaboration;
- Adaptive learning model: This is an adaptive learning model based on the student's needs.
Together with the digitization of the scientific and educational process, the expectations for the skills that students are expected to acquire from higher education institutions have also changed. The skills with which students can gain a competitive advantage if acquired in higher education institutions can be listed as follows: communication skills, self-learning skills, principles of ethics and responsibility, teamwork, flexibility, critical thinking, digital problem-solving skills, and skills for managing digital documents.

5. Digital transformation of higher education in RN Macedonia

According to the Global Digital Report for 2019, the global internet usage rate was reported as 57%. In the Republic of North Macedonia, the internet usage rate is over 80%, while the Ministry of Information Society and Administration's program for the development of the information society sets a goal of over 80% of the population in RNM. This impressive statistic reveals that the internet usage rate among RNM citizens is quite high and above the global average, which means that 3 out of 4 Macedonian citizens are internet users. The increase in internet usage and investments in infrastructure aimed at expanding internet access have enabled higher education institutions to initiate digital transformation to avoid falling behind the times.

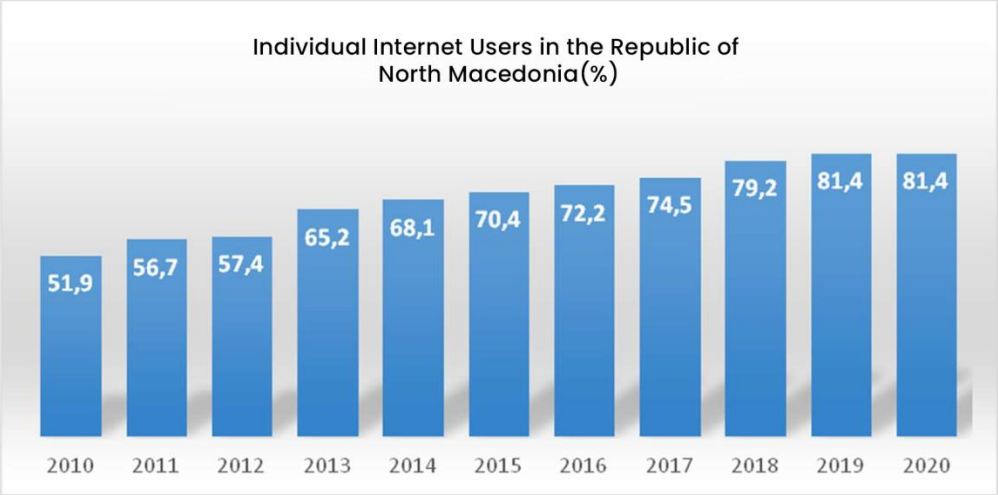


Image 2. Individual internet users in RN Macedonia

According to the Macedonian Digital Compass, the digital transformation of North Macedonia is based on 4 main pillars: Digital Connectivity and ICT Infrastructure; Digital Skills; Digital Government; and Digitalization of Businesses, ICT Enablers and Digital Innovations.

The process of digital transformation of higher education institutions in the Republic of North Macedonia is being realized at an accelerated pace. There are public, public-private and private universities that have significantly implemented this process. Additionally, the Ministry of Education conducts a large part of its services and communication digitally. In 2022, the

process of awarding student scholarships and meals has been completely digitized. Similarly, the procedure for the recognition and equivalence of foreign education is fully digitized.

5.1. Digital transformation of Goce Delchev University - Shtip

The electronic index of the Goce Delchev University in Shtip is an information system primarily intended for the complete e-administration of students from all study cycles at the university:

- First cycle of studies;
- Second cycle of studies, and
- Third cycle of studies.

With the help of the system, the institution has a complete insight into the entire course of studying of students in any faculty/direction/city/study cycle. Through this platform, students can perform all necessary activities during their studies:

- Enrollment in a semester;
- Verification of a semester;
- Registration for exams;
- Registration for project tasks;
- Electronic payment of all necessary expenses for studying;
- Electronic processing of all types of requests from students to the institution;
- Automated procedures for graduation, master's and doctoral studies;
- Monitoring of the electronic bulletin board, and
- Electronic consultations.

The teaching staff carries out the activities for which it is responsible in the part of student administration:

- Electronic evaluation;
- Evaluation of commission applications (with administration of the commissions);
- Verification (in process) and evaluation of completed exam/diploma work/master's thesis/doctoral thesis;
- Administration of electronic notices;
- Insight into the status of registered students for any form of examination, and
- Insight into engagement in all forms, years of engagement and study cycles.

The administrative staff has responsibilities in the following areas:

- Data administration;
- Generating necessary documents, and
- Supporting students in entirety.

Around this system, the following gravitate: Module for enrollment of students (first cycle); Human resources module, and Support module for electronic index users (internal use).

The sector for electronic index is responsible for development, technical and part of the user support, whose responsibility is the functioning of the platform 24/7.

5.2. Digital transformation of University "St. Cyril and Methodius" (UKIM)

The digitalization of UKIM is a process that has a long history and is experiencing particular development during and after the COVID-19 pandemic. The activities in this domain are directed towards:

- Establishing, maintaining, developing and advancing their own communication infrastructure as the basis for implementing computer-based services. Within this activity, its own optical data network has been developed with fast links (1 and 10 Gbps), connecting the largest number of units at the University in the so-called University Computer Network. The University Computer Network with a 1Gbps connection is connected to the Macedonian Academic Research Network - MARNet. In order to improve the reliability and bandwidth of the University Computer Network, i.e. resistance to interruptions and failures, reserve data links are being established in the phase of implementation through the purchase of commercial optical links, with which data rings will be formed, so that a break in any point of the ring will not mean unavailability of the vertices in the ring.
- Development and implementation of numerous computer-based services based on the University Computer Network as infrastructure. These services are in function of supporting the teaching process of units, interaction of students, teaching staff, faculty and institute administration, and external entities. Additionally, such services have been developed to support the work of the university administration, i.e. as support for the realization of certain rights of the students.

In the past decade, UKIM developed a central student information system known as iKnow system as the basis for electronic student records. The system tracks the student from the moment of their enrollment at the university until graduation. In that sense, it contains subsystems for conducting enrollments, i.e. conducting competitions within which candidates apply, submit the necessary documentation in electronic form, which is validated by faculty admission committees and finally ranked. Based on the output ranking lists, candidates who are within the quotas are enrolled and their personal data is automatically entered into the main module of the system, i.e. the electronic student record is formed. Here, the progress of the student during their studies is recorded through the evidence of the enrolled semesters with subjects and credits. The system contains information on study programs with accreditations, related subjects, and the professors who teach the courses. The faculty administration is required to activate the exam sessions according to the university calendar, where students electronically apply for taking exams, and where professors record the results of the exams. This represents the electronic student index. Finally, through a separate subsystem, support is provided for the graduation process. The iKnow system fully includes the second cycle of studies, and recently, adjustments to the system to support the third cycle of studies are being made. In addition, the adaptation of the system is in the final phase, which will enable electronic cashless payment of student obligations arising from the study process with electronic payment cards.

As an additional aid in conducting classes, the iLearn system is also used, which is a digital distance learning platform and an implementation of the well-known Moodle platform. iLearn is a system that recognizes two components: a digital learning support platform as a means of "offline" work for students, and a video conferencing system for conducting distance learning and real-time exams. Within the first system, setting up and accessing materials, multimedia learning resources, homework and activities, testing, grading, monitoring student progress, and evaluating teaching through questionnaires, among other things, are provided. Microsoft Teams was chosen as the video conferencing platform within the second component, which the University currently provides for free to its members.

The University also has a digital repository of documents (https://repository.ukim.mk) in which the current and past scientific and artistic production of the University is archived. The main goal of the repository, called the Treasury of Scientific and Artistic Works of UKIM, is to enable centralized storage of information about the collection of scientific and artistic works of the teaching and scientific-research staff of the University, together with their additional (meta) data, which enables better organization, processing, exchange and search, and at the same time will enable an increase in the level of visibility of the University. Recently, doctoral theses, as well as other documentation arising from the process of studying for doctoral candidates from UKIM, have also been archived in the Treasury. In addition, as part of a separate project, past doctoral theses of doctors of science who graduated from UKIM and whose theses are available in paper form are being digitized.

For easier access to university IT services that require user authentication as a precondition for access, a Single Sign-On system has been developed and implemented at the University. This system enables every employee and student at the University to be guaranteed access with a single username and password to multiple electronic services at the University (iKnow system, iLearn system, the Repository, Eduroam - WiFi network available at some faculties as well as almost all European universities, and specific electronic services at some technical faculties).

Finally, it should be noted that this brief overview only covers the digitization activities organized and implemented by the University, and does not include the digitization processes carried out independently by its constituent units, especially those units that cultivate disciplines in the technical sciences.

5.3. Digital transformation of "St. Kliment Ohridski" University – Bitola (UKLO)

At the "St. Kliment Ohridski" University – Bitola the process of digitization has been introduced in the scientific-educational process, as well as in communication and providing services to students. The COVID-19 pandemic had a significant impact on education, which led to a rapid adoption of digital technologies in the university and administration of UKLO. Like many other universities, UKLO had to quickly transition to online learning in order to continue providing education for its students while adhering to public health guidelines.

Here are a few examples of the digitization process implemented at UKLO:

Student's file:

- Enrollments for candidates for university admission (first and second cycle);
- Semester enrollment;
- Exam registration;
- Requests and issuance of certificates and documents;
- Self-evaluation of the university through student surveys related to study programs and teaching staff;
- Mobility;
- Payment of obligations (semesters, exams, other obligations and debts).

Professors and students services:

- Entry of grades and exams/quizzes;
- Reports for exams/quizzes;
- Communication with selected group of students based on various parameters.

Education:

- Online/hybrid teaching through Meet and Teams;
- Classroom (communication, assignments, learning materials);
- Moodle (repository of learning materials).

As it is stated above, just like in UKIM, at UKLO there is active electronic student index on the platform Iknow where students electronically apply for exams, and where results of the students' exams are recorded by the professors. The iKnow system includes the second and third cycle of studies. Also, the system enables electronic cashless payment of students.

The University has digital repository called Eprints Repository, on the given website http://eprints.uklo.edu.mk/ where, current and past scientific and artistic production of the University is archived.

5.4. Digital transformation of the University of Information Science and Technology "St. Apostle Paul" - Ohrid

As part of the digital transformation of the University of Information Science and Technology "St. Apostle Paul" in Ohrid, (UIST) the Moodle Learning Management system is used for teaching implementation, which the University has been using since its inception. This enables the exchange of learning materials (presentations posted by subject teachers), homework assignments, project tasks, quizzes, tests, etc.

Since 2020, the University has also been using the Microsoft 365 platform, which enables online teaching, meetings (appointments) between students and employees. This platform also enables the exchange of learning materials, homework and project tasks, testing students' knowledge, etc.

At UIST, an electronic student record system has been implemented, tracking students' progress, renting books from the UIST library, electronic financial and material accounting, and a web module for enrolling new students. These modules currently work at the level of desktop applications (except for the module for enrolling new students) and do not allow the use of distance learning services by students. It is necessary to upgrade the current software or implement new software so that these services would be available to students in electronic form, from a distance.

5.5. Digital transformation at Mother Teresa University (MTU)

MTU provided education for its students while facing the COVID-19 pandemic and was taking care of public health guidelines like the other public universities.

Here are a few examples of the digitization process implemented at Mother Teresa University today:

- Online courses: MTU uses Google Classroom as a learning management system to provide its students with access to online content. The university expanded its offerings of online courses and moved existing courses online to continue providing education during the pandemic and beyond. This allowed students to continue their studies remotely and allowed Mother Teresa University to reach a wider audience;
- Virtual classrooms: Universities have also adopted virtual classrooms and other online collaboration tools to enable students to communicate with their professors and classmates in

a virtual environment. This includes the use of platforms such as Zoom, Google Meet, and Microsoft Teams for synchronous and asynchronous learning;
- Digital resources: Universities have created digital resources, such as digital libraries with access to e-books, online articles, and journals, more widely avai3lable to students in order to facilitate learning over the Internet. This has enabled students to access course materials and other resources remotely;
- Digital library: EBSCO and other libraries;
- COURSERA: Mother Teresa University has opened an account with COURSERA, which offers students free access to most of their content during and after the pandemic, with only one course per academic year;
- Blended learning: Universities have implemented a blended learning model, which combines online and in-person instruction. This allows the university to offer a combination of online and in-person learning, depending on the needs and preferences of the students;
- Online exam registration has been offered to the administration using software developed by Mother Teresa University;
- Online class attendance registration is done through Google Forms;
- Online training and seminars: Most of the seminars during the pandemic are held online using various specialized software solutions;
- Online meetings: Senate and Rectorate meetings are sometimes held online using Google Classroom; and
- Internet guests: Some of the guest speakers, including distinguished professors from abroad, are realized using online software systems.

Overall, the COVID-19 pandemic has led to a significant increase in the use of digital technologies in universities, enabling them to continue providing education to their students during the crisis.

5.6. Digital transformation at the University of Tetovo

The primary purpose of the electronic index at University of Tetovo is to provide a comprehensive e-administration system for students across all study cycles at the university, including the first, second, and third cycles. The system allows the institution to monitor the progress of students in any faculty, direction, city, or study cycle. Students can use the platform to carry out necessary activities throughout their studies, such as enrolling in a semester, registering for exams and project tasks. The system also provides automated procedures for graduation, master's and doctoral studies, as well as electronic processing of student requests to the institution.

The teaching staff can use the system to carry out their responsibilities in the part of student administration, including electronic evaluation and commission applications, verification and evaluation of completed exam/diploma work/master's thesis/doctoral thesis, administration of electronic notices, and monitoring of the status of registered students. The administrative staff is responsible for data administration, generating necessary documents, and providing support to students.

The electronic index system is supported by modules for student enrollment, human resources, and user support, which are used internally.

6. Concerns about digital transformation in education and training

The digital transformation of education is revolutionary. Like in any revolution, there are gains and losses. The digital transformation of education arises as a result of need. A large part of the focus of the digital transformation of education is on the development of virtual learning

platforms and online courses. It is a proven fact that online platforms and virtual courses are effective and accessible (Chatterjee & Nath, 2014). Technological development is considered a driving force for modernization and prosperity. However, there are negative situations and worrying aspects created by the digital transformation realized together with technological development (Gringard, 2016). The threats to cyber security, the spread of false and misleading information through social media (Allcott & Gentzkow, 2017), and the fear of massive layoffs as a result of automation are considered the main "dark sides" of digital transformation.

There are two types of mainstream approaches to this topic: "enthusiasts" who support the role of technology in education and training, and "skeptics" who approach it with doubt. Enthusiasts advocate for the advancement of technology use, which is a dominant trend worldwide. Supporters of digitization in higher education promote the view that this is the golden era of education and science, where one can access any desired information.

Researchers in this field have different approaches to digitalization of education and opinions on these approaches are skeptical or, rather curious.

According to Chris Bigum and Jane Kenway (2005) there are three categories of approaches around the digitalization of education like: doomsters, critics and boosters. As they say “the Boosters, the Doomsters, the Anti-Schoolers and the Critics - leading to their own exposition of a practically workable and educationally justifiable stance that schools might best take towards high technology and future schooling” (Bigum & Kenway, 2005). Doomsters are the one who see nothing but dangers and disadvantages in digitalization, while critics possess a cautious attitude towards digitalization and their pessimism is not absolute, instead they have adoptive mindset but they remain skeptical about the use of computers in schools or elsewhere. Furthermore, according to Pekka Mertala (2019) there are two sub-groups identified among boosters, the first is the digital re-schooling, which refers to descriptions of formal education provisions being reoriented and recast for a digital era and the second one the digital de-schooling, which refers to the de-institutionalization of education (Mertala, 2019).

Today, the dominant view in the world is that of the curious group. However, the approaches and criticisms of skeptics who claim that technological transformation of education will have negative consequences are also striking. The skeptical approach argues that digital transformation will cause public schools to lose their dominance, create social incompatibility and inequality (Collins & Halverson, 2012). Although the use of technology in individual learning provides opportunities for effective and faster learning, teaching is fundamentally a social and emotional process.

"The skeptics" who oppose technological transformation in education argue that teachers should moderately use technology in their transfer of knowledge to students. As a concern, the question arises whether state schools can adapt to the technology-oriented educational process during the digital transformation process. If the educational methods developed in the last 150 years cannot be harmonized with the development of technology, it is argued that technology can create unequal instead of equal opportunities (Collins, 2008). The "skeptical" approach, which claims that digital transformation in education will reduce the significance of schools, argues that schools will have a harder time in the learning process compared to the past and present. Possibilities such as homeschooling, workplace learning, distance education, online education portals, which are the result of the digital transformation of education, may reduce the importance of schools while eliminating the space in the educational process (Collins, 2008).

Although distance learning in primary and secondary education still requires dependence on schools, this dependence disappears at the university level. The fact that undergraduate and

graduate education is paid for in many countries makes online and distance education attractive. The concept of a virtual university, which does not require any physical connection to the university, is becoming more prevalent. An example of the concept of a virtual university is the University of Phoenix. According to data from the University of Phoenix in 2008, 30,000 of its 100,000 students are online students.

Digital transformation in education increases efficiency, and the number of students who can attend classes with digital platforms is not limited. A business school in the USA saved an average of $5.5 million annually during the period 2001-2016 by implementing its digital transformation.

The level of effectiveness in university education is determined by measuring the results of learning and student satisfaction (Piccoli et al., 2001). The experience of learning with physical presence in the classroom has benefits such as the possibility to receive answers to questions in real-time and to transmit the instructor's career experiences live.

Efficiency and effectiveness are the anticipated positive outcomes of digital transformation. However, there were also some undesirable consequences resulting from online education. These negative consequences include changes in roles, reduced human interaction, and strategic learning. Changes in roles refer to the shift in the role of the teacher/educator. The task of the teacher is not only to transmit information but also to decide on the volume of information to be conveyed and to determine the pedagogical method. In online education, the teacher's pedagogical characteristics are reduced. Additionally, digital transformation in education significantly reduces interaction between students and teachers.

Minimizing human interaction is not seen as a desirable and expected outcome of digital transformation in education. On the other hand, digital transformation in education also has a negative impact on strategic learning.

The arts of individual digital learning cause inequality: In the classical process of education, teaching is delivered with certain teaching programs to all students, whereby it is clear that your results will be approximately the same for everyone. Such a result is not possible to obtain with individual digital learning, because knowledge is drawn from multiple sources, different from everyone, so the final knowledge will not be equal for everyone.

Loss of authority of teachers: The digital transformation of education changes the role of the teacher and undermines the authority of the teacher.

Problems with standard evaluation and assessment: Methods for measuring and evaluating the results of student learning are objective and aim to establish whether every student has learned the same. Evaluation and measurement systems for schools in e-learning processes will not be as successful as before.

The school aims to provide all the important information that students need for the rest of their lives. As a result of digitization and technological development in education, knowledge is exponentially increasing, making it difficult for schools to fit all the information into their curricula and convey it to their students. For these reasons, teachers need to teach students how to learn, what information they need, and which sources of information they should use. The weakening of the teacher's role may not allow for this.

Inequality: Public schools are institutions where students from different socio-economic classes are educated. Will public universities have the same opportunities as private universities in the process of digital transformation?

Citizenship and social cohesion: One of the main goals of education is to teach students to be good citizens. Another mission of education is to teach students about the shared culture and values of society. The reduction of the role of schools as a result of digital transformation can cause problems such as a decrease in citizenship and social cohesion.

Less competition: Schools are competitive environments. The feeling of competition enables the school to teach students even if they do not succeed. Competition is presented to the student in a controlled way that will be safe. In online learning portals, students may not learn about the feeling of failure and the empathy that comes from it.

Conclusion

In order to keep up with the industrial revolution, known as Industry 4.0, it is essential to digitize the entire educational process with a special focus on the digital transformation of higher education. Graduates of the digital educational process are compatible with the needs of the digital industry and represent a competitive advantage for businesses.

Although technological change brings an end to some professional groups, it also creates new jobs and occupations in many areas. While routine tasks are entrusted to machines, digitally educated individuals are creative, have digital and social skills, and are in high demand in the new world. Many countries are experiencing a shortage of highly qualified workers. It is estimated that by 2030, the global talent shortage will reach 85 million.

The process of digital transformation of the entire educational process in the country is visible but not fast enough, and the digital transformation of higher education institutions is also a slow process. There is an uneven pace of its implementation in different universities in the country.

The establishment of an online educational platform among universities and coordination of the process will facilitate equal development of digital transformation and access to information.

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