1. INTRODUCTION

We have become part of globalization processes that brought us to the threshold of a new technological revolution, which will fundamentally change the way we live, work, and communicate with each other. In its degree, scope and complexity, this transformation will be as fundamental for humanity as any technological and social change that has taken place so far. The development of this change is difficult to predict, but it will certainly be integrated and comprehensive, involving all parties involved in the public and private sectors, public institutions, academia, and civil society.

The paradigm Industry 4.0 is the digital revolution, which is characterized by the integration of technologies that blur the boundaries between the physical, digital, and biological realms. This transformation is determined by the speed, scope and impact on all sectors and branches of the economy, including education. Its development is accompanied by an exponential rather than a linear pace with a global impact. The breadth and depth of these changes have an impact on the transformation of the entire reproductive process and its management systems.

The possibilities of connecting an unlimited number of mobile devices, with high performance and data capacities, create access to new knowledge. These are supported by artificial intelligence, robotics, the Internet of Things, nanotechnologies, biotechnology, composite materials, and innovative ways of obtaining and storing energy, accompanied by the transition from a linear economy to a circular one.
2. CURRENT CHALLENGES ON THE WAY TO AN INNOVATIVE ECONOMY

Digitalization of the economy and Industry 4.0 offer new opportunities and challenges. New technologies can generate increased productivity and facilitate market transactions. They create new assets and services with near-zero or zero marginal costs. In addition, these changes and new technologies create new work activities and occupations for the labour market but also threaten a significant part of the activities traditionally performed by human labour. This has consequences on the overall level of employment, unemployment, and the structure of work, and on the level of income inequality. New work activities, based on digital skills, have the potential for growth and a high-income rate.

The deepening of the imbalance in the income rate relates to the existence of many low-income activities that new technologies will not replace soon, e.g., social services. These tendencies can lead to significant changes in society and to an increase in inequalities in both opportunities and outcomes. The overall impacts of digitization and automation on working conditions and the number of jobs are therefore not unambiguous, they are conditioned by the structure of the economy, dominant sectors, and the composition of the workforce and depend on education and retraining policies at the level of the state, sector, and company.

Digital connectivity will improve efficiency, accelerate innovation, and introducing new business models that can be implemented faster. The dynamic changes require a systemic transformation of education, the output of which is attained education suitable for employment in the physical, virtual, and socially interconnected world.

As stated by Lisý et al. (2016, p. 584), an accompanying impact of globalization upon an innovative economy leads to the growth of foreign investments, the flow of multinational companies, the development of international relations, and the growth of global trade.

Piovarčiová (2013, p. 1) added that globalization trends will first manifest themselves through significant changes in financial or capital markets because these markets are the carriers of globalization.

The signs of globalization may include the technological, informational and communication revolution, poverty, the global cultural industry, and the global network of financial markets. Concerning the economy, Collins (2015) assumes that globalization stimulates competition, enhances lowering consumer prices, increases economic growth, removes barriers to free trade, etc. Among the positive factors of globalization, the reduction of poverty in the world could be included. Thanks to information technologies, costs and time are saved. As a result of growing competition, the quality of goods increases and costs decrease, the pressure to develop technologies increases, and economic growth increases through liberalization and the expansion of world trade. World trade is growing faster than global production, and the internationalization of business leads to the development of the economy, on which the growth of countries’ living standards depends.

Procházková (2015, p. 205) pointed out that the negative factors of globalization include increasing social differences, the globalization of terrorism, and crime. As a result of the necessary dependence and interconnectedness of countries, unexpected and more prone fluctuations arise, and thus the economies of individual countries are more quickly infected by crises and shocks.
The global imbalances are increasing, and the global economy is affecting the distribution of wealth among countries. Unemployment is increasing, as there is a gap between the creation of new jobs and the liquidation of traditional jobs in inefficient productions. Cheap labour from other countries is utilized, which creates sudden fluctuations and shocks in the markets due to inadequate reactions of investors.

According to Collins (2015), free access to information, increasing living standards, new job opportunities, increasing supply and demand for goods, including their quality, reducing production and sales prices, and increasing communication possibilities are considered positive factors of globalization. On the other hand, the negative aspects of globalization include the deteriorating environment, income inequalities, and the increase in economic, ecological, and political migration. Hunger, poverty, and the number of military conflicts are growing.

The economy in the world is more prone to unexpected collapses and it is also affected by various multinational companies. We include here also the problem of the functioning of transnational institutions, the emergence of ecological problems and environmental protection issues, and the inequality in the standard of living. International companies are abusing their market position, thereby causing an increase in poverty in developing countries.

With the process of globalization, the power of multinational companies is growing, which is associated with the following facts:
1. because of their enormous power, conflicts arise with national governments,
2. there is a huge competition among them,
3. competition arises between national governments because of the need to attract and acquire foreign investors,
4. huge financial resources are invested in information and computing technologies,
5. there is a pooling of financial resources due to the financial demands of research processes.

3. EDUCATION MANAGEMENT

The changes identified above also significantly affect educational processes and management within educational institutions. The result of the educational process is attained education degree, as a complete set of knowledge and competences about the world in which we live. The constant development of digital and online educational opportunities, being present in the higher education system, calls on the management of education to adapt the strategies and teaching forms of the educational institution to new trends that are closely related to technology and digitalization.

According to Jankelová (2022, p. 13), the traditional approach to management is based on the role of management to set goals from top to bottom, build a hierarchy, enforce rules, control people, maintain stability and achieve results. The current approach, on the contrary, emphasizes the need for constant changes, innovations, adaptation, proactivity, and the search for differences and uniqueness.

A new perspective on education management from the aspect of the development of digital infrastructures is characterized by Bygstad et al. (2022) who emphasize the combination of bottom-up and top-down management because a key aspect of digital infrastructures is the interplay of user-level capabilities and interconnected technologies. A new view of management in
the 21st century as a kind of superstructure imposed on the traditional view is coming to the fore in the rapidly changing world. According to Jankelová (2022), it means the creation of such an environment in which employees see a deeper meaning in their work and feel responsible for the results of the organization, but also for its operation in the environment in which the organization is located.

According to Lesáková (2021), innovations and the availability of new technologies are changing the direction of education. They “replace” or “displace” existing educational models by disrupting the functioning of established educational models. She assumes that first, they improve them and then provide new ones. Innovation replaces existing methodologies, and ways of transferring knowledge and opens new educational alternatives. In the area of innovation and digitization, there is a huge potential for using technology to deepen and support learning processes.

According to statistics from the platform Statista (2023), the most successful educational systems will be those that can adapt to new technologies and offer their students access to digital infrastructure.

The new way of managing educational institutions also affects several external factors, which mainly include financial resources, increased demands on the quality of management of educational institutions and factors involved in the professional, business, extracurricular and lifelong education of adults.

Jankelová (2022, p. 536) stated that managers in the 21st century operate in conditions of foundational changes in society. Achieving success, fulfilling organizational goals, and maintaining competitiveness in the knowledge society requires new strategies that must consider the factor of sustainable development, elements of new technologies, the fourth industrial revolution and the digitalization and robotization associated with it.

New educational models and educational alternatives also bring new challenges for higher education institutions, which were identified by Burrell (2021). The new challenges first require coping with a new approach, based on a strategy that takes advantage of the cultural, work, and technological changes of the digital transformation. These changes were marked by Grajek and Reinitz (2019), who considered them primary indicators of digital transformation, which are closely related to the main goal of a new educational model, which is the creation of digital educational space and its continuous improvement.

Grajek and Brooks (2020) stated, the management of education is a new way of management, which affects the digital transformation of an educational institution, and it should fulfill the following tasks:

a) consider institutional strategic priorities as a set of big, new, and important challenges that also relate to the wider ecosystem of higher education (referred to as a “set of big challenges”),

b) create and adopt a new “grand strategy” that can provide a coherent principle, define a vision, consider the resources of an educational institution, and focus on priorities,

c) consider the digital transformation, by means of which they can progress with the fulfillment of the university’s strategic goals (educational goals) to a higher level, fulfill strategic goals by rebuilding the institutional culture, modernizing workforce practices, and applying new technologies to manage higher education.
A well-executed updated education strategy enables higher education institutions to achieve their goals, which are new, more flexible, and relevant educational opportunities and other qualification programs within the new strategy that can attract a new population of students, thereby strengthening higher education. The goal of a new educational model is the development of a digital educational space and its constant update, which can be provided only by proper management and a well-functioning information technology department of an educational institution. Digital transformation in higher education was defined by Martin and Xie (2022) as the use of digital technologies for significant improvements in education, the experience of students and teachers, and the creation of new teaching models.

Radó (2017, p. 41) summarized the expectations of the 21st century and the requirements for education in several points: personalization, motivation, intensive involvement of the environment in teaching, use of digital trends, education based on cooperation, on the feeling of personal safety, satisfying the interest and curiosity of students, using diverse resources for strengthening knowledge on multiple threads (links), diversity and interoperability of learning methods and contexts, continuous and progressive assessment, feedback, space for creativity.

Based on the new approach and new definitions considering the digital transformation of society, it can be stated that in the 21st century, the management of education is expected to implement a new educational model in higher education. In this connection, Grajek and Brooks (2020) stated that educational management in grand challenges must set goals, in grand strategy define the approach, and digital transformation will provide methods that will enable higher education institutions to achieve their goals.

The key management activities of education management can be visible:
- in determining new directions and strategies for achieving the goals of educational institutions,
- in planning the individual steps of the educational program,
- in organizing available resources (people, time, sources),
- in control of the implementation process,
- in establishing and improving organizational standards.

Educational management can be defined as a set of coordinated activities aimed at managing an educational institution that creates a modern, inclusive educational model based on a pedagogically controlled technological foundation. The strategy of creating a new educational model uses the cultural, work, and technological changes of the digital transformation, applies new and emerging technologies, and manages the education of learners from the aspect of their professional growth and development while being guided by pedagogical experiences. The concept of educational management must be stable, formable, viable, and should create a value offer for students, the community, and partners of the university. Educational management is a way of managing higher education institutions, the result of which, like attained education, leads to the integration of education and society.

According to Bolgarová (2021), the key demands of globalization and Industry 4.0 place new requirements on education, including individualized education, focused more on the education of the individual, not on the education of the whole group. The education of teachers must be a priority, as teachers should be constantly trained and able to work with the most modern technologies. The education of students must include increased flexibility in the learning process, as
well as a change in student assessment. It also includes a change in the role of the teacher, who is supposed to be a mentor and coach.

The educational management in the strategic planning of a new educational model must consider several areas for improving digital education. For educational management, it is necessary to analyse and assess seven aspects to improve digital education, which Martin and Xie (2022), and Gaebel et al. (2021) denoted as the digital transformation framework for higher education. Key aspects of improving digital education include the following areas a) digital educational technologies, b) teaching methods, c) support services, d) organizational strategy and planning, e) employee development, f) student development, and g) partnerships.

4. INNOVATIVE EDUCATIONAL MODELS

Effective and high-quality education in the higher education environment, in the form of a new educational model, requires a significant increase in infrastructure and stable technological security to support digital teaching and learning technologies, as stated by Fry (2022). Learning Management System (LMS) is software or a set of tools that ensure the provision and management of education. It helps create, manage, organize, and deliver online learning materials to students and educators. Manages communication within the educational system and stores information about assigned lessons, and courses. It is used to store all materials, modules, and activities. The teacher can send announcements, participate in discussions, prepare, and grade assignments and maintain an index in the LMS. Good use of LMS can also support remote work or teaching and some forms of distance learning. Many modern LMSs already include some features for artificial intelligence and learning analytics.

According to Pšenáková (2022, p. 21), technologies for synchronous learning, used to conduct online meetings in real-time, are considered as a subset of online teaching, when all students learn together at the same time and often in the same place, but the teacher is in another place. Videoconferencing or teleconferencing is used to connect the teacher and students digitally. These technologies include a variety of functions such as audio and video, text, screen sharing, polls, whiteboards, and breakout rooms for small group discussions. Technology functions help teachers maintain interactivity in online teaching, using a variety of applications.

Multimedia applications (according to Microsoft, 2023) help the teacher engage the students as they include audio, video, and other interactive elements. Multimedia software can be used to record lectures, demonstrations, orientations, etc. Some multimedia applications can be embedded directly into the LMS for easy access and use. Collaborative applications (NEXTECH, 2020) serve to support effective and productive teamwork. These are web or cloud applications for word processing, presentations, and social engagement that allow students to collaborate online with their classmates and the educator. Cloud technologies (Team Security on Net, 2020) represent a virtual space through which users create, share and work with a large amount of information of various types.

5. FUTURE RESEARCH DIRECTIONS

Future research directions should primarily focus on educational management, the cultural development of digital education, and the development of subjects in the education process. Educational management staff must be ready to finance technology, and to respond to the ability to use new
technology given the new needs of society, which include cooperation, digital literacy, analytical thinking, support for active education, leadership, the ability of complex problem-solving and effective communication, creativity, teamwork, emotional intelligence and problem-solving capacity (Slovak Business Agency, 2022, pp. 48-49).

Educational management staff must ensure:

a) A group of information technology specialists for technological support and for maintaining networks and technologies for students and teachers, including individual support. Administrators of networks, information and communication technologies must be prepared to ensure the smooth flow of distance (online) education and to support face-to-face teaching and learning in various fields.

b) Support services for university staff, academics, and students. The college must provide access to services that can help with the digitization of learning and teaching, such as guidance, consultation, access to digital tools, and more.

c) Cooperation between managers, teachers, students and information technology workers and the opportunity to participate in the creation of an educational path, teaching and digitization of education and study programs is essential to ensure the achievement of goals.

Creating a culture that embraces proactive change in digital transformation is key. Leaders must foster openness to new ways of thinking and working, and the ability to make more effective data-driven decisions. When organizing planned activities and creating standards for teaching and learning according to the new educational model, management should be based on research-based procedures. Managers must consider a range of policies and standards such as teaching load, teaching criteria, performance, and assessment standards. Promotion of the digital transformation of teaching and learning in higher education requires the development and use of innovative digital learning tools and formats. However, this does not guarantee sustainable success. An important factor of sustainability is the development of a culture of digital education.

Building a digital culture is also necessary to address the gap between how an institution perceives its digital presence and what students expect. Building a culture of digital education begins with communication at all levels of the educational institution, the right choice and the effective introduction of digital technologies into teaching. According to Grajek and Reinitz (2019), the development of a culture of digital education requires the cultivation of new forms of participation. Therefore, students, educators and IT administrators must work together to explore the emerging challenges and support the implemented changes due to digitization.

This means that the use of digital tools in teaching practice should force educators to adapt their teaching habits and methods to innovations, as they provide many new possibilities and resources for learning. By the application of available digital tools, educators can support students in their digital skills development. Students will then be able to reflect on the results, and on the learning process itself. They develop their competences and build their independent learning habits, which can also be used in the process of lifelong learning.

In connection with the advancement of digital transformation, it is necessary to allocate, redistribute and stimulate resources for education and for the development of educators. As a result of the knowledge society, digital competencies are now widely understood as an interrelated set of competencies that are essential for success in the digital age. With the development of
technology, in addition to digital competence, it became important to interpret information and data, communicate and collaborate, take care of the safety of one’s person and data, create digital content, and solve problems, other topics relevant today came to the fore.

Nilson and Goodson (2021) consider it extremely important to address disinformation and misinformation in social media and on news sites, the trend of datafication of internet services and applications (e.g. focus on how personal data is used), the interaction of citizens with artificial intelligence systems, new technologies such as the Internet of Things, environmental sustainability concerns (e.g. resources for technologies) and new emerging contexts (e.g. telework and hybrid work).

Educators must continuously adapt to digital and online teaching and learning formats, which they can only do if digital learning is part of their professional development. Above all, they must learn how to adapt digital technology to specific subjects, goals, and activities during teaching. Therefore, their professional education perspective must shift from skills acquisition to technological competencies mastery. The argument of Nilson and Goodson (2021) concerning the quality of teaching is in line with DigCompEdu - The European Framework for Educators’ Digital Competence (Vuorikari et al., 2022) which provides a general reference framework to support the development of digital competences specific to educators in Europe, whereby the digital competences and skills development of educators should focus on technical skills, and how digital technologies can be used to improve and innovate education and training of students. Constant technological development and digitization require lifelong development of competences and skills from all teachers.

The key role of management in the strategic application of new technologies is to link the alignment of technical resources with the kind of change that a higher education institution needs. The technology aspect of digital transformation is obvious, but the other two elements - culture
and workforce change are equally important. Technology without an intentional focus on culture and workforce will not promote the transformation that institutions desire or need.

The process when schools adapt to the changing world is called the digital transformation of the school. As digital transformation is often confused with digitization, it is necessary to distinguish between digitization, digitalization, and digital transformation (Figure 1).

6. CONCLUSION

Digital transformation is not just about adding new technology or automating processes. It is a process of using data and technology to transform an entire institution and especially a process of organizational change that requires a unique vision, perspective and set of leadership skills.

We must agree with Muddassir (2022) who stated that digital transformation in higher education should be understood as the process of using digital technologies to enhance and improve the experience of students, by improving their interactions with instructional services, support teams and other areas of operation of the higher education institution.

It was rightly emphasized by Brooks and McCormack (2020) that digital transformation could be seen as a series of fundamental and coordinated changes in culture, workforce and technology that enable new learning and operating models, and transform the operations, strategic direction, and value proposition of an educational institution.

According to Kimachia (2022), digital transformation is a broader term that includes not only the digitization process but also the organizational changes that accompany it. This transformation is a path that begins with the identification of processes that can be improved or replaced by digital solutions and the subsequent implementation of these solutions to maximize their impact.

Another definition of digital transformation, as stated by Westerman (2019), speaks more of a change process that requires a unique vision, perspective and set of leadership skills to be successful. However, some experts see digital transformation as a technical challenge rather than a leadership challenge. In effect, digital transformation describes a new value offer, the result of coordinated changes in culture, workforce, and technology that, when combined, provide a catalyst for lasting transformation that fundamentally changes the way an institution delivers service or meets the needs of its students, staff, and partners.

Grajek and Brooks (2020) emphasize that digital transformation plays a key role, whether it is the implementation of a new technological solution or the possibilities that technological progress enables. New technologies such as artificial intelligence, big data, robotics, and the Internet of Things also create opportunities for companies to improve their operations and better serve their customers.

Digital transformation that can help companies keep pace with these changes and remain competitive in today’s business environment, is the future of higher education. The future will be the result of such strategies and coordinated changes that require strong management and commitment to institutional changes of the entire organization to bring about the expected result, education as an integral and complete physical, social and virtually interconnected aspect of life.
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Additional reading
