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Technological Challenges of our Time in the Digitalization of the Education of the Future

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Abstract: The purpose of this article is to analyze the features and prospects for the development of the process of using modern technologies in the educational process in the context of the study of the global trend of digitalization, which determines the digital transformation of education in the future. The scientific novelty of the article lies in the determination that digital education is not a substitute for traditional education, but an effective addition to the quality provision of educational services thanks to the introduction of advanced technologies into the educational process in accordance with the technological challenges of the present and future. The practical significance of the obtained results is manifested in the possibility of using them to develop a strategy for solving existing problems of educational digitalization, finding tools for optimizing the process of obtaining online education. Deepening the process of digital transformation of education will make it possible to expand the possibilities of comprehensive use of modern innovative technologies to increase the level of efficiency and accessibility of education, which in turn contributes to the formation of competitive specialists who possess digital competence skills - the key to building a successful career in the future.

Keywords: digitalization of education, technologies, distance learning, digital competence, education of the future.

Introduction

Research Problem

Obtaining quality and accessible education regardless of time and spatial boundaries is an urgent issue of today because of the need to expand the possibilities of traditional education, as the current state of society development requires a high level of professionalism from future specialists in the context of mastering the skills of using the latest modern technologies, which can be obtained only by forming digital competence of teachers and education applicants. It seems possible, blah

Digitalization is not only a trend of the present time, but also a promising direction of improvement in various spheres of activity, including education of the future, which can develop according to different scenarios, but certainly under the influence of technological progress. Digitalization of education is a priority direction of reforming this industry, as there is a transition from automation of learning in the form of computerization, digitization of the educational process to the transformation of the paradigm of learning in the context of the introduction of innovation, such as artificial intelligence, VR-technology or other EdTech trends, and this process will deepen and qualitatively change the prospects of the future educational space.

Given the above, the introduction of innovative approaches through the use of various online platforms and applications in the educational process is a necessity due to both the need to improve the quality and accessibility of educational services in a distance learning environment, and the challenges of the current information space in the aspect of deepening digitalization of education of the future. That is why this topic arouses scientific interest and requires analysis of the state of application of modern learning technologies in the context of digital transformation of education in order to determine the prospects for their further use.

Research Focus

Many domestic and foreign scientists have devoted their works to the study of the peculiarities of the educational process in the light of technological challenges today, as digitalization is a comprehensive trend, which determines the interest in the study and use of innovative technologies, in particular in the field of education. Thus, Kolbina and Oleksenko (2020) analyze the current problems of distance learning implementation in Ukraine. Nahaev and Hrynova (2020) study the content and effectiveness of distance learning technologies. Petrenko et al. (2020) in their works determine the trends of their development. Also noteworthy is a study by Armstrong-Mensah et al. (2020) and Portillo et al. (2020), in which the authors consider the coronavirus pandemic as a catalyst for the development of distance learning worldwide. He and Li (2019) identify features of informal digital education. Also, Muktiarni et al. (2019) comprehensively examine the impact of digitalization on the field of education in the modern industrial era of human development.

Research Aim and Research Questions

The purpose of this article is to analyze the features and prospects of development of the use of modern technologies, widely used by both teachers and students in education, taking into account current educational trends, in particular the digital transformation of education of the future.

To achieve the intended goal, it is necessary to perform the following tasks:

- identify the key reasons for the digitalization of modern educational activity,
- to present the benefits of using the latest educational technologies for both teachers and students,
- to elucidate the risks and problems caused by the digital transformation of education today,
- to characterize the peculiarities of using the most popular technologies, the role of which has increased in the conditions of distance learning,
- to analyze the state of correspondence of the development of the educational sphere with the needs of the present and to substantiate the prospects of the digitalization of education of the future.

Research Methodology

General Background

To implement the goals and objectives aimed at its achievement, used methods of research, which helped to comprehensively investigate the features and prospects of modern educational technologies in the educational process, both present, and future.

Sample / Participants / Group

This theoretical study is based on a sample of such digital technologies in the educational process:

- platforms for creating personalized learning environments Moodle, Google Classroom, and Edmodo,
- Zoom, Skype, Microsoft Teams, and Google Meet video communication services,
- Quizlet Go, Kahoot! Simplemind, Flashcards+, and xMind. Instrument and Procedures

During the study, such methods were used as an analysis of scientific papers on the topic, the synthesis of foreign and domestic experience, comparative analysis of advantages and disadvantages, the method of systematization and generalization.

Data Analysis

These methods were chosen taking into account the object of research - technological challenges of digitalization of education, so first of all, the analysis of scientific papers contributed to the definition

of the concept of digital education, the reasons for this transformation of the educational sphere. Also, the experience of digitalization of education in the Ukrainian realities and the example of some foreign countries was structured, which allowed a comparative analysis of the advantages and disadvantages of digital technologies in education. Systematization of the features of the use of distance learning technologies helped to identify current trends in the digital format of education, indicating the current state and prospects of digital transformation of the educational space.

Research Results

The application of progressive forms of educational organization is the main direction of educational reform. The technological challenges faced by today's educational institutions around the world stem from the need for digitalization in this field due to the emergence of global problems such as pandemics, interstate conflicts, or environmental crisis, which have actualized the need for the digital transformation of educational space through the use of distance learning technologies to acquire knowledge in a safe environment, despite the external instability of the world.

Holfelder (2019) argues that the digital transformation of the educational process is “the saturation of the physical space of an educational institution with electronic and digital devices, facilities, systems and the implementation of pedagogical technologies based on the use of information and communication, cloud-oriented technologies and augmented and virtual reality technologies”.

We can observe such transformation processes all over the world, as digitalization is a global trend of the present and even of the future, particularly in education. For example, during the quarantine through Covid-19 in Norway, the University of Oslo promptly took all the necessary measures to create digital classrooms, provided online support, access, and security of the use of the relevant services for students (Brandslet, 2021). Today, this process of digital transformation of education in Norway continues and intensifies in line with the increasing pace of digitalization.

There are also countries where the digitalization of education is less developed due to the lack of significant expertise or opportunities for quality investment in this area, but there are aspirations to improve the situation. For example, Mamun Bhuiyan (2020) believes that in Bangladesh the digital transformation of education will be possible with the creation of educational software under the patronage of the government, the Ministry of Education, education specialists, e-learning experts, and the Grand Commission of Universities.

At the same time, the effectiveness of the introduction of distance technology in the educational process has been assessed differently in different regions of the world. For example, McKinsey conducted a study according to which more than 2,500 teachers from around the world assessed the quality of distance learning on a scale of 1 to 10 in 2020. The average score was 4.8, with educators from Australia giving the highest rating of 6.6 and Japanese teachers giving the lowest of 3.3 (McKinsey & Company, 2021).

This indicates that there is a transformation of the educational process by moving from the traditional way of learning to the distance format of online education at a different pace, with its own characteristics, but all over the world. Muktiarni et al. (2019) found that technology allows for a standardized global learning environment in which students are surrounded by a variety of learning

resources and e-learning services, so the conventional education system must demonstrate a welcoming attitude toward new ways of learning associated with digitalization. Like any other approach in learning, the use of distance technologies in the process of obtaining education has positive negative consequences, allowing to determine the benefits and possible problems of the introduction of certain technologies. Consequently, it is known that distance learning technologies allow for: centralized management of the learning process in an electronic format; effective provision of training materials to students; support of modern standards in the field of distance learning technologies; possibility of multiple use of personal content; tools for effective organization of interaction between the participants of the learning process.

Also, the introduction of the elements of digitalization and gamification into the distance learning process corresponds to the latest standards of global digitalization, which contributes to integration into the world educational space and consequently improves the quality of educational services. The online format of education ensures the continuity of learning in conditions of external instability, which, in turn, allows for educational communication, additional transmission of information despite time and space barriers, building a flexible schedule of classes in accordance with the individual needs of the participants in the educational process.

As Kubrushko et al. (2020) point out, with the help of media and interactive tools it is easier for teachers to use the approach to teaching through the introduction of innovative approaches, including the use of “cases”, experiential learning, business games, because as a result students learn information much better and form relevant skills, being in an emotionally comfortable environment, without losing their desire to learn, generate ideas and create.

It should be added that the use of distance learning technologies has expanded academic opportunities for students and teachers to participate in various programs, conferences, internships, and events online, which simplifies access to them. Also, the use of information resources of such platforms as Web of Science and Scopus, cloud repositories, where scientific publications and other information distributed by advanced educational institutions around the world are placed, opportunities for publication in foreign publications have increased.

Another positive manifestation of the use of digital technologies in education is a favorable effect on the environment through the rational use of resources, which is manifested in the following aspects: reducing the cost of travel and accommodation of students and certain teachers; reducing the cost of printing the necessary educational materials, which today can be digitized or immediately developed in virtual format.

In addition, time savings can be noted, because training becomes available regardless of location and at a time that is convenient for you. Yes, in open online courses, students work asynchronously with all materials that are provided digitally. Although there are deadlines for submitting tasks, students working at their own pace have some independence about when they can do their work.

Regarding the risks and challenges posed by the digital transformation of education and the increasing use of distance learning technologies, the following should be noted. Armstrong-Mensah et al. (2020) found that making distance learning “work” for all students is a challenge because the best tools can be, but without equitable access for all students to them, sufficient preparation and training

time for teachers, and adaptation of existing curricula or development of entirely new course programs, it is difficult to replicate the in-person online learning experience.

Thus, there may be a decrease in the level of achievement among education applicants due to the lack of a proper level of organization of online learning, the complexity of monitoring compliance with standards of academic virtue, which can lead to the abuse of the relevant requirements by participants in the educational process. Kukharensky and Bondarenko (2020) point out similar problems in their monograph - low production discipline among students and teachers, lack of reliable authentication at control events, overload with documentation of the educational process, computer anxiety.

It should also be noted that the educational information on the web is very chaotic, not always relevant and reliable, so education applicants may have problems with its effective filtering, which in turn leads to difficulties in the process of learning certain disciplines, reduced concentration, decreased activity. in the classroom on the uncertainty of their knowledge.

In view of the above, it seems appropriate to systematize in the form of a table the advantages and disadvantages of the introduction of distance learning technologies, the active use of which is due to the digital transformation of education (Table 1).

Table 1

The advantages and disadvantages of the introduction of distance learning technologies

Pros	Cons
Continuity of the educational process	Uneven access to technology
Improving the quality and accessibility of education in accordance with recognized international standards	The decline in educational attainment among education applicants
Rational use of resources in the process of education	Potential for abuse of academic virtue requirements
Greater opportunities for academic activities, partnerships with foreign researchers	Low production discipline among both students and faculty
To satisfy the global trends of digitization and digitalization	Increased computer anxiety among participants in the educational process
Increasing the level of access to information, publications, etc.	Difficulties in analyzing information, deconcentration

Source: author's development

Domestic and foreign universities use a variety of technologies in terms of receiving online education, but we should highlight the most popular of them, which have proven their convenience, availability, and efficiency in the course of their use. So, many educational institutions in their activities widely use the platform Moodle, based on which educational electronic information complexes of universities function, providing opportunities for placing all the necessary educational and methodological materials, as well as interactive elements: presentations, tests, glossaries, quizzes, chat rooms, etc. In addition, using Moodle helps improve academic performance. Portillo et al. (2020) attribute this to the fact that this platform allows students to plan ahead and learn accordingly on their own, compared to the traditional or conventional way of learning, where the teacher only gives knowledge through face-to-face interaction. Google Classroom, Edmodo, and other services have similar functionality, which provide educational institutions with opportunities to create a personalized learning environment, where access to materials for studying certain disciplines is provided. The principle of such platforms is based on the fact that they place the course corresponding to the discipline, for example, a foreign language, so it is filled with digitized textbooks or collections of grammar exercises, recorded audio and video lectures, podcasts, presentations on the subject of the class, hyperlinks to additional materials and means of knowledge control - tests or quizzes for self-testing. The popularity of these services is due to the convenience of their integrated use both during classes and for homework, as well as for mastering additional material on a topic or section, which is important to achieve a high level of knowledge.

With regard to online classes, the most popular programs were such as Zoom, Skype, Microsoft Teams, Google Meet, through which the video conferencing maintains the social and communicative component of the learning process since the direct interaction of students with each other and with teachers is very important. Among other advantages of these services, Hussaini et al. (2020) highlight a wide functionality of possibilities for the implementation of interactive elements in the process of conducting online classes, because through video conferencing students can feel a sense of unity and communicate well with friends and the teacher in an interactive mode. Presentations, quizzes, virtual boards with the possibility of joint editing provide visibility of the material, quality organization of teamwork, and increase interest in the study of the discipline among students.

At the same time, these platforms can have significant drawbacks that affect the effectiveness of their use by participants in the educational process. For example, Zoom has a limited arsenal of options in the free version, and as pointed out by Burov et al. (2020), it puts a strain on the visual receptors of VEA and affects the psychological and emotional state.

Also, with the digitalization of the educational process, there has been an increase in the role of a variety of applications that simplify the study of a particular topic, because they contain elements of gamification, which provides the ability to develop various quizzes and games to test the level of knowledge and assess the performance of students. Simple but effective apps for learning include Quizlet Go, Kahoot!, Simplemind, Flashcards+, and xMind.

Holfelder (2019) notes that in the United States, too, apps that help teachers give and grade tasks and conduct classes online are gaining popularity. Among them are Newsela and Nearpod, a program that many teachers use to create live, interactive video lessons or to lead virtual field trips.

I should add that the digital transformation of education has challenged both educators and students with proper digital literacy, that is, the ability to create and distribute content using innovative

technology. First and foremost is a basic understanding of computer programming, skills in searching, filtering, and sharing information. However, a more important aspect of mastering digital competence is understanding the principles of information security, the cultural context of the online environment, and the ability to communicate in the online environment. Borodkina and Borodkin (2018) provide the following definition of digital competence – it is the user's ability to confidently, effectively, and safely choose and apply information and communication technologies in different spheres of life, based on continuous mastery of new knowledge and skills.

However, students will not be able to fully acquire digital literacy if teachers do not directly have knowledge in this area, so the digital transformation in education must begin with educators. Laszlo (2019) argues that only an educator who is digitally literate and digitally minded is able to provide quality preparation for future graduates. The teacher should have not only general technical and technological competence but also modern information and communication technologies necessary to implement the educational process in a distance form.

Given this, the implementation of the concept of lifelong learning in the aspect of improving the digital competence of teachers, given the technological challenges of our time should be ensured. Thus, an urgent issue of education sector reform in the future should be the creation of an effective system of postgraduate education institutions or professional development courses, which will contribute to the professional development of teachers in various branches of science to use technological advances in a distance learning environment. Also, as of today, the role of digitalization in receiving non-formal education is actively growing. He and Li (2019) believe that students with high levels of digital competence can find and organize the most appropriate digital tools and take advantage of them in informal digital education. A variety of public and private institutions offer numerous courses and projects to enhance their knowledge, including the use of current digital technologies. For example, the private Ukrainian EdTech Institute of independent professional online education Projector Institute offers everyone the opportunity to take a course “AI for business” on the implementation of artificial intelligence in various fields of activity (Projector — Creative & Tech Online Institute, n. d.).

Discussion

Global trends of today, in particular digitalization, reform the state of the modern education system in accordance with the technological challenges of our time, which leads to the transformation of the educational space in the aspect of expanding opportunities for the full use of technological innovation today and in the future.

It is believed that distance learning with the help of actual educational technologies, despite certain drawbacks in general, has a positive effect on increasing the level of quality and accessibility of education, but at the same time learning without technical intermediaries is still needed, so the most effective form of educational level is a combination of traditional and new approaches to the study of certain disciplines.

Foreign and domestic educational institutions in the process of obtaining online education provide and encourage students to use a variety of technologies. The most popular are platforms Moodle and Google Meet, video communication services Zoom and Teams, applications Quizlet Go and Kahoot! as they have clearly proved their convenience, accessibility, and efficiency. At the same time, the study also revealed the technological challenges faced by teachers and students in the use of such distance learning

tools. Thus, some of the functions of certain services are inaccessible to a number of participants in the educational process who cannot purchase a paid version, which reduces their effectiveness for this category of users. In addition, the constant use of technology can have a negative impact on human physical and moral health.

Given this, it is appropriate to search for ways to ensure the stable functioning of technical support from universities, based on which these technologies are used to implement their smooth operation, as well as the ability to eliminate problems that arise during the use of the platform, to provide suggestions for improving the operation of a particular service, because reasonable feedback is necessary for the quality transformation of the virtual educational space.

In addition, the technological transformation of the educational industry has actualized the question of how teachers and students can master the skills of digital competence in accordance with the needs of the information society. Today's educators need to learn how to communicate effectively with students in a physically distant environment, show leadership in an online environment, provide high-quality interactive interaction, and maintain motivation for learning, because this experience they must pass on to their followers, in particular, for the development of future education.

Consequently, it can be argued that based on the above, the objectives of the study were achieved - an analysis of the features of the use of modern technologies in the educational process and justified the prospects of digitalization of education of the future. Currently, the introduction of modern teaching technologies, their improvement, taking into account the distance format of education is more relevant than ever, because it provides both students and teachers with innovative methods of studying certain disciplines, which makes the learning process more effective today and even more progressive in the future.

Conclusions and Implications

Thus, the digital learning space is now actively developing, given the overarching trend of digitalization of all spheres of activity. Digitalization of education in today's conditions should be understood as the competent use of the latest technologies by both educators and students, which contributes to the formation of a highly professional personality, successfully implementing themselves in the modern information space.

As a result of scientific research and performance of the tasks set, the factors that led to the deepening of digitalization of educational activity were established, the advantages and disadvantages of using innovative educational technologies were highlighted, the most popular programs and applications for training and identified trends in the educational sphere in accordance with the technological challenges of our time were considered.

However, it is important to note that digital education should not be a substitute for classical education, but only supplement it with new technical possibilities for further development and integration of educational institutions into the national and global information space. Digitalization of the educational process caused a transition to a distance learning format, which led to a redistribution of roles between students and teachers, the formation of new effective forms of learning. An educational environment saturated with technology allows educational institutions to overcome physical and

institutional barriers and to interact with a wide range of education applicants, educators around the world.

It should be added that organizationally there is not just one digital learning space, but countless schools, universities, and non-formal education projects that have digitized their initial capacities, which in turn intersect with hybrid and physical spaces. Such possibilities reflect the powerful potential of digitalization of education, in particular in the future, because technology is constantly evolving, forming new forms of knowledge development, indicating the deepening transformational processes in education.

In the future, it seems promising to find ways to solve technological problems faced by educational institutions, namely: the issues of effective management and use of digital learning resources; development and financing of the development of domestic platforms and services that will be effective in the distance format of online education; compliance of the quality of digital competence of specialists with state standards and international requirements; implementation of tools for information and analytical support of activities.

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