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KEY POINTS, CHALLENGES, AND PROSPECTS OF DIGITALIZATION IN EDUCATION

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Qualitative changes in modern society are impossible without global transformations and digitalization - the introduction of modern digital technologies. The modern era of digitalization of society actualizes the need of the individual to act effectively, performing various social functions in the digital space, both independently and as a subject (as part of a team).

Thanks to a carefully organized digital environment, education becomes more accessible and comfortable, which is extremely important in terms of minimizing time and financial costs, as well as human resources. Digitalization is a mechanism for the development of the education sector due to the increase in efficiency and increase in productivity from the use of digital technologies. Given this and in order to achieve qualitative transformations, there is a need for total digitalization, digital transformation, which involves the introduction of a new educational paradigm, building the educational process in a digital format with the introduction of the latest methods that should be based on digital technologies, taking into account their advantages and disadvantages.

The works of such foreign scientists as M. Deuze, T. Thurston, K. Lundstrom, S. Mathrani, L. Mercer-Mapstone C. Reid, and others are devoted to various aspects of the introduction of digital technologies in the educational space [1-12].

Digital technologies make life easier by optimizing routine processes, leveling the boundaries in the educational space, going beyond the borders of one's country and continent. On the other hand, such a total introduction increases the requirements for the level of professional training of workers, increasing competition in the labor market. After all, there is a need for highly qualified specialists with certain competencies, efficiency, manifestation of activity, responsibility, perseverance and creativity, the ability to solve problems independently or as part of a team.

Undoubtedly, the digitalization of education must meet the basic principles of didactics, which will help to effectively introduce digital technologies into the educational process. At present, even a new direction has been formed, digital didactics - a branch of pedagogy aimed at organizing the educational process in the context of the digitalization of society. This scientific discipline uses the principles and basic concepts traditional for didactics, but transforms and supplements them, adapting them to modern realities. Digital didactics is the basis for building modern teaching methods and strategies.

So, let's consider the main didactic principles of the digital educational process [1-3, 5, 8, 10].

The principle of dominance focuses on the independent learning activities of the student in the digital educational environment. The teacher, in turn, needs to organize the learning process, provide support and help the student in the learning process.

The principle of personalization implies the ability of the student to independently determine the goal of learning, in turn, the strategy and pace of the educational process should be determined by the teacher and depend on the process of mastering the educational program. This approach will allow the teacher to track the personal development indicators and learning outcomes of the student.

The principle of expediency intersects with the traditional didactic principle of purposefulness: in the learning process and requires the use of such digital technologies that maximize the achievement of goals in the educational process of a particular individual. This principle implies the use of effective pedagogical and digital technologies and tools without clearly defined educational goals. Also, do not use the redundancy and variety of learning tools to avoid confusion and loss of time to adapt to the learning process itself.

The principle of flexibility and adaptability allows developing an individual approach depending on the conditions of the digital educational process. This allows the learning program to be automatically tailored to the goals of each learner, considering aspects such as the order, manner and pace of the delivery of learning material. This principle also considers the level and nature of student support.

The principle of success in learning requires the achievement of the set final or intermediate goals, as well as the full assimilation of knowledge, skills and abilities. This principle is the final element in the didactic chain "explanation - consolidation - control". The teacher must track the optimal ratio of classes and the result obtained, which allows you to maintain interest in the classes and the final interest. Digital tools greatly speed up this process and make it less routine.

The principle of learning in cooperation and interaction requires the construction of an educational process based on active multilateral communication - between a teacher and a student or a group of students, as well as students in cooperation. This principle involves the use of group forms of network learning.

The principle of practice orientation is directly related to the traditional didactic principle of linking learning with life, requires a clear setting of goals and specific results. To do this, you need to organize:

- a clear statement of educational goals, objectives and problem situations;
- practical tasks;
- consolidation of the acquired knowledge in real conditions, ideally on an existing project or enterprise.

The principle of increasing complexity which correlates with the didactic principle of accessibility, systematicity and consistency, suggests a sequential transition:

- from simple to complex and from complex to simple;
- from the general to the particular and from the particular to the general;
- from individual to group and from group to individual and other learning processes.

The principle of saturation of the educational environment requires saturation of the individual learning strategy with information resources. This can be implemented with the help of a network educational resource - a unified information educational environment.

The principle of polymodality is determined by the need to involve visual, auditory, and motor (kinesthetic) methods of perception in the educational process. For this, various devices are used, such as simulators, sensors, simulators, as well as augmented reality tools.

Principle of inclusive assessment requires continuous assessment of the student's success throughout the entire educational process. Digital technologies provide instant feedback, continuously transmitting to the teacher the necessary data on the results of the task. Thanks to this, the teacher draws conclusions about the strengths and weaknesses of the student, allowing you to adjust development scenarios and immediate learning goals right in the learning process. Thus, digital technologies provide objectivity and transparency of the final assessment of the performance of a particular task.

Consider the main tools and technologies necessary for the implementation of the digital education system [6, 9].

Media content, interactive digital textbooks, and information resources are becoming increasingly popular and are gradually replacing classical sources of knowledge. Taco content is videos, computer tests and other virtual reality objects that contribute to the transfer and implementation of knowledge. When using it, it is important that the teacher is able to effectively build the educational process correctly for its successful assimilation.

The Internet is a huge space for learning, but it's the sheer size of it that can sometimes be a problem. For the digitalization of education, the existence of proven educational resources that will be available to students around the world is important. For example, there are trusted sites such as Wikipedia, online libraries, and webinars from experts in various fields. But besides this, there are a lot of low-grade resources that provide incorrect data. Therefore, in training, it is so necessary to use sites with a high reputation, verified by professionals.

The ability to share data online has become very important for students and teachers and plays a big role in the digitalization of education. The work of all online courses is built on it, and this method of interaction will be relevant in the schools of the future.

Now distance learning has become very popular due to the pandemic, during which many classes were conducted online through services where it was possible to create “classes” to teach many people [1, 3].

There are many online platforms, as well as forums and applications for building communities online. They are created to imitate live communication, as well as provide an opportunity to exchange information.

IT technologies make it possible to use information in a new way: organize it in various formats, visualize, interpret, and make it more accessible for perception. It's an endless space for categorizing data and presenting it in the most human-readable way. It is like a brain with a convenient set of tools for searching and processing information. If students can competently store and distribute information, then they will be able to devote the freed time to more significant subjects.

Content creation software is also becoming more popular as it is modern and user-friendly. Now people are increasingly typing on a computer or smartphone than writing by hand. Drawings and music are also created using electronic media and programs. Even the creative aspects of life are being transformed with the help of digital technology. People still want to paint and make music, but in time they will start doing it through electronic instruments.

The following main trends in global online education have also been outlined, which are due to the development of computer technology.

The emphasis in education is on targeted training, as employers value professionalism in a particular area. Certificates obtained can serve as proof. This saves many people from the need for time-consuming, broad-profile education that requires many months, and often many years of development.

Also in recent years, artificial intelligence has developed significantly and has become capable of teaching. Of course, while he cannot completely replace a living competent teacher, but he can be an excellent assistant for him and an addition to the training program.

The so-called edutainment model (education + entertainment) is becoming increasingly popular in the field of digitalization of education. Game mechanics allow a person to keep their attention on one subject with interest for a long time, and thus gain knowledge in a fun way. Most often, this trend is used in teaching foreign languages, which makes learning simple and interesting.

Experts assure that the goal of digitalization of education is the use of technologies that will allow moving to a personalized educational process.

To comply with the digitalization of the process, it is necessary to develop material infrastructure, including data centers and the creation of devices for studying, developing educational materials; introduction of digital programs (creation, testing and use of educational materials using artificial intelligence); development of a learning management system (programs that can administer and control training courses) [1-12].

Experts believe that all this will create conditions for the digitalization of education and provide an opportunity to obtain equal and broad knowledge.

The education system is built mainly on independent work. Therefore, from childhood it is necessary to accustomed to the pursuit of knowledge. Such an educational base makes a person's character more solid and purposeful, and also allows you to achieve better results in the area of interest. In the future, paper media can be easily replaced by a student's personal tablet and a computer in the classroom.

The profession of a teacher is considered very difficult, and mainly in psychological terms. The teacher spends a lot of time and nerves on developing an

individual approach to each student. In the digital version, the teacher's work will only be a help to the student, who himself is focused on the result. The teacher will only have to set the direction of activity and correct the actions of his wards in controversial situations.

It is not so much information technologies themselves that are important, but also their proper selection, combination, and management to establish effective work.

The benefits of the digital transformation of education are obvious. This is the provision of favorable conditions for [4, 6, 8]:

- development of skills to study independently, to allocate the most valuable material for self-development;
- the formation of personal mobility, the ability to quickly adapt to changing conditions unpredictably and rapidly;
- strengthening motivation for self-education and self-development;
- reach a diverse audience (content becomes personalized), ensure collaboration and interactivity;
- building an individual educational trajectory;
- learning in the most convenient conditions - at a comfortable pace, but with the best use of the time allocated for certain tasks.

Thus, a modern educational space is developing, in which there are all conditions for mastering basic competencies. And, most importantly, digitalization ensures the transition from education for all to education for everyone.

The digitalization of education is a mutual transformation of the process that is being formed under modern conditions, and modern technical means that are being introduced into the educational process.

The goal of transforming the educational process is to use the possibilities of digital technologies with maximum efficiency. In turn, the goal of the development of technologies in the field of education is their complete adaptation and the most convenient integration into the learning process for maximum.

Digital learning is usually understood as a whole cohort of phenomena. Sometimes, speaking about the digitalization of education, it means the transition of students to distance learning using modern means of communication such as Zoom or Discord. And sometimes we are talking about the use of IT technologies as a supplement to existing educational practices. This also includes the training of future professionals who will be able to acquire the necessary skills to meet the realities of the digital economy and help reduce the shortage of workers in the field of information technology.

Digitalization of education and distance online education are different concepts. The concept of digitalization includes the use of various programs and

other digital resources to receive e-learning remotely or while gaining knowledge at a school or university. For example, these may be tasks that are performed in the classroom using electronic means such as a computer or tablet. Digitalization includes not only directly educational processes, but also organizational issues. These can be electronic diaries and journals, the ability to contact the teacher remotely, and so on.

The trend towards the digitalization of education has become especially clear in connection with the onset of the coronavirus pandemic. Schools and universities everywhere have switched to distance learning, and this has affected almost all students, their parents, and teachers [9].

But what became apparent with the onset of the pandemic actually began much earlier. The digitalization of education is on the rise. They are evidenced by the size of the education technology (EdTech) market. It is developing rapidly and, according to the World Economic Forum, by 2025 its size will reach 342 billion US dollars.

Modern people are increasingly helped in life by digital competencies. For example, interaction with government agencies now mainly occurs through websites, bank account management through digital applications. In addition, more and more people are working remotely. All this leads to the need to start teaching children how to use digital technologies correctly at school age.

However, it is worth mentioning the negative aspects of the full-scale digitalization of education and society. Consider the psychological aspects. There is a change in mental activity, mental abilities change because all the necessary data can be obtained on the Internet. There is no need to independently think about the solutions to many questions because they already have a ready answer. This phenomenon is manifested now not only in children, but also in adults. Less and less attention is paid to writing, which can lead to a decrease in students' student skills, that is, they will begin to read worse, and this will also affect their motor skills and coordination, namely, a decrease in the ability to formulate thoughts.

Socialization is deteriorating. When a student enters school, he learns there to build relationships with other people. He learns to make friends and interact with society. Obtaining knowledge through the information system significantly reduces a person's ability to socialize, which cannot but affect his personality development.

It is also worth mentioning the physical development. First of all, the digitalization of education will have an impact on vision and fine motor skills. Long stay at the screen of a computer or tablet leads to eye fatigue and, as a result, to a subsequent deterioration in vision. Because of this, the likelihood that in the future a person’s vision will become much worse than it is now increases. This problem

can be solved by creating new technologies that will become safer. In addition, constant work with the keyboard leads to a change in the physiology of the fingers, especially for the emerging young organism.

So-called absolute control is created. This applies not only to schoolchildren, students, but also to their parents and teachers. Each person will have a personal file with detailed information about him and his family. This will lead to the absolute control of society. The child will be completely under the supervision of the parents, which will affect his ability to make independent decisions. After all, earlier it was possible to keep silent about the teacher's remark, correct the grade and try to solve any problem with the help of personal ingenuity, albeit not always in the right way. After the implementation of the project on the digitalization of education, this will not work.

But it is necessary to note the positive aspects of the digitalization of education. This innovation has gained a certain reputation among students, who highlight such a positive aspect as convenience, namely saving time. Also, a positive feature is practicality, physical convenience, mobility (education is available at any time). Well, the last positive aspect is the economic and environmental feasibility, expressed in reducing the cost of purchasing educational literature and reducing the amount of deforestation, which is necessary for the manufacture of paper media.

Today, digitalization appears as a key factor in improving the education system. In addition to a direct impact on the effectiveness of the educational process, it provides a chain of indirect benefits the optimal use of time for more efficient formation of key competencies.

Thanks to digitalization, the educational process is becoming more personalized, accessible, and flexible. This, in turn, provides comfortable conditions for self-learning, effective development and career growth. However, digitalization should by no means be seen solely as an end. It is only a tool, it creates advantages and provides easy access to them, it is a paradigm shift in the way we think, what tools we choose for actions, what strategies we prefer in communicating with each other and with the external environment.

The considered didactic principles of digital education are open and dynamically changing, and complementary, and, due to their novelty, require additions as the theoretical and practical possibilities of digital education develop.

The results of the digitalization of education will be effective education, built on an individual approach in educational processes and continuous monitoring of the student's activities. Digitalization significantly expands the possibilities of using group and individual forms of classes, ensures the complete assimilation of knowledge and skills, and significantly affects the development of all types of education.

REFERENCES:

[1] Thurston, T. N., Lundstrom, K., & González, C. (Eds.) (2021). Resilient pedagogy: Practical teaching strategies to overcome distance, disruption, and distraction. Utah State University. https://doi.org/10.26079/a516-fb24
[2] Bovill, C. (2020). Co-creation in learning and teaching: the case for a whole-class approach in higher education. Higher Education, 79(6), 1023–1037. https://doi.org/10.1007/s10734-019-00453-w
[3] Koroviaka, Y., Pashchenko, O., & Khomenko, V. Modern paradigm of learning with distance technologies: Abstracts of the III International Scientific and Practical Conference (Lisbon, February 2 – 5, 2021). Portugal 2021. 300 p. Pp. 196–199. Available at: DOI: 10.46299/ISG.2021.I.III URL: https://isg-konf.com
[4] Mathrani, S., & Cook-Sather, A. (2020). Discerning growth. In L. Mercer-Mapstone & S. Abbott (Eds.), The power of partnership: Students, staff, and faculty revolutionizing higher education. Center for Engaged Learning Open Access Book Series. https://doi.org/10.36284/celelon.oa2
[5] Mercer-Mapstone, L., & Marie, J. (2019). Practical guide: Scaling up student-staff partnership in higher education. Institute for Academic Development, University of Edinburgh.
https://www.taylorfrancis.com/books/mono/10.4324/9780203431269/halliday-introduction-functionalgrammar-halliday-christian-matthiessen.
[6] О.А. Пащенко, Т.В. Раціна Використання комп'ютеризованої системи контролю і оцінювання // Удосконалення системи моніторингу забезпечення якості вищої освіти України: зб.тез доповідей наук. - практ.конф.,квітень 2013 р., Дніпропетровськ / М-во освіти і науки, молоді та спорту України, Держ.вищ.навч.закл. «Нац.гірн.ун-т». –Д. :ДВНЗ «НГУ», 2013. – 369 с.
[7] Peseta, T., Pizzica, J., Beathe, A., Chinnu, J., Lynch, R., Manthos, M., Nguyen, K., & Raza, H. (2020). A partnership mindset: Students as partners in and beyond the academy. In L. Mercer-Mapstone & S. Abbott (Eds.), The power of partnership: Students, staff, and faculty revolutionizing higher education. Center for Engaged Learning Open Access Book Series. https://doi.org/10.36284/celelon.oa2
[8] Медведовська, Т.П. (2024). Удосконалення інженерно-педагогічної освіти в контексті реформування освіти. GRAIL OF SCIENCE : inter. scientific journal. – Vinnytsia : NGO «European Scientific Platform»; SI «Institute of Scientific and Technical Integration and Cooperation», 46, p. 855-860.
[9] Deuze, M. (2020). The Role of Media and Mass Communication Theory in the Global Pandemic. Communication Today, 11(2), 4-16. https://www.communicationtoday.sk/the-role-of-media-and-mass-communication-theory-in-the-global-pandemic/
[10] Mathrani, S., & Cook-Sather, A. (2020). Discerning growth. In L. Mercer-Mapstone & S. Abbott (Eds.), The power of partnership: Students, staff, and faculty revolutionizing higher education. Center for Engaged Learning Open Access Book Series.https://doi.org/10.36284/celelon.oa2
[11] О.В. Терханова, С.В. Закревська Система національних ЗМК у сучасній Україні: нова візія: Матеріали XVI Всеукраїнської науково-практичної конференції молодих вчених та студентів (16 квітня 2020 р.), С. 122-124
[12] Viznuk, G. Diachenko Professions of the Future in Ukraine and Internet of Everything: Who to Study as not to be Left Without Work: MSTIoE 2020-7. 7-th East European Conference on Mathematical Foundations and Software Technology of Internet of Everything, 2020/12, С. 38-39.