OVERVIEW OF SOME ASPECTS OF THE CONCEPT OF “DIGITALIZATION OF EDUCATION”

Abstract. The article analyzes rather a new problem in pedagogical science – the digitalization of education – which is becoming increasingly important. In modern pedagogical science, there has not yet been a generally accepted concept of digitalization of education. For this reason, the article does not contain the actual presentation of this concept, but only an overview of some aspects of this concept. Digitalization is an inevitable process taking place all over the world. High-tech achievements are being introduced into our lives non-stop. One of the challenges of a digitalized society is the readiness of the teacher/lecturer for the digital transformation of the learning process, the design of an individual educational trajectory, and the organization of the modern process of partnership pedagogy between pupils/students and teachers/lecturers. Consequently, the educator needs to study constantly and in parallel with the main activity. The factors of digital transformations of modern educational interaction are the processes of globalization, digitalization, and convergence. To a large extent, they determine the life of the modern individual and society of the 21st century. It is the concept of digitalization of education that will determine the course of further psychological and pedagogical research. The article provides an overview of modern analytical sources describing the phenomenon of the digitalization of education. The history of the development of digitalization of education is outlined, various aspects of this phenomenon are considered, and special attention is paid to changes in the organization of the educational process that digitalization entails. The article discusses new terms that have come into use with the onset of digitalization such as “Big Data”, “Educational Data Mining”, “lifelong learning”, and “advanced learning technologies”. The digitalization of education is a multifaceted phenomenon that covers all spheres of human activity. The phenomenon that needs to be comprehended, developed, and actively put into practice the advanced learning technologies that result from it to fit into the new, emerging digital, global system.
Keywords: digitalization of education, globalization, convergence, digital transformations, learning process, high-tech achievements.

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ОГЛЯД ДЕЯКИХ АСПЕКТІВ ПОНЯТТЯ «ЦИФРОВІЗАЦІЯ ОСВІТИ»

Анотація. У статті аналізується досить нова проблема педагогічної науки – цифровізація освіти, яка набуває дедалі більшої актуальності. У сучасній педагогічній науці ще не склалося загальноприйнятної концепції цифровізації освіти. З цієї причини стаття не містить власне викладення цього поняття, а лише огляд деяких аспектів цього поняття. Цифровізація – це неминучий процес, який відбувається в усьому світі. Високотехнологічні досягнення безупинно впроваджуються в наше життя. Одним із викликів цифровізованого суспільства є готовність вчителя/викладача до цифрової трансформації процесу навчання, проектування індивідуальної освітньої траєкторії та організація сучасного процесу педагогіки партнерства між учнями/студентами та вчителями/викладачами. А отже, навчатися педагогу необхідно постійно і паралельно з основною діяльністю. Факторами цифрових трансформацій сучасної освітньої взаємодії є процеси глобалізації, цифровізації та конвергенції. Вони значною мірою визначають життя сучасної людини та суспільства XXI століття. Саме концепція цифровізації освіти визначатиме напрямок подальших психолого-педагогічних досліджень. У статті подано огляд сучасних аналітичних джерел, що описують феномен цифровізації освіти. Окреслено історію розвитку цифровізації освіти, розглянуто різні аспекти цього явища, особливу увагу приділено змінам в організації освітнього процесу, які несе цифровізація. У статті розглядаються нові терміни, які увійшли до вжитку з початком цифровізації, такі як «Big Data», «Educational Data Mining», «lifelong-learning», «advanced-learning technologies». Цифровізація освіти – багатогранне явище, яке охоплює всі сфери людської діяльності. Явище, яке необхідно осмислити, розвинути та активно застосовувати на практиці передові технології навчання, які є його результатом, щоб вписатися в нову цифрову глобальну систему.
The relevance of the problem. In modern pedagogical science, there has not been a generally accepted concept of digitalization of education yet. For this reason, the following article will not contain the actual presentation of this concept, but only an overview of some aspects of this concept.

Modern technologies are confidently and steadily penetrating our lives: very often one can hear the term “digitalization” not only in scientific discussions but also in everyday conversations. Discussions about the positive and negative effects of digitalization continue, however, many states have taken a course towards modernizing in this format. Our country is no exception. Electronic textbooks are intensively created in our country, and interactive whiteboards, computer classes, and Internet connections appear in educational institutions. Electronic document management, etc., is implemented in institutions of education of all levels. Work in this direction is reflected in our state policy, in particular, in the Laws of Ukraine “On the National Informatization Program”, and in the State Program “Information and Communication Technologies in Education and Science”. Starting since 2018, the Ministry of Education and Science of Ukraine has taken a course to develop digital education in Ukraine. The Concept of Reforming General Secondary Education, which provides for the introduction of an electronic educational environment, the State Program “Information and Communication Technologies in Education and Science”, Digital Agenda of Ukraine – 2020 was developed [3].

Analysis of last studies and publications. Digital competence is recognized as one of the eight key competences that a modern person must develop constantly, even after obtaining compulsory education, to adapt flexibly to the changing conditions of the surrounding world. The works of such modern scientists as R. Avhurstyn, O. Bazyliuk, V. Bykov, Yu. Bohach, I. Vorotnikova, N. Dementievska, M. Zhernakova, O. Zakhar, V. Lapinskyi, N. Morze, I. Rumiantseva, O. Spivakovskiyi, etc. The development of technologies causes the development of new learning tools and makes the learning process more perfect and effective. Accordingly, the requirements for all the participants in the educational process also change. Thus, one can talk about the need for a modern person to have information culture and digital literacy.

The purpose of the research is to bring to the attention of readers an analysis of a new problem in pedagogical science – digitization of education –
which is gaining more and more relevance because it is the concept of digitization of education that will determine the course of further pedagogical, psychological, methodological and general scientific studies.

**Presentation of the main material of the research.** Actually, the term “digitalization” arose in connection with the intensive development of information and communication technologies. Klaus Schwab believes that the accelerator of the digital revolution was the development of semiconductor computers, in the 1960s and 1970s – the PC, in the 1990s – the global Internet [5]. The researcher predicts the coming of the fourth industrial revolution, which will be tightly connected with the phenomenon of artificial intelligence and the digitalization of everyday life. According to some scholars, the real and virtual worlds are interdependent, but at the same time self-sufficient: each of them can be used to identify a person. From these two worlds, a new, hybrid world is being formed.

The digital revolution taking place in the global economy is impressive in terms of pace and scale. The transition from mainframe computers to PCs has been going on for a long time. The introduction of new information and communication innovations today is carried out in a much shorter time. At the initial stages, digitalization consisted of the technological automation of many processes, and an increase in the number of consumers who used new technologies. At the same time, very quickly digital technologies are becoming part of the economic, political, and cultural life of society [6]. Today, digitalization is also penetrating into education actively [7].

Some scholars consider digitalization as a change in the paradigm of thinking, communication, and interaction with each other and with the environment [9]. Thus, the development of the Internet and mobile devices are fundamental indicators of digitalization. Modern economic science introduces such categories as “digital economy”, “digital ecosystem”, “digital community”, “digital environment”, etc. The processes of digitalization of education lead to transformations of markets, educational systems, and awareness of the need to form the latest competences. Also, these processes result in a reconfiguration of the educational model. The availability of information leads to the need for regular search and selection of adequate content. Thus, the digitalization of education leads to its complete, qualitative restructuring. The educator faces the need to learn how to use new technological tools and virtually unlimited information resources [9].

Digital transformation will play an important role in the modern transformation of the institution of education. It is necessary to speak not only about re-equipping the IT resources, but also about a kind of reworking of human potential, upgrading professional capital, bringing the corporate culture
of socialization, communication of the institution of education in line with modern requirements, optimizing all its internal processes [7].

The new state of the labor market requires a fundamentally different approach to the preparation of graduates. Digitalization changes not only the content of education but also its organization [6]. The lecturer from the bearer of the transferred knowledge and skills turns into a navigator who helps to navigate the knowledge bases. Expanding access to the Internet and mobile computers (laptops, tablets, smartphones, etc.) helps to bridge the digital divide between those who have access to digital technologies and those who do not. The new “digital gap” is related to the disparity between those who are able to use digital technologies creatively to perform non-standard work, such as research, observation, and construction, and those who are able to use digital technologies only for routine operations. Overcoming the new digital divide is associated with updating content and is becoming one of the urgent tasks of education.

For a long time, e-learning systems of various institutions of education have been accumulating a huge amount of information about various aspects of the educational process: students, their progress and attendance, teachers/lecturers and their scientific, educational, and administrative activities, educational content (text, audio, video materials), etc. These data need to be stored, processed, and analyzed for their effective use. To process such large archives and large data flows, new technologies are required, which are often called Big Data technologies [9]. The term “Big Data” refers to large and complex datasets that can be structured or unstructured and take up a very large amount of disk space. In the field of e-learning, the Big Data technologies cover three aspects: volume, speed, and variety. Currently, the number of highlighted aspects has increased to seven. The Big Data technologies mean lots of information about millions of students and thousands of institutions. These data accumulate and generate a previously unprecedented amount of information that can be used to manage the educational process effectively.

The rate of change of the Big Data allows controlling the learning process interactively and responding promptly to any changes in the learning process. The Big Data technologies in education allow teachers/lecturers to receive a variety of information on time: about the level of students’ preparation; their assimilation of academic disciplines; performance of control tasks and laboratory work. One can also control which textbooks and how many times a student has used them.

Today, the Big Data technologies are becoming the language of modern interaction technologies for educational organizations that seek to improve
their strategic and tactical decision-making ones. The use of the Big Data in education is very diverse. This includes improving the effectiveness of online learning, predicting the academic success of students, identifying differences in the behavior of urban and rural students, creating a global database of educational activities of the online platform, and researching tools for predicting educational success. Other forms of the Big Data application are the consideration of issues related to the achievement of educational results, the creation of adaptive e-learning systems, the study of the interaction of learning subjects, and the study of the internal interaction of performance parameters and factors for predicting academic performance. It should be noted that at present the development of the Big Data technologies in education is described through a variety of approaches and models, which hinders the systematic accumulation of data on the Big Data for the development of the education system.

Another important problem in the analysis of modern e-education is the identification of new, sometimes hidden, relationships in the Big Data, and obtaining new knowledge on this basis (Data Mining). The analysis of the Educational Data Mining is a specific research area in which artificial intelligence is used to process the information array received from various institutions of education. The Educational Data Mining develops and improves methods for processing educational data, which often have several levels of semantic hierarchy. These data can be very extensive and contain a large amount of additional information [9].

At the same time, it should be noted that digital technologies, on the one hand, allow increasing the volume and performance indicators of activity, and on the other hand, they contribute to the implementation of an individual approach in various directions. This also applies to education. In education, digitalization is aimed at lifelong learning, as well as the individualization of learning based on advanced-learning technologies.

Lifelong learning is the concept of a permanent search for new meanings, which is based on both professional and personal ambitions and motivations. Such an attitude to life contributes to the professional growth and competitiveness of a person in the labor market, and at the same time is an effective form of personal growth. The concept of lifelong learning is that these processes can affect the widest social groups, regardless of gender, age, property status, the geography of residence, etc. [9].

Advanced learning technologies are technologies that improve the quality of learning using the latest scientific achievements. The main technical problem in the development and improvement of these technologies is related to the too-high speed of innovation in the field of information and
communication technologies. What is called the advanced today will be considered obsolete in a few months. Therefore, the assessment of a particular technology as advanced should be dynamic and correspond to the moment in time. On the other hand, it is necessary to present, identify and evaluate the possible positive effects of the use of new technologies and learning conditions. An experimental approach in the selection and description of advanced technologies contributes to scientific progress, both in the information component and in the psychology of human learning [9].

Conclusions and prospects of the research. At the current stage of our country’s development, the requirements for the level of training of specialists, who must possess a stock of theoretical knowledge and practical skills, be able to navigate in a difficult situation, and be ready to make non-standard decisions, are significantly increased. In this regard, the education system in Ukraine is being significantly reformed today. This requires the introduction of advanced forms and methods of training that will contribute to the formation of the personality of the future specialist [10].

The rapid development of society and the growth of the information and technology base contribute to the improvement of computer equipment, and programming technologies and, as a result, the application of new information and communication technologies and teaching aids in the educational process.

Thus, the digitalization of education is a multifaceted phenomenon that covers all spheres of human activity. Such a phenomenon needs to be comprehended, developed, and actively put into practice the advanced learning technologies that result from it to fit into the new, emerging digital, global system.

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