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**DIGITAL
TRANSFORMATION
OF THE SOCIETY
AND ITS IMPACT
ON THE
DEVELOPMENT
OF EDUCATION**

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Abstract. *The processes of digitalisation of society have intensified significantly over the past decade and have a remarkable impact on all spheres of human life, including education. The digitalisation of the Ukrainian society has significantly increased after signing the Association Agreement between Ukraine and the European Union, which requires alignment of the goals of information society development with the European benchmarks, published in a number of legislative and regulatory documents. Digital transformation has a significant impact on the education system through the development of innovations, new approaches, principles, methods and forms of educational interaction. The purpose of the article is to analyse the processes of digital transformation of society in the European and national contexts, to determine its role in the development of modern education. The study was conducted using theoretical methods, namely the analysis of legislative documents of various levels and researches, devoted to the issues of digitalisation of education in Ukraine and in the EU member states. Based on the theoretical analysis of the literature, the definitions of the key concepts functioning in the modern digital world are clarified. They are digital citizenship, digital consumers, digital state, digital security, and digital education. Digital education plays an important part in this process, as digital transformation processes should begin with the development of citizens' digital competence and digital literacy. Actions to develop digital education are reflected in the scientific research of domestic scientists and emphasise the use of information and communication technologies as a tool for improving the efficiency of the educational process. It is figured out that the main trends of educational digitalisation under the influence of transformational processes in society include: cross-cutting development of digital competences, widespread use of digital technologies in the educational process, introduction of the open education principles, development and implementation of electronic educational platforms.*

Key words: *digital transformation, digitalisation of education, teacher's digital competence, digital literacy, electronic educational platform.*

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ЦИФРОВА ТРАНСФОРМАЦІЯ СУСПІЛЬСТВА ТА ЇЇ ВПЛИВ НА РОЗВИТОК ОСВІТИ

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Анотація. Процеси цифровізації суспільства значно інтенсифікувалися впродовж останнього десятиліття та здійснюють значний вплив на всі сфери життєдіяльності людини, включаючи освітню сферу. Цифровізація українського суспільства значно прискорила після підписання Україною Угоди про Асоціацію з Європейським Союзом, яка вимагає узгодження цілей розвитку інформаційного суспільства з європейськими орієнтирами, що є викладеними в цілій низці законодавчих та нормативних документів. Цифрова трансформація чинить значний вплив на систему освіти через розроблення інновацій, вироблення нових підходів, принципів, методів та форм освітньої взаємодії. Метою статті є аналіз процесів цифрової трансформації суспільства в європейському та національному контекстах, визначення її ролі в розвитку сучасної освіти. Дослідження проведене з використанням теоретичних методів, а саме аналізу законодавчих документів різного рівня та наукових праць, що висвітлюють питання цифровізації освіти в Україні та в країнах-членах Європейського Союзу. На основі теоретичного аналізу літературних джерел уточнено сутність ключових понять, що функціонують в сучасному цифровому світі, зокрема: цифрове громадянство, цифрові споживачі, цифрова держава, цифрова безпека, цифрова освіта. Особливу роль в цьому процесі відіграє саме цифрова освіта, оскільки процеси цифрової трансформації мають починатися з формування цифрової компетентності та цифрової грамотності громадян. Дії щодо розбудови цифрової освіти відображені в наукових дослідженнях вітчизняних учених та наголошують на запровадженні інформаційно-комунікаційних технологій як інструменту підвищення ефективності освітнього процесу. Установлено, що до головних тенденцій освітньої цифровізації під впливом трансформаційних процесів у суспільстві належать: наскрізне формування цифрових компетентностей, широке використання цифрових технологій в освітньому процесі, запровадження принципів відкритої освіти, розроблення та впровадження електронних освітніх платформ.

Ключові слова: цифрова трансформація, цифровізація освіти, цифрова компетентність учителя, цифрова грамотність, електронна освітня платформа.

Introduction and current state of the research problem. The modern society is at the information stage of its development that results in digitalisation of all the life spheres of people – producing goods, scientific research, education, health care, culture etc. The current trends in digitalisation of the society in global context include development of artificial intelligence, augmented reality, mobile technology, cloud technology, telemedicine, systems of protection of data base and combating cybercrimes, developing and implementing of chatbots and databases.

The process of digitalisation in the Ukrainian society significantly sped up after signing the Association Agreement between the European Union and Ukraine, and main goals of the information society development in Ukraine align with the European benchmarks on the societal development, including the regulations of initiative Digital Agenda for Europe (2010) [1], released within the European strategy of economic development “Europe 2020 Strategy for Smart, Sustainable and Inclusive Growth” (2020) [2]. This document highlights the priority areas such as the improvement of computer (digital) literacy and skills, and the availability of digital services. Based on above mentioned document, in 2016, the Digital Agenda for Ukraine – 2020 was designed [3], which covered the key regulations of the European strategy for the development of the digital society.

The changes, which are the strategic aims in the educational system in Ukraine, include the development of digital literacy and digital competence as key ones for successful living and working. Although these documents expired at the end of 2020, we cannot ignore the provisions set forth in them, as they are important imperatives for the development of modern society. The Digital Agenda of Ukraine (2016) defines digital transformation as one of the main digital trends, and it is the basis for implementing innovations, new values and properties. Digital transformation is seen not as a goal, but as a tool for developing the society and the economy, as an opportunity for the country to move to a higher level of development and to be represented on the global economic market. Digital transformation includes all activities in which the country’s citizens are involved. It leads to the emergence of new systems of production of goods and services [3].

The issues of digitalisation of education and implementation of digital technology in education at different educational levels are disclosed in the researches by N. Bakhmat, V. Bykov, L. Havrilova, L. Kartashova, V. Kukharenko, S. Lytvynova, N. Morze, O. Ovcharenko and others. However, among such a great number of researches dedicated to digitalisation of education, the issues of investigating of the impact of digital transformation of the society on the digitalisation of education are not still studied thoroughly.

The purpose and objectives of the study. The purpose of the article is to study the process of digital transformation in the society and to outline its impact on the education system development.

Research methods. The research is conducted based on the theoretical methods: theoretical analysis of policy-related documents and scientific research in the sphere of digitalisation of education in the European countries and in Ukraine; synthesis of the literature on the issues of digitalisation of society and education, conducted on the basis of the search for sources in Google scholar and ERIC data base.

The statement of the main material research. The digitalisation processes contribute to the introduction of a number of new concepts into the scientific literature that are functioning in the modern digital world, including: digital citizenship, digital consumers, digital state, cyber security, and digital education. In this research we consider these concepts in more detail for a deeper understanding of their role for

implementing digital innovations and supporting transformational processes that result in the digitalisation of the education system.

Digital citizenship is considered to be the conscious use of technology by any user of computers, the Internet and digital devices to interact with society at various levels [4]. The issue of digital citizenship is widely discussed by the global community in such contexts: defining personal identity as a result of using digital technologies; expanding professional opportunities in the digital space; engaging in community life and organising communicative interaction via digital technologies.

The concept of digital citizenship is closely connected to the service consumption distributed electronically via the Internet. O. Ovcharuk asserts that being a digital citizen means being a digital consumer [5]. In their research, foreign scientists F. Cochoy, Ch. Licoppe, M. McIntyre, and N. Sörum study the digitalisation of the consumption sphere in a broad sense, focusing on social, cultural, political and gender consequences. The authors argue that the digital market infrastructure operating in the world today influences the development of digital consumer behaviour and, as a result, the digital culture of consumption emerges [6].

The concept of information (cyber) security is considered in the context of digital consumption. In modern science, there is a number of terms for specifying security and safe behaviour on the Internet: Internet security, computer security, digital security, information security, cybersecurity. Common for all the concepts of security is two main viewpoints: *firstly*, digital security is considered an important component of the security of the whole country in the context of the development of the globalised world, which causes new threats and has a destructive impact on the functioning of many state systems, so the issue of ensuring digital security should be addressed at the level of a country's political governance; *secondly*, digital security is considered to be a component of citizens' digital competence, which means the responsible use of digital technologies that are present in the everyday reality and change people's lifestyles, they are: protection of digital content, safe use and exchange of information, knowledge of the rules of digital consumption, ability to protect oneself from dangers that digital technologies can pose to physical and mental health [7].

Digital citizenship and digital consumption require the increase of the level of citizens' education to use information and communication technologies and to introduce changes in all spheres of human life. These issues are in the field of interest of many scholars and numerous international organisations. For example, the World Economic Forum is an international organisation that deals with the problems of overcoming economic crises, increasing economic development of countries and implementing effective reforms. Since 2016 when the issues of formation and development of digital society started to be widely discussed, the World Economic Forum conducts the monitoring of the European countries' digital transformation and digital competitiveness every month. In the report, released in March 2020, they said that according to the digital economy and society index (DESI) whose indicators include the development of Internet user skills among the country's population, use of Internet services and online transactions by citizens, and digitalisation of business, development of digital country, Finland, Estonia, and Denmark have the highest ranking among the EU member states in terms of citizens' use of online services and digital skills [8].

The development of the public services market, which operates via the Internet, that has led to the emergence of the concept of a digital state, which involves the digitisation of the country's public services, the updating of the legal framework, technical support

for the functioning of these services and the protection of electronic data. This digital transformation of the country affects not only the provision of administrative services, but also the education sphere.

Ukraine has certain achievements in the process of the development of digital state. Since 1998 Ukraine has launched a comprehensive implementation of the objectives of informatisation of society, which has a legal basis. The successful project of the national informatisation program is considered to be the creation and functioning of the Ukrainian Scientific and Educational Telecommunication Network URAN, which contributes to Ukraine's involvement in the global information space [9].

In August 2019, the Ministry of Digital Transformation was established whose main purpose is to implement state policy in the field of digitalisation, create electronic open information resources at the national level, develop a system of administrative and public electronic services for the citizens of Ukraine, and develop digital literacy of the population [10].

The issue of developing citizens' digital competence is key one to build a digital society in all European countries, as evidenced by the results of a study conducted by the World Economic Forum and published in a report on measuring the Digital Economy and Digital Society Index. Thus, the Netherlands and Finland are at the top of the ranking of countries with a high level of citizens' digital competence. In these countries, the number of people with basic digital skills is about 58%. The survey results also show that the most active users of digital technologies are young people aged between 16 and 24, 97% of them are enrolled in formal education [8]. But the number of Internet users has increased significantly since the beginning of the Covid-19 pandemic, according to a study by the World Economic Forum, it reaches about 85% of the total population of European countries, this has not affected the quality of their education, which has increased by only 3% [8]. So, the digitalisation of all spheres of modern society, which has intensified with the onset of the Covid-19 pandemic, has significantly actualised the problem of enhancing digital literacy and digital competence of citizens.

The Ministry of Digital Transformation of Ukraine also conducted a study on the level of digital literacy of Ukrainian citizens, which showed that about 40% of the population aged between 18 and 70 have the initial level of digital competence, and about 15% have no digital skills at all. Another survey, held by the Ministry of Digital Transformation of Ukraine, aimed to determine the interest and readiness of citizens to master digital skills, has revealed the following indicators: only 47% of the Ukrainian population considers digital literacy training relevant in current conditions [10]. However, it is a well-known fact that a person cannot be successful in a digital society without mastering digital skills.

Researchers studying various aspects of the digital transformation of society agree about the role of digital education, as digital citizenship, consumption of electronic services, and safe behaviour in the digital space require increasing the level of citizens' digital literacy and digital competence, as they are not only a means of improving social life but also directly affect the economic and social development of the country. The concept of "digital education" has several synonymous concepts, one of them is "electronic education" ("e-education").

The concept of e-education was first introduced in Ukraine after the Ministry of Science and Education of Ukraine published the draft of "Conceptual Framework for the Development of E-Education" for discussion in February 2013. The draft of conceptual framework defines e-education as one of the means of developing the information society, whose introduction has a positive impact on updating the forms, methods and

technologies of learning and teaching disciplines, as well as providing access to education at all levels and in various types of institutions, allowing students to build their own learning path and contributing to the development of their 21st century skills [11]. The conceptual framework was not adopted, but it can be considered as a basis for further development of e-learning in Ukraine, since the beginning of the creation of certain developments at the legal level has had a qualitative impact on the information law and the formation of the digital society in general.

The adoption of the Strategy for the Development of the Information Society can be considered as an achievement of Ukraine at the regulatory level [12]. The concept of “electronic education” (e-education) as a form of education obtained using information and communication technologies was introduced to the list of the main forms of education, which was first substantiated at the level of current legislation. The definition of this concept is quite broad, opening up a field for research and further clarification for scholars.

The international experience of active transition to e-education began in 2000 after the European Commission signed the Action Plan for e-Education. This document defines e-education as the process of using multimedia technologies and the Internet to improve the quality of learning by providing access to resources and services, as well as through remote exchange and collaboration [13, p. 2]. The main objectives of the implementation of e-education are to accelerate the deployment of e-education infrastructure in the European Union and to intensify learning at all educational levels by forming universal digital literacy of students and enabling teachers to receive proper training, in particular, on the use of information and communication technologies in learning process. Thus, summarising the above positions, it should be noted that the concept of “e-education” at the regulatory and legislative level, both in the context of national and international development of the information society, is defined as the organisation of the educational process through the introduction of information and communication technologies and free access to educational resources.

The active development of the e-learning system in European countries continues today, however, the conceptual framework has changed, in particular, in Action Plan for Digital Education [14] the term of e-education is not used any more, but instead the term “digital education” is used. The emergence of digital education is a result of evolution of modern society, as the digitalisation processes under the influence of technical and technological innovations have affected many aspects of life.

The definition of digital education includes two interrelated aspects that characterise the strategy of education development in the European Union: 1) the development and implementation of a wide range of digital technologies to improve the quality of education and expand access to educational resources and services, digital education is implemented through online, distance and blended learning; 2) digital education contributes to the enhancement of digital competences for effective learning, professional activity, and successful existence in the world that is predominantly driven by digital technologies [14].

Taking into account the necessity to align the key legislative documents with European ones in order to realise the prospect of Ukraine’s membership in the European Union, the government has taken several steps toward digital transformation. In particular, the concept of digital education was introduced into widespread use at the legislative level. The Order of Cabinet of Ministers of Ukraine “On Approval of the Concept of Developing the Digital Economy and Society of Ukraine for 2018–2020 and Approval of the Action Plan for its Implementation” defines the concept of digital education as

“the combination of various components and state-of-the-art technologies with the use of digital platforms, the introduction of new information and education technologies, the use of progressive forms of organising the educational process and active teaching methods, as well as modern teaching materials” [15]. So, the problems of building digital society can be effectively solved by modernising the education system and its upgrading in the globalisation conditions.

Based on the analysis of policy-related documents that cover the interpretation of the concepts “e-education” and “digital education”, I consider it appropriate to use the concept of digital education in my study, since it is more modern and meets the requirements of the digital transformation of society, and is adapted at the legislative level to the development trends of European countries. Moreover, an important aspect of digital education is the development of citizens’ digital competences. The state programs in many countries around the world focus on enhancing digital literacy of the population to increase competitiveness at the labor market. The European Commission approved Action Plan for Digital Education (2020), which outlines the objectives of digital education in the context of the digital transformation of society, which should have been implemented by 2027. This document is a call to all European countries to strengthen cooperation in sharing experiences in the digitalisation of the education system during the Covid-19 pandemic and the development of a digital education system [14].

The new action plan has two strategic priorities: 1) development of the digital ecosystem, which requires the development of digital education infrastructure, enhancement of teachers’ digital competence, development of digital learning content, electronic resources and secure platforms for organising training in compliance with ethical rules; 2) improvement of digital competences for the digital transformation of society [14].

The main goals of the Ministry of Digital Transformation, which should have been achieved by 2024, include the engagement of 6 billion of citizens of Ukraine in the program for developing digital skills [10]. Since January 2020, the Ministry has implemented the courses for developing Ukrainians’ digital literacy that are implemented in the form of video series. Twenty-seven series are available at the national online platform “Diia. Tsyfrova osvita” (Action. Digital education), the target audience is diverse (secondary school students, their parents, teachers, doctors, etc.). The series contribute to improving the basic digital skills, skills of digital safety, and skills of using online services [10]

The further action of the Ministry of Digital Transformation of Ukraine is the designing of “Digital Competence Framework for Ukrainian Citizens” [7]. The need to develop such a standardised document is outlined in the “Concept for the Development of Digital Competences in Ukrainian Society”, which should become a guide for choosing a strategic vector for the development of digital competences of citizens and employees in various professional fields and for the further prospects of creating a single digital market with the EU countries. The basis for the development of this document is the Digital Competence Framework for Citizens (DigComp 2.1: The Digital Competence Framework for Citizens) (2016), updated and published by the European Commission in 2017 as part of the research on learning and skills development for the digital age. The framework presents five main areas of digital competence for citizens: information literacy, communication and collaboration, digital content development, security, and problem solving. The document presents eight levels of proficiency in digital competence based on the definition of learning outcomes according to the B. Bloom’s taxonomy [16].

The Digital Competence Framework for Ukrainian Citizens is created to improve the level of development of digital competencies, which contributes to a deeper understanding

of the key concepts of digital education and the components, descriptors, and levels of digital competence. The team of authors, having created it, argues that this framework serves as a standard for the development of digital competencies of Ukrainians, which sets requirements for mastering the knowledge, skills and abilities to use digital technologies for entering and competing at the international labour market [7].

Focusing on the development of citizens' digital literacy, the Ministry of Digital Transformation tries to involve all the population in this process. However, the main emphasis of the state policy in the field of digitalisation should be on formal education, which allows implementing a sustainable system of cultivating digital literacy. Reforming the education system in Ukraine should be in line with the trends of the digital economy and digital society. The introduction of digital technologies should be cross-platform and take place not only in the study of courses directly related to computer science, but in teaching of all courses, the interaction between education agents, research, the implementation of educational projects, etc.

The concept of digital education is increasingly used that requires the training of qualified teachers who prepare the younger generation for professional activities in the digital economy and digital society. The Europe 2020 strategy [2] emphasises that education plays a crucial role for modern European society in overcoming the economic crisis and expanding economic growth opportunities. The digital transformation of the education system in general, and specifically the vocational education system, is an initiative of the Council of Europe, whereas the improvement of digital competence and online learning are priority areas.

Ukrainian scholars have repeatedly emphasised in their studies the need to develop national standards for developing teachers and education leaders' digital competence, which affects the unsatisfactory level of digital competence of modern youth. V. Bykov determines the impact of information and communication technologies, which are widely used in modern education and science, on the digital transformation of society. The scientist says that this process should be managed at the level of state and local authorities. Therefore, the key aspects of the digital transformation of the education sector, in his opinion, include the adoption of international and European standards of digitalisation, the development of national framework standards for the development of education agents' digital competences, the coordination and alignment of national and international standards [17].

Therefore, scholars often study the experience of European countries for determining theoretical, methodical and methodological approaches to the digital transformation of education. The framework of digital competences for teachers has been developed and is effectively implemented in the European education area.

In 2018, The European Commission has issued a document "The European Framework for the Digital Competence of Educators (DigCompEdu)", which presents a definition of digital competence of educators that has a scientific and regulatory basis. It is emphasised that the scope of this concept covers all levels of education from primary to higher education, including vocational education, adult education, special and non-formal education. In the light of the education reform in Ukraine, this document is an important benchmark, as it is presented as a response to the challenges of global processes of informatisation and technologization of society. The Digital Competence Framework for Educators outlines six areas: professional engagement, digital resources, learning and teaching, assessment, student empowerment, and support for the development of students' digital competence [18].

In Ukraine, the strategies of building the policies of digitalisation of education are implemented in the Concept of New Ukrainian School [19] that stresses that the use of information and communication technologies is a tool for improving the efficiency of the educational process. The conceptual framework of the new Ukrainian school, in accordance with modern requirements, describes information and digital competence, which is seen as an ability to confidently and critically apply information and communication technologies to search, process and exchange information in the course of professional activities and in everyday life. The main structural components of information and digital competence are the following: information and media literacy, algorithmic thinking, ability to work with databases, skills of safe work on the Internet, knowledge of ethical rules and norms of working with information.

N. Bakhmat [20], V. Bykov [17], L. Kartashova [21], and L. Pietukhova [22] assert that effective development of information and digital competence, which has a cross-cutting nature in the new Ukrainian school, is possible only under the condition of creating a high-quality information and educational environment. According to V. Bykov, the designing of an information and digital environment should be based on the introduction of computer-oriented tools into the educational process, the implementation of distance learning technologies, the ICT support for research work, and the involvement of ICT technologies in the process of education management at different levels in different types of educational institutions [17]. In the process of education digitalisation, V. Bykov pays special attention to the creation of an information and educational environment, whose components should be computer-oriented teaching aids and information and communication technologies. The key technological principles for the development of an information and educational environment should be the widespread use of cloud-based technologies, software and electronic educational resources [17].

The use of e-learning resources is one of current trends in modern digital education, which, according to the Ministry of Education and Science of Ukraine, should be incorporated in a single platform developed and adapted for the national education system. Thus, in 2018 the Ministry of Education and Science of Ukraine approved the creation of a national educational platform at the policy level. The platform should provide free access to e-textbooks for all participants of educational process, make education more qualitative and accessible to students and teachers from rural areas, promote significant changes in the educational process, allow launching a market for producing electronic educational products and services, and intensify the development of digital competence of education agents in Ukraine [23].

The e-platform is a universal educational tool and part of the transformation process. The European Commission's document "Action Plan for e-Education" [13], whose main goal has already been mentioned above, based on the experience of organising training during the crisis caused by the spread of the Covid-19 pandemic, states that the need to develop an e-learning platform requires prompt resolution without any restrictions, taking into account the principles of open education. The ten components of open education include free access, open educational resources, open pedagogy, individualised learning, collaboration and networking, use of authentic resources and exchange of educational resources and teaching practices, recognition, open research, strategy, technology, quality, cooperation, and leadership.

Conclusions and perspectives of further researches. To conclude, it's essential to say that digital transformation is a global trend that has its legislative and regulatory basis. These official documents are adopted on the European level that are used as

recommendations for Ukraine. The analysis of these documents of European and national level proved that the modern trends of digital transformation contribute to the evolution of such phenomena as digital citizenship, digital consumers, electronic democracy, digital state, cyber safety, and digital education. The special attention in this process is paid to digital education, as the processes of digital transformation should start with improving citizens' digital competence and digital literacy. The main directions of developing the education under the conditions of digital transformation of the society are the following: cross-cutting development of digital competences, widespread use of digital technologies in the educational process, and introduction of open education principles.

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