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*Digitalisation of the Educational Process in Higher Education
Institutions under Martial Law in Ukraine on the Basis
of Research at the Vasyl Stefanyk Precarpathian National
University*

Cyfryzacja procesu kształcenia w szkołach wyższych w stanie wojennym w Ukrainie na podstawie badań w Podkarpackim Uniwersytecie Narodowym im. Wasyla Stefanyka

HOW TO QUOTE THIS PAPER: Stynska, V. (2024). Digitalisation of the Educational Process in Higher Education Institutions Under Martial Law in Ukraine on the Basis of Research at the Vasyl Stefanyk Precarpathian National University. *Annales Universitatis Mariae Curie-Skłodowska. Sectio J, Paedagogia-Psychologia*, 37(3), 91–103. DOI: 10.17951/j.2024.37.3.91-103.

ABSTRACT

Digital technologies have become extremely important and necessary during the global pandemic and Russia's full-scale armed aggression against Ukraine. These events led to a massive shift to online education, which allowed the educational process to continue even in the face of quarantine and military operations. Digitalisation has opened up new opportunities for professional growth and development, made graduates more competitive in the labour market and ready for the challenges of the future, as the ability to work with digital tools and understanding the basics of information technology are indispensable skills. Therefore, in the context of the rapid development of technology and globalisation of the labour market, challenges and risks of our time, the information component of professional training has become an obvious advantage for every graduate. The aim of this paper was to, among other things, to analyse the peculiarities of digitalisation of higher education under martial law in Ukraine. The study used general scientific methods, i.e. analysis, synthesis, and generalisation. The results of the survey showed a high level of student satisfaction with the digitalisation of the educational process at the Vasyl Stefanyk Precarpathian National University, especially during martial law. However, there are certain problems such as technical difficulties, lack of personal communication, and insufficient motivation, which require further attention and solution. It is concluded that during martial law, the relevance of digital technologies, which open up new opportunities for learning,

work and personal development, becomes especially evident: digital tools provide an opportunity to support, intensify and mobilise the educational process, make it differentiated and adapted to the requirements of the present.

Keywords: digitalisation; digitalisation of education; higher education institution; innovative technologies; educational process; martial law; Ukraine

INTRODUCTION

At the present stage, technological and information globalisation dictates international standards and requirements for the qualification of specialists and, accordingly, for national training systems. As part of the strategic goal of the Strategy for the Development of Higher Education in Ukraine for 2021–2031 (*Stratehiya rozvytku...*, 2020), which provides for ensuring the quality and accessibility of higher education for different segments of the population, an operational goal has been formulated – the introduction of innovative technologies and distance learning in higher education – which is specified in the following tasks: creating an industry of innovative technologies and learning tools that meet the world scientific and technical level; digitalisation of all processes in the higher education system; regulation of distance learning as a form of education.

Digital technologies have become extremely important and necessary during the global pandemic and Russia's full-scale armed aggression against Ukraine. These events led to a massive shift to online education, which allowed the educational process to continue even in the face of quarantine and military operations. Digitalisation has opened up new opportunities for professional growth and development, made graduates more competitive in the labour market and ready for the challenges of the future, as the ability to work with digital tools and understanding of the basics of information technology are indispensable skills. Therefore, in the context of the rapid development of technology and the globalisation of the labour market, as well as the challenges and risks of our time, the information component of professional training has become an obvious advantage for every graduate.

THE PURPOSE OF THE STUDY

The aim of this article is to analyse the peculiarities of digitalisation of the educational process in higher education institutions under martial law in Ukraine.

RESEARCH METHODS

General scientific methods were used in the study, in particular analysis, synthesis, and generalisation.

ANALYSIS OF RECENT STUDIES AND PUBLICATIONS

The problem of digitalisation and digital transformation has been thoroughly studied by foreign (B. Van Ark, P. Weil, S. Warner, D. Kreiss, J. Licklider, D. Stiglitz) and Ukrainian (O. Vyshnevsky, O. Hudz, V. Liashenko, H. Tkachuk, H. Chmeruk) scientists.

RESULTS

The Cabinet of Ministers of Ukraine approved the Concept for the Development of the Digital Economy and Society of Ukraine for 2018–2020 by Resolution No. 67-r dated 17 January 2018, according to which digitalisation is a recognised mechanism of economic growth due to the ability of technology to positively influence the efficiency, effectiveness, cost and quality of economic, social and personal activities. The main goal of digitalisation is to achieve digital transformation of existing and create new sectors of the economy.

Also, on 3 March 2021, the Cabinet of Ministers of Ukraine approved the Concept for the Development of Digital Competences and approved an action plan for its implementation. It is based on the European conceptual and reference model of the Digital Competence Framework for Citizens with eight proficiency levels and examples of use (DigComp 2.1), the EU Digital Competence Framework for Educators (DigCompEdu), and the adapted Digital Competence Framework for Ukrainian Citizens (DigComp UA). The adoption of this Concept is a strategic step forward in building a digital state, as one of its most important goals is to teach digital literacy to Ukrainians in three years. The document states that by mastering digital skills, every Ukrainian will be able to receive public services online, improve their living standards, and use social media and the Internet with confidence.

To support the sustainable and effective adaptation of education and training systems, the European Union has launched the Digital Education Action Plan (2021–2027), which focuses primarily on promoting the development of a high-performing digital education ecosystem and improving digital skills, enabling digital transformation. The Digital Education Action Plan (2021–2027) is a renewed policy initiative of the European Union (EU) that sets out a common vision for high quality, inclusive and accessible digital education in Europe and aims to support the adaptation of education and training systems of Member States to the digital age. The Action Plan, adopted on 30 September 2020, is a call for greater cooperation at European level in the field of digital education to address the challenges and opportunities posed by the COVID-19 pandemic, as well as to present opportunities for the educational and professional community (teachers, students), policy makers, academia and researchers at national, European and

international levels. The digitalisation of higher education has been in the focus of the European University Association (EUA) since 2012, with the introduction of Massive Online Open Courses.

The European Skills Agenda, the European Social Pillar Action Plan and the 2030 Digital Compass: the European way for the Digital Decade also define key goals and strategic directions for education in Europe. It is important for Ukraine to ensure that its strategies for the development of digital transformation of education meet the requirements of European and global standards. This means systematic implementation of the provisions of these documents, which define European standards for the development of a highly efficient digital ecosystem in education and the improvement of digital skills and competences in the context of the digital transformation of education. The introduction of European standards will help Ukraine become competitive and relevant in the global educational arena.

The Government of Ukraine is taking large-scale measures to develop its digital infrastructure: it has created the Diia portal and app; and is implementing the Diia. Digital Education; European Integration, etc. Digitalisation provides a remote workplace for people who want to be fulfilled in certain industries and be useful, but due to certain physical characteristics could not do so before (Semenyako et al., 2023, p. 184).

According to the Strategy for the Development of Higher Education in Ukraine for 2022–2032, it is established that domestic higher education institutions, actively using digital tools, should move to new digital learning models and create conditions to ensure the competitiveness of educational and research activities. Among the digital challenges faced by domestic colleges and universities, the conditions for the development of digital competencies of researchers and educators are a priority. Thus, both domestic and foreign regulatory documents are aimed at developing digitalisation in the educational process, which contributes to improving the quality of education and training qualified specialists for the digital economy. Let us analyse the terminological field of the study.

According to the Concept for the Development of Digital Economy and Society of Ukraine for 2018–2020, digitalisation is the saturation of the physical world with electronic and digital devices, tools, systems and the establishment of electronic communication exchange between them, which actually enables the integrated interaction of the virtual and physical, i.e. creates a cyber-physical space (Concept for the Development of Digital Econom and Society of Ukraine).

According to the *Encyclopedia of Information Science and Technology* (2017), digitalisation is the integration of digital technologies into everyday life by digitising everything that can be digitised. Digitalisation means the computerisation of systems and workplaces for greater ease and accessibility. The terminology guide suggests that digitalisation should be interpreted as the introduction of digital technologies into all spheres of life: from human interaction

to industrial production, from household items to children's toys, clothing, etc.; as the transition of biological and physical systems into cyberbiological and cyberphysical systems (combining physical and computational components); as the transition of activities from the real world to the virtual world (online) (Public Library..., n.d.).

These definitions have similarities in that digitalisation is aimed at society, at the introduction of digital technologies, digital transformation to facilitate and improve the economic situation of the state.

According to Khoustova's research, the term "digitalisation" is currently used in both narrow and broad terms. In the narrow sense, digitalisation means the transformation of information into digital form, which in most cases leads to new opportunities, etc. A large number of specific transformations of information into digital form lead to significant positive consequences, which determine the use of the term digitalisation in a broad sense. As a transition to digital information in all aspects of economic and social life, digitalisation is turning from a simple method of improving various private aspects of life into a driver of global social development that increases economic efficiency and improves living standards. Digitalisation in a broad sense can only be seen as a trend of effective global development if digital transformation meets the following requirements: it covers production, business, science, social sphere and everyday life of citizens; it is accompanied only by the effective use of its results; its results are available to users of the transformed information; its results are used not only by specialists but also by ordinary citizens, and users of digital information have the skills to work with it (Khoustova, 2022, p. 9). According to Bykov, digitalisation is based on the latest achievements of scientific and technological progress, in particular, it involves the creation of a powerful, worldwide networked cloud-oriented computer and technological ICT infrastructure and the widespread introduction and effective use of digital tools and technologies in all spheres of public life. In essence, this is an evolutionary and phased process of purposeful formation of the computer-technological, electronic-procedural, information and communication, and social and communication platform of Society 4.0, which reflects the characteristics of the fourth technological revolution (Bykov, 2022).

In education, digitalisation is a condition for reforming the education sector, the main and primary task of the effective development of the information society in Ukraine. It is impossible to do this without taking into account global trends, including the development of technologies such as augmented reality (AR), virtual reality (VR), artificial intelligence (AI), the Internet of Things (IoT), robotics, blockchain, media education, cloud-based environments, gamification, interdisciplinarity, etc.

Thus, two views on the problem of active digitalisation have emerged in the scientific world. The first one (Manoylenko et al., 2021) appeals to the great

technological capabilities of digitalisation, which contribute to improving learning outcomes and open up great opportunities for both students and teachers, namely wide access to information retrieval systems, individualised educational trajectory, academic mobility, formation of an active life position, general information culture and media literacy (information and research competence).

At the same time, there are also sceptical opinions about the consequences of the digitalisation of the educational process in higher education institutions (Netreba, Tymofeeva, 2019). First of all, it is an increase in competitiveness in the market of educational services due to the emergence of new providers, increased student mobility, changes in their requests for the organisation of the educational process in higher education institutions, on the one hand, and the inability of higher education institutions to fully implement the capabilities of digital technologies, on the other hand, the readiness of the staff of higher education institutions to dynamic changes in the conditions of organisation and implementation of the educational process. Attention is also focused on the formalisation of training of future doctors due to algorithmisation and standardisation of online education and the lack of direct contact between the teacher and the student. Attention is also drawn to the growing number of cases of violations of academic integrity due to the expansion of access to information resources of educational organisations. And, of course, we cannot ignore the health and wellbeing problems associated with prolonged exposure to a computer screen.

However, despite the social challenges, digitalisation is now becoming a key factor in the organisation of the educational process in higher education institutions, as it makes it more personalised, accessible and flexible, and digital learning technologies are a powerful resource for the professional development of teachers, enabling them to quickly adapt to the current conditions of existence in the information society, expand communication opportunities, self-realisation, and enrich their professional experience.

The active introduction of the term “digitalisation” into all spheres of society has contributed to the emergence of new definitions – digital education, digital educational technology, digital pedagogy, digital economy, digital art, digital medicine, etc. Let us analyse the term “digital education”.

Digital education is: the combination of various components and state-of-the-art technologies through the use of digital platforms, the introduction of new information and educational technologies, the application of advanced forms of organising the educational process and active learning methods, as well as modern teaching and learning materials (Concept of Digital Economy Development); education that functions through the use of digital platforms, the introduction of new information and educational technologies, the application of advanced forms of organising the educational process and active learning methods, as well as

modern teaching and learning materials (Conceptual and Reference Framework for Digital Competence).

The main areas of digitalisation of education are: creation of educational resources and digital platforms supporting interactive and multimedia content for general access of educational institutions and students, including tools for automation of the main processes of educational institutions; development and implementation of innovative computer, multimedia and computer-oriented teaching tools and equipment for creating a digital learning environment (multimedia classrooms, STEM research centres, laboratories, inclusive classes, mixed learning classes); organisation of broadband Internet access for pupils and students in classrooms and auditoriums in educational institutions of all levels; development of distance education using cognitive and multimedia technologies (Concept of Digital Economy Development).

As noted during martial law, the relevance of digital technologies, which open up new opportunities for learning, work and personal development, is particularly evident: digital tools provide an opportunity to support, intensify and mobilise the educational process, make it differentiated and adapted to the requirements of the present. Digitalisation of vocational training includes:

- mastery of digital tools: graduates must be able to use a variety of software products such as text editors, spreadsheets, project management systems, and other tools to effectively organise their work;
- data analysis and processing: the ability to work with large amounts of data, analyse it and draw conclusions is an important skill in many professions. This includes knowledge of data processing software such as Excel, SQL, Python, and others;
- cybersecurity: the ability to protect information and an understanding of the basic principles of cybersecurity are essential to prevent threats and attacks on digital systems;
- online communications: effective communication through digital platforms such as email, video conferencing and social media has become an important part of professional activities;
- self-study skills: the ability to acquire new knowledge and skills independently through online courses, webinars and other resources is critical in today's world where technology is constantly evolving.

Therefore, digitalisation, which is currently integrated into teacher education to the maximum extent possible, opens up various opportunities for professional and personal development and allows to:

- extend students' education;
- increase their mobility in online courses and webinars;
- interact with a teacher at a distance (surveys and consultations in online chat (using Microsoft Teams, Zoom, Skype, Discord) according to a developed programme with a specific work schedule;

- use any gadget connected to the Internet to watch lectures in video or live broadcast;
- take interactive tests;
- introduce new formats for full-time education, interactive distance learning (life virtual), VR/AR simulations (Virtual Reality and Augmented Reality).

Thus, studying the experience of digitalization in the leading countries of the world, we can highlight the changes that can be traced in the Ukrainian education today in this direction:

- educational institutions, especially higher education institutions, should not only provide education, but also serve as a platform for innovation, which is impossible without the integration of science and practice;
- combining the resources of higher education institutions, governmental and non-governmental organizations, and commercial organizations to design and implement joint projects, develop online platforms for learning and research;
- the possibility of creating educational trajectories adapted to individual needs;
- the use of non-traditional education at the same level as traditional education, which can be explained by the growth of innovative competencies (Prokopiv, Stynska, 2023).

Thus, digitalisation is one of the trends that has had the strongest impact (compared to other processes) on the reality of higher education in recent years. It should be noted that digital technologies in the modern world are not only a technical means of learning, but also an environment that opens up new opportunities for learning at any time, anywhere, the ability to design individual educational trajectories, with the possibility of moving from simply consuming electronic resources to creating them. The digital environment requires a different mentality from pedagogical and research and teaching staff, a different perception of the world, completely different approaches and forms of work with students. An educator becomes not only a carrier of knowledge shared with pupils/students, but also a guide in the digital world, which is why it is important for him/her to have a sufficiently high level of digital competence (Conceptual and Reference Framework for Digital Competence). Thus, the digitalisation of education directly depends on the level of teacher's digital technology skills, their productive use in educational activities and the quality of youth preparation for the rapidly developing digital economy. The following levels of digital competence are distinguished (Conceptual Reference Framework for Digital Competence):

Level A.1 (basic): beginner in the use of digital technologies. Beginners are aware of the potential of digital technologies to improve pedagogical and professional practice. However, they are unmotivated to use digital technologies and use them mainly for themselves and partly to prepare for lessons, at the request of the administration or as a matter of necessity during distance learning.

Beginners need guidance and encouragement to expand their digital toolkit and apply digital skills in the pedagogical domain.

Level A.2 (basic): user in the use of digital technologies. Users are aware of the potential of digital technologies and are interested in exploring them to enhance pedagogical and professional practice. They have started to use digital technologies from time to time in some areas of digital competence, but not in a comprehensive, consistent and systematic way.

Level B.1 (sufficient): Integrator with advanced use of digital technologies. Integrators experiment with digital technologies in a variety of contexts and for a variety of purposes, integrating them into many of their practices. They use them creatively to extend different aspects of their professional work. They are keen to expand their repertoire of practice. However, they are still working on understanding which tools work best in which situations and on adapting digital technologies to pedagogical strategies and methods.

Level B.2 (high): Experimental creator using digital technologies. Experimental creators use a range of digital technologies confidently, creatively and critically to extend their professional practice. They purposefully select digital technologies for specific situations and try to understand the advantages and disadvantages of different digital strategies. They are curious and open to new ideas, knowing that there are many things they have not yet tried. They use experimentation as a means of expanding, structuring and consolidating their repertoire of strategies. Professionals are the backbone of any educational organisation when it comes to innovative practice.

Level C (expert): Innovative leader in the use of digital technologies. Innovative leaders have a consistent and comprehensive approach to using digital technologies to improve pedagogical and professional practice. They rely on a wide repertoire of digital strategies from which they know how to choose the most appropriate one for any given situation. They constantly reflect on and develop their practice. They keep abreast of new developments and ideas. At the same time, innovative leaders are concerned about the sufficiency of current digital and pedagogical practices, their limitations or shortcomings, which encourages them to further innovate in education. They experiment with highly innovative and complex digital technologies and/or develop new pedagogical approaches. They are a source of inspiration for others and role models.

Among the main digital forms of organising learning in the educational process of higher education institutions are (Pavlysh et al., 2023):

Video conferencing is one of the most popular technologies in distance learning. This technology allows teachers and students to conduct classes in real time, exchange ideas and ask each other questions. Video conferencing can be conducted using various platforms such as Zoom, Google Meet, Microsoft Teams, Viber, etc. Electronic platforms allow teachers to post learning materials,

assignments, and other resources online. Students can access these materials from anywhere and at any time, allowing them to study at their own convenience. Examples of e-learning platforms include Moodle, MIA: Education, Blackboard, Canvas, etc.

Virtual laboratories are online environments where students can conduct experiments and research in a safe and controlled environment. Laboratories allow to increase the availability of practical classes and reduce the cost of their organisation. Document sharing helps students and teachers work on projects and assignments in real time. Documents can be uploaded to shared cloud drives, such as Google Drive, Dropbox, or OneDrive, allowing everyone to work on the same file at the same time.

Video lessons are a convenient tool for distance learning, as students can view the materials at any time convenient for them. Video lessons can be uploaded to a distance learning platform or to YouTube, allowing them to be viewed on any internet-enabled device. Learning tracking systems – allow teachers and students to track their progress in real time. Instructors can set metrics and goals, and students can check results on distance learning platforms.

VR/AR simulations (Virtual Reality and Augmented Reality). VR is a technology that allows users to enter a different virtual reality – a completely artificial environment created using computer technology, where they can interact with objects and environments. AR is a technology that adds virtual objects and interactive information to the real world, creating a complex interaction between the real and the virtual. VR and AR can be used to create interactive training courses and simulations (*Perspektyvy ta mozhlyvosti...*, 2024).

At the same time, although distance learning is widely implemented in the educational process of higher education institutions, there are some disadvantages of this learning for both students (lack of personal communication and the possibility of a more detailed discussion with the teacher; motivation; psychological isolation; self-discipline, etc.) and teachers (large expenditure of resources and time to create high-quality educational materials for distance learning; cumbersome work on digitising video lectures and video lessons, master classes, developing educational materials; creating electronic libraries, etc.).

In order to determine the satisfaction with the educational process at Precarpathian National University, a survey was organised among students of the Faculty of Education, the Faculty of Mathematics and Informatics, and the Faculty of Foreign Languages. A total of 300 people took part in the survey. The survey results showed that to the question “How do you assess the overall level of digitalisation of your higher education institution?”, 75% of students answered as “high”, 20% – medium, 5% – low. To the question: “What digital learning tools do you use most often?”, 78% named platforms for online classes (Zoom, Google Meet, etc.) and video lectures; 20% – learning management systems

(Moodle, Google Classroom, etc.); 2% – digital libraries and discussion forums. To the question: “How satisfied are you with the quality of distance learning at your institution?”, 62% said they were “satisfied”, 12% were dissatisfied, 26% were neutral, and 26% were undecided. To the question: “What are the main problems you face during distance learning?”, the respondents named: 26% – technical problems (Internet, equipment); 46% – lack of personal communication and insufficient motivation; 12% – problems with self-discipline; 16% – lack of access to necessary materials. To the question: “Do you feel that the quality of the educational process has improved due to digitalisation during martial law?”, students answered: 72% – “yes”, 22% – “partially”, 6% – “no”.

In general, the survey results show a high level of student satisfaction with the digitalisation of the educational process at the Precarpathian National University, especially during martial law. However, there are certain problems, such as technical difficulties, lack of personal communication, and insufficient motivation, which require further attention and resolution.

CONCLUSIONS

Thus, it has been shown that during martial law, the relevance of digital technologies, which open up new opportunities for learning, work and personal development, becomes especially evident: digital tools provide an opportunity to support, intensify and mobilise the educational process, make it differentiated and adapted to the requirements of the present.

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ABSTRAKT

Technologie cyfrowe stały się niezwykle ważne i niezbędne podczas globalnej pandemii i pełnowymiarowej agresji zbrojnej Rosji na Ukrainę. Wydarzenia te doprowadziły do masowego przejścia na edukację online, co pozwoliło kontynuować proces edukacyjny nawet w kontekście kwarantanny i operacji wojskowych. Cyfryzacja otworzyła nowe możliwości rozwoju zawodowego,

sprawiła, że absolwenci stali się bardziej konkurencyjni na rynku pracy i gotowi na wyzwania przyszłości, ponieważ umiejętność pracy z narzędziami cyfrowymi i zrozumienie podstaw technologii informacyjnej są niezbędnymi umiejętnościami. Dlatego w kontekście szybkiego rozwoju technologii i globalizacji rynku pracy, wyzwań i zagrożeń naszych czasów komponent informacyjny szkolenia zawodowego stał się oczywistą zaletą dla każdego absolwenta. Celem badań była analiza specyfiki cyfryzacji szkolnictwa wyższego w stanie wojennym w Ukrainie. W badaniu zastosowano ogólne metody naukowe: analizę, syntezę, uogólnienie. Wyniki ankiety wykazały wysoki poziom zadowolenia studentów z cyfryzacji procesu edukacyjnego na Podkarpackim Uniwersytecie Narodowym im. Wasyla Stefanyka, zwłaszcza w okresie stanu wojennego. Istnieją jednak pewne problemy, takie jak trudności techniczne, brak komunikacji osobistej i brak motywacji, które wymagają dalszej uwagi i rozwiązania. Stwierdzono, że w czasie stanu wojennego znaczenie technologii cyfrowych, które otwierają nowe możliwości uczenia się, pracy i rozwoju osobistego, staje się szczególnie widoczne: narzędzia cyfrowe dają możliwość wspierania, intensyfikowania i mobilizowania procesu edukacyjnego, różnicowania go i dostosowywania do wymagań współczesności.

Słowa kluczowe: cyfryzacja; cyfryzacja edukacji; instytucja szkolnictwa wyższego; innowacyjne technologie; proces edukacyjny; stan wojenny; Ukraina