UDC 331.5
JEL Classification: E24; I20; I25; N3

THE ISSUE OF DIGITAL TRANSFORMATION IN HIGHER EDUCATION IN THE CONTEXT OF DIGITAL SOCIETY FORMATIONI

©2025 **BOBRO N. S.**

UDC 331.5
JEL Classification: E24; I20; I25; N3

Bobro N. S.

The Issue of Digital Transformation in Higher Education in the Context of Digital Society Formation

The aim of the article is to examine the economic and value-related aspects of digital transformation in higher education within the context of forming a digital society. The article analyzes the characteristics of the transition from an information society to a digital society, which is accompanied by profound changes in the technological, social, and educational environment. The article outlines the impact of digitalization on the modernization of higher education and identifies the university's role as an institution responsible for professional activity in a global digital environment. The article explores how digital technologies alter the structure and content of the educational process, transform the role of the teacher, promote the development of new forms of learning and communication, and contribute to the cultivation of flexible skills needed in the 21st century. The article focuses on the economic effects of digitalization in higher education. The article examines the impact of implementing digital technologies such as artificial intelligence, machine learning, Big Data, blockchain, and virtual and augmented reality on the efficiency of managerial decisions, cost optimization, process automation, and the competitiveness of universities. Examples are provided of the economic growth of educational institutions thanks to digital distance learning platforms, new revenue streams, and the commercialization of research. The substantiation for creating a unified digital ecosystem within the university that integrates educational, administrative, and financial processes is presented. The article also highlights the contradictory nature of digital transformation, particularly the risks of digital inequality, fragmentation of the academic space, and threats to the formalization of educational activities. The value tension between traditional educational principles (academic freedom, personal development, service to science) and administrative-digital practices oriented toward metrics, reporting, and quantitative measures has been analyzed. The experience of higher education institutions transitioning to a remote format during the pandemic as a catalyst for digital transformation has been examined. It has been demonstrated that effective use of digital technologies is possible if the humanistic orientations of education are preserved. It is concluded that digital transformation in higher education should be regarded as a strategic response to the challenges of the digital age, involving not only infrastructural changes but also a profound rethinking of the university's roles, educational content, and organizational mechanisms. An effective integration of digital tools with traditional academic values ensures the sustainable development of higher education and its capacity to act as an active agent in shaping a digital society.

Keywords: *digital transformation, digital university, digitalization, distance education, digital economy, educational environment.*

DOI: *https://doi.org/10.32983/2222-0712-2025-3-13-18*

Tabl.: *1.* ***Bibl.:*** *14.*

Bobro Natalia S. *– Candidate of Sciences (Economics), Director of the Digital Department, European University (16-V Akademika Vernadskoho Blvd., Kyiv, 03115, Ukraine)*

E-mail: *natalia@noolab.ch*

УДК 331.5
JEL Classification: E24; I20; I25; N3

Бобро Н. С. Проблема цифрової трансформації вищої освіти в контексті формування цифрового суспільства

Метою статті є дослідження економічних і ціннісних аспектів цифрової трансформації вищої освіти в контексті формування цифрового суспільства. У статті проаналізовано особливості переходу від інформаційного до цифрового суспільства, що супроводжується глибокими змінами в технологічному, соціальному й освітньому середовищі. Окреслено вплив цифровізації на модернізацію вищої освіти, а також визначено місце університету як інституції, відповідальної за професійну діяльність в умовах глобального цифрового середовища. Розглянуто, як цифрові технології змінюють структуру й зміст освітнього процесу, трансформують роль викладача, стимулюють розвиток нових форм навчання та комунікації, а також сприяють формуванню гнучких навичок, необхідних у XXI столітті. У статті приділено особливу увагу економічним ефектам цифровізації вищої освіти. Проаналізовано вплив впровадження таких цифрових технологій, як штучний інтелект, машинне навчання, Big Data, блокчейн, віртуальна та доповнена реальність, на ефективність управлінських рішень, оптимізацію витрат, автоматизацію процесів і підвищення конкурентоспроможності університетів. Наведено приклади економічного зростання освітніх установ завдяки цифровим платформам дистанційного навчання, новим джерелам доходів і комерціалізації досліджень. Обґрунтовано доцільність формування єдиної цифрової екосистеми в межах університету, що інтегрує освітні, адміністративні та фінансові процеси. Розкрито суперечливий характер цифрової трансформації, зокрема ризики цифрової нерівності, фрагментації академічного простору та загрози формалізації освітньої діяльності. Проаналізовано ціннісну напругу між традиційними освітніми принципами (академічна свобода, особистісний розвиток, служіння науці) та адміністративно-цифровими практиками, орієнтованими на показники, звітність і кількісні метрики. Досліджено досвід переходу закладів вищої освіти на дистанційний формат у період пандемії як каталізатор цифрової трансформації. Показано, що ефективне використання цифрових технологій можливе за умови збереження гуманістичних орієнтирів освіти. Зроблено висновок, що цифрова трансформація вищої освіти має розглядатися як стратегічна відповідь на виклики цифрової епохи, що передбачає не лише інфраструктурні зміни, а й глибоке переосмислення функцій університету, змісту освіти та механізмів її організації. Ефективне поєднання цифрових інструментів з традиційними академічними цінностями дозволяє забезпечити сталий розвиток вищої освіти та її здатність бути активним агентом формування цифрового суспільства.

Ключові слова: *цифрова трансформація, цифровий університет, диджиталізація, дистанційна освіта, цифрова економіка, освітнє середовище.*

Табл.: *1.* ***Бібл.:*** *14.*

Бобро Наталія Сергіївна *– кандидат економічних наук, директор цифрового департаменту, Європейський університет (бульв. Академіка Вернадського, 16-В, Київ, 03115, Україна)*

E-mail: *natalia@noolab.ch*

Introduction. The current stage of society's development is characterized by profound and large-scale changes caused by digital technologies. Digitalization, which covers all spheres of life, is not just a technical modernization but a fundamental transformation of the way people, organizations, and states interact. This trend is especially noticeable in higher education, where digital innovations are transforming both teaching methods and the organization of the educational process.

In this regard, the problem of digital transformation of universities as key centers of the formation of knowledge and competencies for the future digital society is becoming particularly relevant. Universities are faced with the need to adapt to the rapidly changing conditions of the digital environment, which requires a rethinking of their educational and economic role. This process is accompanied by numerous challenges and opportunities, which are determined by the degree of readiness of educational institutions for digital transformation.

Considering the above, it is extremely important to analyze the impact of digital technologies on the educational sphere, to identify the main trends and risks of this process. The economic aspect of digitalization is of particular interest, as it determines the prospects for the further development of higher education and its ability to meet the modern requirements of the labor market and global competition.

Analysis of recent research and publications. The problem of digital transformation of higher education is widely studied in international and Ukrainian academic discourse. International researchers (Kortemeyer et al. [1; 6]) focus on the consequences of hybrid and online learning after the pandemic and on AI-assisted learning technologies, while Ukrainian scholars (Колодінська, Скляренко, Ніколаєвський [2]; Скляренко, Ягодзінський [9]) emphasize the practical use of interactive digital tools in teaching. Works by Kozhyna [3] and Lopuschnyak [5] analyze socio-economic determinants of sustainable development, relevant also to the higher education ecosystem. At the same time, Ukrainian and international co-authored studies by Bobro and colleagues [12–14] highlight the economic efficiency of digitalization through AI, digital avatars, and digital platforms. Despite the broad scope of research, there remains a lack of comprehensive studies that simultaneously consider pedagogical, economic, and institutional aspects of digital transformation, especially in the context of Ukrainian universities' adaptation to European and global digital standards.

Highlighting previously unresolved parts of the general problem. Most existing works focus on global practices or technological and pedagogical aspects of digitalization. However, unresolved issues remain particularly acute for Ukraine:

- the absence of a unified state strategy for digital transformation of higher education aligned with EU digital education policies;
- uneven digital infrastructure development across regions, which creates risks of inequality between Ukrainian universities;
- insufficient integration of economic indicators into assessments of digitalization effectiveness;
- limited institutional capacity to commercialize innovations and attract investment.

Thus, the general problem is not only technological but also systemic, requiring solutions at the level of state policy, university management, and academic communities.

Formulation of the purpose of the article. The purpose of the article is to analyze the economic aspects of the digital transformation of higher education in the context of the digital society formation, with a particular focus on Ukrainian universities and their adaptation to global digitalization trends.

Description of the methodology (structure, sequence) of conducting the research. The research is based on a systemic and interdisciplinary approach. The methodology combines methods of analysis and synthesis, comparative analysis of Ukrainian and international practices, and content analysis of scientific publications. The study proceeds through several interconnected stages: clarification of conceptual foundations of digital transformation and its dual nature; exploration of the dynamics of digitalization in Ukrainian universities in comparison with global practices; identification of economic effects of introducing digital technologies in higher education institutions; evaluation of risks and challenges of digitalization in the context of regional disparities and European integration; and formulation of recommendations for state authorities of Ukraine, university administrations, and academic staff aimed at strengthening digital infrastructure, developing institutional digital ecosystems, and effectively applying digital tools in teaching and research.

Presentation of the main material and the obtained scientific results. Modern society is characterized by the complete digitalization of all spheres of human activity and the space of human existence. This process, which is a global trend of improving the efficiency of socio-economic development of states, has replaced informatization, which began in the mid-twentieth century, and marked the transition from an information society to a digital one [1;2]. This transition is associated with the intensive development of information and communication technologies and their implementation in professional activities, communication, research, production, management, business processes, and everyday practices, as well as the formation of the digital economy. The technological structure of modern society, based on innovative technologies, contributes to the formation of a digital information environment, increased information transparency, simplification of social interactions, reduction of production and consumption costs, and overall improvement of the quality of life.

Digitalization, which covers the economy and politics, social and cultural spheres, production, industry, business, and science, creates new requirements for training competent personnel who are able to effectively interact with the digital space and be in demand in the modern labor market. This determines the innovative vector of development of the higher education system aimed at transforming the educational process through the active introduction of digital technologies.

Higher education is one of the most important platforms for innovation, as it uses the potential of modern technologies to form the foundation for the formation of a digital society [3, p. 29]. In such an environment, future specialists acquire soft skills – personal and professional qualities necessary for life and professional activity in a changing world, where it is important to be socially active and quickly process large amounts of information. Digitalization of higher education expands the boundaries of students' cognition, engages them in independent search for information, creates conditions for the continuity of the learning process, and opens up significant opportunities for personal development, formation of general cultural and professional competencies necessary in the twenty-first century [4; 5].

At the same time, innovative trends are significantly changing the educational process of universities, affecting their content, structure, and organization, which is accompanied by numerous difficulties and problems associated with the risks of digitalization. That is why it is important to study the grounds and essence of the digital transformation of higher education in order to determine the role of the university's educational environment mediated by digital technologies for the further development of the digital society.

Digital technologies are an important attribute of digitalization, as they play a key role in stimulating technological breakthroughs in modern society and its transformation [6]. These are systems, devices, resources for creating, storing, and managing digitized information, which include various software and hardware components that allow automating processes, creating new opportunities, services, and products, as well as "knowledge and skills to use digital data, systems, and procedures for their practical implementation" [7, p. 207]. As a type of information technology that is part of the NBIC convergence ("nano-, bio-, info-, cognitive technologies"), the core of the technological structure of modern society, digital technologies reproduce their inherent meanings and create information of a new quality about processes, phenomena, and objects [8].

Digital technologies are represented by the following types:

- Machine Learning and Artificial Intelligence (AI);
- Internet of Things (IoT);
- Big Data collection and analytical processing technologies;
- blockchain;
- Virtual Reality (VR) and Augmented Reality (AR);
- production technologies (3D printing);
- cloud storage;
- wireless devices;
- digital platforms;
- social media technologies;
- cybersecurity technologies [9–11].

These technologies not only accumulate information, store it, and process it, but also contribute to increased efficiency and productivity of labor, economic growth and integration, stimulate innovation, simplify communications and interaction, and provide free access to necessary goods.

The researches emphasize the duality of digitalization: on the one hand, digital technologies improve many aspects of life; on the other hand, penetrating into everyday practices, they become a factor of dynamic changes in society. In this context, it is noted that digitalization is the development and use of technologies based on the ideas of discreteness, algorithmicity, computability, and programmability. It is these computer and information and communication technologies that determine modern civilization and change in the format of development of the entire civilization environment. Radical changes in the economy, public administration, science, education, art, and personal life have been and continue to be brought about by the total medialization of all these areas of human activity in digital format [12, p. 44].

This leads to the use of the term "digitalization" in a broad sense, as a global trend in the development of society, based on digitized information and the integration of modern technologies into society, which contributes to improving the quality of life in general and becomes an additional impetus for social transformation. At the same time, digitalization can be considered in a broad sense if the digital transformation of information meets the following requirements:

- covers production, business, science, social sphere, and the ordinary life of citizens;
- is accompanied by the effective use of its results;
- these results are available to users of the transformed information;
- its results are used not only by specialists, but also by ordinary citizens who have the skills to work with digital information [13, p. 43].

Thus, the discourse of digitalization implies digital transformation, which in the context of economic reflection is interpreted as:

- a philosophical category that describes the current stage of human development and changes the paradigms of the world order due to technological solutions [14, p. 8];
- transformation of the form of organization of society's activities in a particular area based on the use of digital information technologies [1; 9];
- the result of large-scale and complete digitalization [10; 11], during which digital technologies change the perception of the world and the experience of living in it, which indicates the need to form a new type of thinking and social organization in order to adapt to changes and maximize the use of new opportunities.

Analyzing the above definitions, we can conclude that digital transformation includes both digitization and digitalization. Thus, digital transformation should be considered as a process of technological and social changes initiated by the digital transformation of analog information and the use of digital technologies in various spheres of public life, which, in turn, leads to the formation of a digital society. It is noted that

the process of transformation of modern society is aimed at forming the civilization of the digital world and, as a result, the digital society. There is a broad informatization of the social space: culture, education, politics, and economy. All this indicates that digitalization is a dynamic factor in the formation of modern society [14, p. 9].

It is worth emphasizing that the terms "digitalization" and "informatization" are used in connotations of innovation, dynamic growth, and technological breakthroughs in social reality and are often perceived as synonyms. At the same time, these concepts are not absolutely identical, since in the process of technology evolution, informatization, which describes the processes of development of telecommunications infrastructure and integration of computer, information, and communication technologies [8], is moving into the stage of digitalization. This is facilitated by a trend based on the digital representation of information. Therefore, digitalization is a broader concept, covering all aspects of information technology progress and becoming a mechanism for transition to the next stage of society development.

It is important to note that the process of digitalization of higher education has been developing relatively slowly and unevenly, mainly focusing on improving the traditional organization of the educational process before the COVID-19 pandemic. In our opinion, this was due to a number of reasons:

- lack of a single strategy and coordination of digital transformation;
- poor technical equipment of educational institutions (especially universities in remote regions);
- low level of digital literacy of the academic staff, which did not allow for the full use of digital technologies in the educational process;
- insufficient awareness of the possibilities and benefits of digital technologies, which led to low motivation of students and teachers to introduce innovations in education and research.

Digital technologies were used as a complement to classical education until the pandemic radically changed the status of digital innovations in higher education, which were previously considered mainly as a technical novelty.

During quarantine and self-isolation, the scientific and educational space has rapidly moved into the digital environment, switching to a remote work format. Classes and practices, consultations, certification, defense of final qualification papers, scientific conferences, and symposia were transferred to a virtual environment that provided both synchronous and asynchronous learning and interaction formats. It should be noted that universities that have already actively used digital technologies in their activities were able to quickly adapt to the new conditions, unlike those where digital processes were developing more slowly.

The urgent development of e-learning materials, online courses, and digital educational platforms required additional time and complicated the transition to a distance format. Moreover, teachers at many universities were skeptical of the drastic changes due to the specifics of certain disciplines that are difficult to adapt to the online format, and conservative views on teaching methods.

In addition, two value systems have emerged in the academic environment that were in tension even before the transition to online mode. The first system consists of traditional academic values: knowledge transfer, search for truth, intellectual and moral development, professional responsibility, honesty, academic freedom, and unity of teaching and research. This value-based educational system cannot be quickly and without losses transferred to fully distance learning, because direct observation of the teacher's work and direct communication with them are important elements of students' professional development.

The second value system is formalized work, which replaces university values with statistical indicators and reporting. The experience of distance work has shown the advantages of the first system and the lack of content of the second. Formalized universities in distance learning moved to imitate educational activities: teachers spent more time preparing reports, while students were formally in virtual classrooms without real involvement in the learning process. This approach leads to the devaluation of innovations in higher education and does not contribute to the formation of competencies in future specialists.

At the same time, teachers who have preserved traditional academic values in practice perceived the distance format as an opportunity to effectively use digital technologies for quality educational work, the development of new knowledge, a creative approach to its transfer, and the personal development of students. This made it possible to maximize the educational potential of digital technologies and increase students' motivation to actively master the virtual environment as an important communication tool.

As a result, the combination of traditional values and innovative digital technologies contributed to the effective and creative interaction of participants in the educational process in the context of distance learning. This new approach to education includes:

- in the methodological aspect: focusing on interest in the discipline, which is ensured by a variety of forms and methods of teaching with the use of digital technologies, which allows increasing the content of the educational process;
- in the ethical aspect: the adoption of new values based on the equality of the parties to the educational process in the possession of digital tools, mutual trust, the desire to learn and develop, as well as the joint design of training sessions.

The problem of digital transformation of higher education is of particular importance due to the economic changes that accompany the transition to a digital society. In modern conditions, educational institutions are becoming not just subjects of socio-cultural processes, but active participants in economic relations, where the quality and speed of digitalization determine competitive advantages. In this context, the digital transformation of universities goes beyond purely educational issues, becoming an important economic factor in the development of states and individual regions.

The economic efficiency of higher education digitalization largely depends on the introduction of digital technologies into key business processes of universities: resource management, administration, marketing of educational services, and research. An analysis of current trends allows us to identify the most promising technologies in terms of economic effect (Table 1).

Table 1

Economic effects of the introduction of digital technologies in higher education

Digital technologies	Economic effect
Big Data and Analytics	Increased efficiency of management decision-making, cost optimization
Artificial Intelligence and Machine Learning	Automation of routine processes, saving labor resources
Virtual and Augmented Reality	Reduced costs for training materials and practical classes
Digital platforms for distance learning	Increased student enrollment, additional revenue from online education
Blockchain technologies	Reduced transaction costs, increased transparency of financial management

Source: compiled based on [6; 14]

Thus, the digitalization of higher education is becoming not only a condition for the competitiveness of universities, but also a mechanism for ensuring economic growth and sustainable development of regional economies. Digital technologies enable universities to significantly reduce operating costs, increase resource efficiency, and attract new sources of revenue.

However, the economic effect of digitalization is not automatic and depends on the degree of readiness of universities to introduce technologies and their ability to adapt educational and management processes. In particular, it is necessary to develop and implement clear strategies for digital transformation that provide for the integration of educational, administrative, and economic processes of universities into a single digital ecosystem.

Universities that actively use digital technologies to develop research and innovation activities create a favorable environment for the emergence of technological startups, the commercialization of scientific developments, and integration into national and global economic chains. This aspect allows universities to act as centers of economic growth, attract additional investments, and create new jobs.

At the same time, the digitalization of higher education poses a number of economic risks, including a possible increase in inequality between universities due to different levels of access to digital resources. The lack of uniform standards for digitalization may lead to increased regional disparities in economic development, which requires active state involvement in supporting less developed regions.

Considering these challenges, the government's priority should be to form a digital education infrastructure, create conditions for equal access to digital technologies, and support universities that invest in digital innovations. This is how the digital transformation of higher education will become an important factor not only in the educational but also in the economic development of the digital society.

Conclusions and prospects for further research in this direction. The digital transformation of higher education is a complex and multidimensional process that encompasses both educational and economic components. At the global level, digital technologies are reshaping teaching methods, expanding access to knowledge, and creating new models of economic sustainability for universities. For Ukrainian universities, these processes acquire particular relevance, since the modernization of higher education must proceed simultaneously with post-war recovery, regional equalization of opportunities, and integration into the European Higher Education Area.

The introduction of digital technologies provides significant economic effects: optimization of resources, development of new educational services, and participation in innovative ecosystems. For Ukraine, the digital transformation of universities also becomes a mechanism of regional development, labor market adaptation, and alignment with EU digital education standards. At the same time, risks remain: deepening inequality between universities due to uneven access to digital resources, insufficient funding, and limited institutional capacity to commercialize innovations.

Therefore, recommendations should be differentiated:

- for the state authorities of Ukraine – to develop a national strategy of digital education, ensure equal access to infrastructure, and support regional universities;
- for university administrations – to build comprehensive digital ecosystems that integrate educational, administrative, and research processes;
- for the academic community – to preserve traditional academic values while mastering digital tools for teaching, research, and international cooperation.

Further research should focus on developing methodological approaches to measuring the economic efficiency of digital transformation in Ukrainian universities, studying the long-term effects of digitalization on regional and national development, and analyzing successful global practices for their adaptation to Ukrainian conditions.

LITERATURE

1. Kortemeyer G., Dittmann-Domenichini N., Merki C., Attending lectures in person, hybrid or online at a technical university: how do students choose after the pandemic, and what about the outcome? *Discover Education*. 2025. Vol. 4 (1). P. 94.

DOI: https://doi.org/10.1007/s44217-025-00500-y

2. Колодінська Я. О., Скляренко О. В., Ніколаєвський О. Ю. Практичні аспекти розробки інноваційних бізнес ідей з використанням цифрових сервісів. *Економіка і управління*. 2022. № 4. С. 53–60.

DOI: https://doi.org/10.36919/2312-7812.4.2022.53

3. Kozhyna A. Reducing Poverty, Inequality and Social Exclusiom in European Countries. Based on Inclusive Approaches to Economic Development. *Economics and Management of The National Economy. The Crisis of National Models of Economic System.* 2022. P. 29–32.

DOI: https://doi.org/10.30525/978-9934-26-269-2-7

4. Kubiv S. I., Bobro N. S., Lopushnyak G. S., Lenher Y. I., Kozhyna A. Innovative potential in European countries: analytical

and legal aspects. *International Journal of Economics and Business Administration*. 2020. Vol. 8 (2). P. 250–264.

DOI: https://doi.org/10.35808/ijeba/457

5. Lopuschnyak H., Chala N., Poplavska O. Socio-economic determinants of the ecosystem of sustainable development of Ukraine. *IOP Conf. Series: Earth and Environmental Science*. 2021. Vol. 1. P. 1–9.

DOI: https://doi.org/10.1088/1755-1315/915/1/012019

6. Kortemeyer G., Nöhl J. Assessing confidence in AI-assisted grading of physics exams through psychometrics: An exploratory study. *Physical Review Physics Education Research*. 2025. Vol. 21 (1). P. 010136.

DOI: 10.1103/PhysRevPhysEducRes.21.010136

7. Козинець А. Мотиваційне середовище закладів вищої освіти в системі міжнародних порівнянь. *Věda a perspektivy*. 2024. № 12 (43). С. 206–2014.

DOI: https://doi.org/10.52058/2695-1592-2024-12(43)-206-214

8. Krap A., Bataiev S., Bobro N., Kozub V., Hlevatska N. Examination of digital advancements: Their influence on contemporary corporate management methods and approaches. *Multidisciplinary Reviews*. 2024. Vol. 7 (26).

DOI: https://doi.org/10.31893/multirev.2024spe026

9. Скляренко О. В., Ягодзінський С. М., Ніколаєвський О. Ю., Невзоров А. В. Цифрові інтерактивні технології навчання як невід'ємна складова сучасного освітнього процесу. *Інноваційна педагогіка*. 2024. № 68 (2). С. 51-55.

DOI: https://doi.org/10.32782/2663-6085/2024/68.2.51

10. Хоменко О. О., Паустовська М. В., Онищук І. А. Вплив інтерактивних технологій на процес навчання і розвиток здобувачів вищої освіти. *Наукові інновації та передові технології*. 2024. № 5 (33). С. 1222–1231.

DOI: https://doi.org/10.52058/2786-5274-2024-5(33)-1222-1231

11. Стрижак О. Ю. Digital university. Concept of creation. *Scientific Notes of Junior Academy of Sciences of Ukraine*. 2024. № 2 (27). С. 70–79.

DOI: https://doi.org/10.51707/2618-0529-2023-27-08

12. Bobro N., Hyshchuk R., Strunhar A., Bukovskyi O., Alekseiko V. Exploring the role of AI in shaping future marketing strategies: evaluations and outlooks. *Amazonia Investiga*. 2024. Vol. 13 (80). P. 43–53.

DOI: https://doi.org/10.34069/AI/2024.80.08.4

13. Lysenko S., Bobro N., Korsunova K., Vasylchyshyn O., Tatarchenko Y. The Role of Artificial Intelligence in Cybersecurity: Automation of Protection and Detection of Threats. *Economic Affairs*. 2024. Vol. 69 (Special Issue). P. 43–51.

DOI: https://doi.org/10.46852/0424-2513.1.2024.6

14. Bobro N. Use of digital avatars in the learning process as a factor of economic efficiency. *International Scientific Conference "Economic Transformation in the Context of Global Challenges: Current Issues": Conference Proceedings (February 7–8, 2025, Klaipeda, Lithuania)*. P. 7–10.

DOI: https://doi.org/10.30525/978-9934-26-529-7-3

REFERENCES

Bobro, N. (2025). Use of digital avatars in the learning process as a factor of economic efficiency. *International Scientific Conference "Economic Transformation in the Context of Global Challenges: Current Issues": Conference Proceedings* (pp. 7–10). Klaipeda, Lithuania. https://doi.org/10.30525/978-9934-26-529-7-3

Bobro, N., Hyshchuk, R., Strunhar, A., Bukovskyi, O., & Alekseiko, V. (2024). Exploring the role of AI in shaping future marketing strategies: evaluations and outlooks. *Amazonia Investiga, 13*(80), 43–53. https://doi.org/10.34069/AI/2024.80.08.4

Khomenko, O. O., Paustovska, M. V., & Onyshchuk, I. A. (2024). *Vplyv interaktyvnykh tekhnolohii na protses navchannia i rozvytok zdobuvachiv vyshchoi osvity* [The influence of interactive technologies on the learning process and development of higher education students]. *Naukovi innovatsii ta peredovi tekhnolohii, 5*(33), 1222–1231. https://doi.org/10.52058/2786-5274-2024-5(33)-1222-1231

Kolodinska, Ya. O., Skliarenko, O. V., & Nikolaievskyi, O. Yu. (2022). *Praktychni aspekty rozrobky innovatsiinykh biznes idei z vykorystanniam tsyfrovykh servisiv* [Practical aspects of developing innovative business ideas using digital services]. *Ekonomika i upravlinnia, 4*, 53–60. https://doi.org/10.36919/2312-7812.4.2022.53

Kortemeyer, G., Dittmann-Domenichini, N., Merki, C. (2025). Attending lectures in person, hybrid or online at a technical university: how do students choose after the pandemic, and what about the outcome? *Discover Education, 4*(1), 94. https://doi.org/10.1007/s44217-025-00500-y

Kortemeyer, G., & Nöhl, J. (2025). Assessing confidence in AI-assisted grading of physics exams through psychometrics: An exploratory study. *Physical Review Physics Education Research, 21*(1), 010136. https://doi.org/10.1103/PhysRevPhysEducRes.21.010136

Kozhyna, A. (2022). Reducing Poverty, Inequality and Social Exclusiom in European Countries. Based on Inclusive Approaches to Economic Development. *Economics and Management of the National Economy. The Crisis of National Models of Economic System*, 29–32. https://doi.org/10.30525/978-9934-26-269-2-7

Kozynets, A. (2024). *Motyvatsiine seredovyshche zakladiv vyshchoi osvity v systemi mizhnarodnykh porivnian* [Motivational environment of higher education institutions in the system of international comparisons]. *Věda a perspektivy, 12*(43), 206–214. https://doi.org/10.52058/2695-1592-2024-12(43)-206-214

Krap, A., Bataiev, S., Bobro, N., Kozub, V., & Hlevatska, N. (2024). Examination of digital advancements: Their influence on contemporary corporate management methods and approaches. *Multidisciplinary Reviews, 7*(26). https://doi.org/10.31893/multirev.2024spe026

Kubiv, S. I., Bobro, N. S., Lopushnyak, G. S., Lenher, Y. I., & Kozhyna, A. (2020). Innovative potential in European countries: analytical and legal aspects. *International Journal of Economics and Business Administration, 8*(2), 250–264. https://doi.org/10.35808/ijeba/457

Lopuschnyak, H., Chala, N., & Poplavska, O. (2021). Socio-economic determinants of the ecosystem of sustainable development of Ukraine. *IOP Conf. Series: Earth and Environmental Science, 1*, 1–9. https://doi.org/10.1088/1755-1315/915/1/012019

Lysenko, S., Bobro, N., Korsunova, K., Vasylchyshyn, O., & Tatarchenko, Y. (2024). The Role of Artificial Intelligence in Cybersecurity: Automation of Protection and Detection of Threats. *Economic Affairs, 69*(Special Issue), 43–51. https://doi.org/10.46852/0424-2513.1.2024.6

Skliarenko, O. V., Yahodzinskyi, S. M., Nikolaievskyi, O. Yu., & Nevzorov, A. V. (2024). *Tsyfrovi interaktyvni tekhnolohii navchannia yak nevidiemna skladova suchasnoho osvitnoho protsesu* [Digital interactive learning technologies as an integral component of the modern educational process]. *Innovatsiina pedahohika, 68*(2), 51–55. https://doi.org/10.32782/2663-6085/2024/68.2.51

Stryzhak, O. Yu. (2024). Digital university. Concept of creation. *Scientific Notes of Junior Academy of Sciences of Ukraine, 2*(27), 70–79. https://doi.org/10.51707/2618-0529-2023-27-08

Стаття надійшла до редакції 10.09.2025 р.

Статтю прийнято до публікації 26.08.2025 р.