UDC 811.15428.147:811.111
DOI https://doi.org/10.24919/2308-4863/92-1-45

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TRENDS IN THE INTEGRATION OF DIGITAL TECHNOLOGIES INTO HIGHER EDUCATION

The rapidly developing digital economy is permeating all spheres of modern society, which, as a consequence, creates a need for systemic technological breakthroughs and the development of new methods of information processing. Based on an analysis of publications on the digitalization of higher education, this article identifies four trends related to the introduction of digital technologies and tools into the educational process: developing a blended learning model; transitioning to online learning; creating a virtual (digital) educational environment; changing the approach to managing educational organizations. These trends are interconnected, yet each has a specific impact on higher education. On the one hand, digitalization promotes greater openness and flexibility in education, increased student engagement in the learning process, and the development of a networked model of university interaction. On the other hand, it leads to the creation of a new educational situation, the inclusion of new actors in the education system, which alters the configuration of relationships between its main participants. Digitalization introduces significant changes in the roles of teacher and student in the learning process, requiring appropriate adaptation.

The transition to online education and the creation of a virtual educational environment generate the need for changes in the management of educational institutions. If these changes do not occur, digitalization may lead to negative consequences.

Purpose: *to systematize the social effects of digitalization in higher education and conduct corresponding longitudinal studies. A study design has been developed to examine the social risks of transforming higher education institutions under the influence of digitalization, based on a case study strategy. This research attempts to systematize the directions of digitalization of higher education, to determine their impact on the content and outcomes of graduate training, on the relationships between the main actors in educational activity, and, based on this, to outline a research program on the social risks of transforming higher education as a social institution under the influence of digitalization.*

Methods: *analysis, synthesis, abstraction for generalization and conclusions, as well as quantitative methods (statistical analysis, correlation analysis) and qualitative methods (case studies).*

Results. *The article describes trends in the digitalization of higher education and their impact on the respective institutions. The social risks arising during the transformation of higher education institutions under the influence of digitalization are also emphasized. It is recognized that the digitalization of higher education is an objective process, reflecting the general logic of the transition to a digital society. However, this process is associated with a number of social risks affecting both individual social groups (in this case, faculty and students) and key social institutions. We see the prospect of further scientific research in the studio for digitalization of the educational process.*

Conclusions. *In the conditions of informatization and digitalization of education, the creation of a digital educational environment becomes a particularly urgent task. The analysis showed that the advantages of the digital educational environment are the provision of educational opportunities for all participants in the educational process equally; mobility of training (variation of time and place of training); the possibility of implementing continuous education throughout life; the possibility of preparing students on the projected individual educational routes; consumption, application and development of electronic educational resources. Representatives of all generations need to understand that lifelong learning, familiar in the West, is becoming a necessity for Ukrainians as well. Digital transformation is less about new technologies and restructuring business processes, and more about the people who need to possess the necessary competencies to work with these technologies.*

Key words: *higher education, higher education students, social institution, digitalization, blended education, online education, virtual educational environment.*

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ТЕНДЕНЦІЇ ІНТЕГРАЦІЇ ЦИФРОВИХ ТЕХНОЛОГІЙ У ВИЩУ ОСВІТУ

Цифрова економіка розвивається надзвичайно динамічно, інтегруючись у всі сфери сучасного суспільства та зумовлюючи потребу в системних технологічних інноваціях і створенні нових методів оброблення інформації. На основі аналізу публікацій про цифровізацію вищої освіти у представленій статті визначено чотири тенденції, пов'язані з впровадженням цифрових технологій та інструментів в освітній процес: розвиток моделі змішаного навчання; перехід до онлайн-навчання; створення віртуального (цифрового) освітнього середовища; зміна підходу до управління освітніми організаціями. Ці тенденції взаємопов'язані, проте кожна з них має специфічний вплив на вищу освіту. З одного боку, цифровізація сприяє більшій відкритості та гнучкості в освіті, підвищенню залученості здобувачів вищої освіти до навчального процесу та розвитку мережевої моделі взаємодії університетів. З іншого боку, спричиняє створення нової освітньої ситуації, зарахування нових суб'єктів до системи освіти, що змінює конфігурацію взаємовідносин між її основними учасниками. Процеси цифровізації істотно трансформують функції викладача та студента в навчальному процесі, що потребує відповідної адаптації.

Перехід до онлайн-освіти та формування віртуального освітнього середовища зумовлюють потребу в оновленні системи управління навчальними закладами, адже відсутність таких змін може спричинити негативні наслідки цифровізації.

***Мета дослідження:** здійснити систематизацію соціальних наслідків цифровізації у вищій освіті та провести відповідні лонгітюдні дослідження. Розроблено дизайн дослідження для вивчення соціальних ризиків трансформації вищих навчальних закладів під впливом цифровізації, заснований на стратегії тематичного дослідження. У межах цього підходу зроблено спробу систематизувати основні напрями цифровізації вищої освіти, визначити їхній вплив на зміст, результати підготовки випускників та основних суб'єктів освітнього процесу, а також окреслити дослідницьку програму щодо соціальних ризиків трансформації вищої освіти як соціального інституту.*

***Методи дослідження:** аналіз, синтез, абстракція для узагальнення та висновків, а також кількісні методи (статистичний аналіз, кореляційний аналіз) та якісні методи (аналіз конкретних випадків).*

***Результати.** У статті проаналізовано основні тенденції цифровізації вищої освіти та їхній вплив на відповідні заклади. Окреслено соціальні ризики, що виникають у процесі трансформації вищих навчальних закладів під впливом диджиталізації. Підкреслено, що цифровізація вищої освіти є об'єктивним і закономірним процесом, що відбиває загальну логіку переходу до цифрового суспільства. Утім, цей процес пов'язаний з низкою соціальних ризиків, що впливають водночас на окремі соціальні групи (у цьому разі – викладачі та студенти) та на ключові соціальні інститути. Перспективу подальших наукових студій вбачаємо у поглибленому вивченні процесів цифровізації освітнього середовища.*

***Висновки.** В умовах інформатизації та диджиталізації освіти створення цифрового освітнього середовища набуває особливої актуальності. Серед основних переваг цифрового освітнього середовища виокремлено забезпечення рівного доступу до освітніх можливостей для всіх учасників процесу; мобільність навчання завдяки варіативності часу й місця здобуття знань; реалізація концепції безперервної освіти впродовж життя; можливість формування індивідуальних освітніх траєкторій для здобувачів вищої освіти; використання та розвиток електронних освітніх ресурсів. В умовах сьогодення представникам усіх поколінь важливо усвідомити, що навчання впродовж життя, поширене в країнах Заходу, стає необхідністю й для українського суспільства. Цифрова трансформація передбачає не лише впровадження нових технологій і зміну освітніх процес, а насамперед розвиток компетентностей фахівців, здатних ефективно працювати з цими технологіями.*

***Ключові слова:** вища освіта, здобувачі вищої освіти, соціальний заклад, цифровізація, змішана освіта, онлайн-освіта, віртуальне освітнє середовище.*

Introduction. The changes in the education system brought about by digitalization are currently being widely discussed. Much has been written about the benefits of digital technologies used in higher education. These advantages include broad access for students to educational information resources; the ability

to build individualized educational trajectories; transparency in the activities of educational organizations; optimizing interactions between teachers and students, and between all participants in the educational process; developing mobile educational management structures, etc. Along with positive aspects, this area of research also contains skeptical assessments of the digitalization of education. The challenges facing the higher education system are discussed: increased competition in the educational services market due to the emergence of new providers, increased student mobility, and changing student demands for content, forms, and technologies of education, on the one hand, and on the other − the inability of universities to master new requirements and fully utilize the capabilities of digital technologies. Attention is also drawn to the increase in fraud and plagiarism in connection with the expansion of access to information resources of educational organizations.

Researchers are seriously concerned about the formalization of professional training and the decline in the diversity of knowledge and competencies of graduates due to the algorithmization and standardization of online education, especially in the case of the use of robotic programs and the lack of direct contact with the teacher and students. However, the main problem with studies analyzing the social effects of digitalization in higher education is that they, as a rule, evaluate the digitalization of one element. This concerns a change in either the teaching paradigm, or the management of educational institutions, or the organization of the learning process, or communications between the main participants in the educational process. There are virtually no studies devoted to the transformation of this institution under the influence of digitalization and the associated social risks as well as the likelihood of positive or negative outcomes for society and the educational institution itself.

Digital technologies are fueling the emergence of a number of promising projects and platform solutions in areas such as learning management, assessment and certification of learning outcomes, social networks for teachers and students, researchers and employers, and more. It turns out that specialized digital education startups are capable of more effectively performing many traditional university functions − teaching, assessment, community building, and more. Digitalization has led to the cataloging of all university resources (creation of databases), the creation of electronic document management, departmental knowledge maps, monitoring of student performance and departmental faculty performance, building individualized student learning and employment trajectories, automating knowledge management processes and their transfer.

The object of the study in this case is the interaction of the main participants in the higher education system − students, faculty (research and teaching staff), university administration, and government agencies regulating the activities of universities. The subject of this study is the impact of digital technologies on the perception of key participants in the higher education system of these technologies and the resulting changes in interaction practices between these participants.

It is advisable to use a neo-institutional approach in the study. From our perspective, it allows us to identify how digital technologies influence the requirements for key participants in the higher education system, and how these requirements are perceived by different participants in the higher education system, how the relationships between them are transformed, how the established order of interaction is changed, and what social consequences these changes lead to.

Presentation of the main research material. Before considering the transformation of higher education institutions under the influence of digitalization, it is important to define what we mean by the institution of education in general and higher education in particular. Education is a crucial social institution, regulating the processes of individual socialization. The process of institutionalization, according to scientists, represents a mutual typification of habitualized, or, in other words, habitual (having become models) actions by various types of actors, as well as the actors themselves, and an institution is this typification (Sappey et al., 2010: 10). When we speak of a social institution, we mean that roles (mutually typified actions, habitualized for each role) are distributed among the subjects of the relationship, which prescribe specific actions to the actors in a specific situation. Relationships between holders of specific roles are regulated by a system of norms and rules placed within a cultural and historical context, and the roles themselves represent patterns of behavior. Norms, rules, and roles are always tied to a specific situation and a specific cultural context. This means that institutions are not created once and for all; they are subject to change depending on place, time, and cultural context. Institutions sediment (reinforce in people's memories) social experience, thanks to which individuals are able to ascribe meaning to their actions, their biographies, and the actions of others.

Education is an institution that implements all forms of secondary socialization (primary socialization occurs within the family). In modern society, education is managed by formal organizations that have no other purpose than education. It is segmented from other forms of social life, primarily from the

family (Higgins et al., 2012: 52). In the education system, the individual is deprived of the unique status they acquired in their family. Here, along with others, he performs either the role of a student, a teacher, or an administrator (depending on the individual), which prescribes to him a set of actions determined by formal organizations, most often those with a bureaucratic structure. In modern society, higher education institutions perform the function of preparing individuals for professional activity. Its most important task is to ensure the quality of human resources, adequate to the demands of the economy and the labor market.

The digitalization of higher education means the transformation of the educational, management, and everyday social practices within the higher education system, driven by the introduction of technologies for the creation, processing, exchange, and transmission of large amounts of information on non-paper media. Digitalization involves the integration of education with information resources. In analyzing the digitalization of higher education, we will focus on the fact how digital tools and technologies are changing the educational situation, the roles of key participants in the educational process, the conceptual model of education, and the management of educational organizations.

A literature review allowed us to identify four trends associated with the digitalization of higher education. These include the integration of digital tools and technologies into traditional educational programs and disciplines, or, in other words, the development of a blended learning model; the development of online education; and the creation of a virtual (digital) educational environment; a changing approach to managing educational institutions. The above-mentioned trends are interconnected, but at the same time, each has its own specific features and social impacts, so we consider it appropriate to examine them separately.

Formation of a blended learning model. Not all universities consider digitalization a priority for modernizing their educational process. At the same time, they cannot remain aloof from technological progress, which promises certain benefits to all stakeholders, since it is believed that the introduction of digital technologies and tools expands the possibilities for using interactive teaching methods and has a positive effect on student engagement in the learning process. Effective technologies include the use of learning management systems (LMS), which, according to researchers, facilitate access to educational materials and make the learning process more flexible. Researchers believe that digital technologies based on artificial intelligence, such as chatbots, are also proving to be highly useful in organizing the educational process. The literature describes examples of the use of chatbots in university libraries. A study demonstrated that students find the chatbot convenient: they can quickly obtain the literature they need or get answers to their questions; they can avoid going to the library if it's far away. Some students find it more convenient to ask questions via a chatbot rather than directly to a librarian (Higgins et al., 2012: 39). Thus, this technology is a true assistant for students, facilitating their work with searching for literature and placing orders. At the same time, the chatbot frees library staff from routine work. Chatbots are also used as virtual consultants, helping both students and teachers adapt the learning process to their capabilities. For example, in the Summit Learning project, a chatbot acts as a tutor, engaging in dialogue with each student and identifying areas where each student is lagging. The chatbot then uses this data to create a personalized learning program that focuses on subjects that pose the greatest challenges.

A natural question arises: what changes are AI-based technologies bringing to higher education? Speaking of bots, it's important to note that new, symbiotic structures are emerging in the educational process, based on the interdependence between humans and artificial intelligence. These structures impose their own logic of relationships and role assignments. And it's difficult to say what the social consequences of the new architecture of relationships in the educational process will be. To answer the question of the social outcomes of such transformations, it is necessary to conduct longitudinal studies of the influence of symbiotic structures on the behavior of key actors in the educational process, their values, and expectations.

Along with digital technologies, universities, even those that adhere to a conservative educational model, are using interactive Web 2.0 tools in their educational practices. They are created on internet resources such as Wikia, Wikidot, and others, using various services (for example, Learning Apps). These tools are believed to be able to stimulate students' interest in learning, increase their engagement in the learning process, and improve the quality of their preparation for future professional careers.

At the same time, it's important to note that the introduction of web tools creates new demands on both teachers and students. They must learn to work with Web 2.0 tools and master digital competencies. However, as experience with the use of digital tools and technologies in universities around the world shows, not all students and teachers are ready for such changes. Moreover, the use of these tools in the tea-

ching process leads to a change in the roles of teachers and students, a transformation of their relationships and a redefinition of the essence of classroom work. Classroom work becomes a kind of discussion platform where students discuss solutions, identify errors or omissions, and conceptualize aspects of the subject matter that are important for future work. The development and implementation of digital tools and technologies in the educational process also leads to a change in the educational landscape: new actors are joining the circle of actors involved in education, whose activities transform the traditional relationships between teachers, students, and the administration of educational institutions. These actors include developers of software and tools, developers and owners of educational platforms, and intermediaries that provide services to adapt both the tools and technologies themselves to the educational process at the university, as well as teachers and students to new technologies. New actors are actively involved in decision-making regarding the content and organization of the educational process, partially displacing academic staff from this area. These kinds of changes are clearly visible in the transition to online education.

The Development of Online Education. Online education, unlike the use of individual digital technologies and tools, involves the active implementation of interconnected digital technologies that involve moving the entire educational process online: The development and implementation of online courses on specially created internet portals, the use of online assessment, and the transition to online communication between students, teachers, and administration responsible for organizing education (electronic schedules, electronic gradebooks, etc.). Online learning using digital technologies makes the educational process more dynamic, engaging, and flexible. The created electronic educational materials (e-textbooks, presentations, video tutorials, etc.) can be reused, saving teachers time on lesson preparation. They can focus more on communicating with students. Systems like Socrative, Kahoot, Edmodo, integrated into the educational process, allow teachers to share interactive materials, engage students in discussions, and assess assignments in real time (Sappey et al., 2010: 81).

At the same time, effective use of these systems requires technical support (both for the preparation of electronic teaching and methodological materials and for the use of online resources). This necessitates specialists or even separate units within the university to provide such support. And this leads to a complication of the process of managing an educational organization. When considering the rapid development of online education, one cannot help but notice more global social risks. Thus, competition between internet portals providing online learning services, as well as between universities seeking to expand their influence through online courses, leads to an increase in duplicative disciplines and educational materials and, as a consequence, to a reduction in the impact of the network education model. Online learning brings to the forefront yet another challenge: communication between instructors and students, which has a significant impact on the content and learning outcomes. This is the challenge of maintaining effective dialogue when conveying material in order to create shared meaning and ensure mutual understanding, which is especially important in teaching social sciences and humanities. Furthermore, internet technologies are a source of additional communication noise, which can negatively impact learning outcomes. In this case, it is crucial to develop technical tools and instruments that reduce the negative impact of internet technologies on teachers and students.

It's also important to prepare both teachers and students for dialogue mediated by internet technologies. And here, creating online platforms like forums isn't enough; learning participants need to be psychologically prepared for communication in this new format. On the 22nd of April 2025, the Dnipro National University named after Oles Honchar held a test “PROwork: your career”. The Erasmus+ KA2 project will develop the potential for high-level education “Modernization of university education programs from foreign countries based on integration with information technologies” to the *virtual job fair* benefited 25 robotic companies and provided a large number of employees with valuable information. Potential stakeholders for humanities faculties included educational holdings, translation bureaus, libraries, and media museums.

Creation of a virtual (digital) educational environment. The use of information and communication technologies and social media enables students to act not only as consumers of information structured according to certain principles and pedagogical logic, but also as educators who can share knowledge, give advice, and suggest solutions. They have greater opportunities to act as active participants in knowledge creation (Glenn, 2008: 76). Modern digital technologies make it possible to create a personalized learning environment that integrates the capabilities of formal and informal self-regulated learning. Social media, a collection of various networking tools and technologies that serve as channels for communication, collaboration, and creative self-expression, play a central role in shaping the personal learning environment:

– weblogs, or easily created blogs and updatable websites, that allow authors to instantly publish online; they facilitate communication between teachers and students;

– Wikis – a website where any user can edit any page or create a new page using their web browser, adding to and editing what has already been published; an example is Wikipedia;

– bookmarking sites, which allow users to bookmark and share links to websites; users can create a personalized internet; examples of such sites include Reddit, StumbleUpon, and Digg;

– social networks (YouTube, Facebook, LinkedIn, etc.) are publicly available web services that provide users with the ability to create a personal profile, identify other users with whom they are connected, read and respond to messages made by other users on the site, and send and receive messages privately or publicly.

Social media possess valuable qualities for educational practice: 1) they create a connected environment that unites two aspects of knowledge reproduction: its creation and consumption; 2) they provide quick access to various types of information; 3) they reproduce a situation of dialogue with mutual feedback. At the same time, they contain a lot of "information garbage," which interferes with the proper implementation of the educational process.

Along with social media, various types of learning management systems play an active role in creating a virtual educational environment. They represent an integrated platform for managing educational resources, supporting communication between teachers and students, and assessing the quality of education (Collins et al., 2009: 54). In this context, it is appropriate to note the experience of using the Moodle (Modular Object-Oriented Dynamic Learning Environment) platform to create a unified learning space for all participants in the educational process at the university. Moodle's main advantages are that the platform offers a wide range of opportunities for teacher creativity: designing courses, using various formats for delivering educational materials, and a wide range of interactive learning tools. For students, the platform creates all the conditions for developing cognitive strategies for self-study and self-education. Furthermore, the platform facilitates online interaction between instructors and students: discussing course topics on the forum, holding online consultations, online seminars, and conferences. The chat built into the Moodle system allows for real-time communication within the framework of web consultations, situation analysis, and discussion of complex issues during the course of mastering disciplines. The creation of a virtual learning environment is leading to a radical shift in the role of the higher education teacher: from a bearer of academic knowledge and a provider of information, they are transformed into an instructional designer, a provider of content and resources, a student mentor, and a facilitator of learning.

Changing the approach to managing educational organizations. The digitalization of the educational process inevitably affects the university's governance system. The introduction of digital technologies and tools that shape a new educational environment and a new educational model creates a need for the development of collective cultural practices that support the joint creative work of teachers and students, and the joint construction of knowledge in the learning process (Collins et al., 2009: 61). The development of these practices is a prerequisite for the effectiveness of digital technologies and tools in the higher education system. Universities that actively integrate digital technologies into the educational process are gradually moving from a bureaucratic to a participatory management model. As research results show, the following changes are observed in the management of educational organizations:

– a shift from standardized to individualized educational trajectories that allow students to actively participate in knowledge creation and self-education, and for administrators and teachers to take into account individual learning styles;

– a transition from a standardized knowledge assessment system, which assumes that all students study the same content, to an individualized assessment system based on criteria such as the ability to solve assigned problems, think critically, learn, and work with large volumes of information;

– creating organizational and logistical conditions for the transition to action learning, or, in other words, to Kolb's learning model, the essence of which is that learning cannot be explained in terms of results; it is a process of generating and changing ideas, thoughts, and practical actions; knowledge is created through the transformation of experience, and learning presupposes the activation of all aspects of human activity: thought, sensory perception, and behavior; the learning process itself is deeply immersed in practice, since knowledge is born from practice and is tested by it;

– redesign of learning spaces: a transition from traditional spaces (classroom, library, computer lab) to hybrid spaces, combining the capabilities of digital, mobile, virtual, online, social and physical spaces;

– developing new models of interaction with graduates based on information and communication tech-

nologies, allowing for consideration of their educational needs after graduation and a flexible response to their requests.

Overall, the digitalization process is making the university's governance system more flexible, democratic, and open to educational innovation. It should be noted that the digital technologies and tools being introduced are changing both the educational landscape itself and the roles of key participants in the educational process, as well as the rules of interaction between them. This suggests that the institution of higher education is being transformed.

Conclusions and perspectives of the study. As research on the digitalization of higher education demonstrates, the impact of digital technologies and tools on higher education is multifaceted. The literature notes both positive and negative aspects of digitalization, which are important to study systematically. It is recognized that the digitalization of higher education is an objective process, reflecting the general logic of the transition to a digital society. However, this process is associated with a number of social risks affecting both individual social groups (in this case, faculty and students) and key social institutions.

Studying and systematizing these risks is necessary to ensure that the digitalization process is manageable and that its negative consequences are minimized as much as possible. A literature review revealed that studies of the digitalization process in higher education most often emphasize one aspect: either the readiness of students or faculty to use new digital technologies and tools, or the impact of new technologies on student engagement in the educational process, or a change in the learning model (transition to online learning) under the influence of digital technologies. The question of how the institution of higher education itself is changing remains open and certainly requires long-term analysis and further research.

In our opinion, these studies play an important role in understanding the requirements for modern teachers and students, which models of university management are effective in the context of digitalization, and what actions need to be taken to mitigate the negative consequences of the digitalization of higher education. At the same time, comprehensive, longitudinal studies are needed to describe the process of transformation of the institution of higher education under the influence of digitalization and to evaluate it from the perspective of the social challenges that both the higher education system and society as a whole are currently facing or will face in the future. The proposed study design could serve as a starting point for developing a comprehensive program to study this process.

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Дата першого надходження рукопису до видання: 28.10.2025
Дата прийнятого до друку рукопису після рецензування: 28.11.2025
Дата публікації: 19.12.2025