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CONTEMPORARY MODELS OF ORGANIZING THE EDUCATIONAL PROCESS IN THE CONTEXT OF UNIVERSITIES' DIGITAL TRANSFORMATION

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Анотація. У статті здійснено систематизацію, узагальнення та наукове обґрунтування сучасних моделей організації освітнього процесу в університетах, що перебувають у фазі активної цифрової трансформації. Розглянуто основні форми реалізації електронного та дистанційного навчання – онлайн, з вебпідтримкою та змішане (гібридне), які виступають не лише технологічними інноваціями, а й структурними етапами становлення цифрового університету. Показано, що цифровізація освітнього процесу змінює саму логіку педагогічної взаємодії, трансформуючи її у формат динамічного цифрового середовища, у якому інтегруються навчальні, дослідницькі й управлінські процеси. Обґрунтовано, що поєднання традиційних (офлайн) і цифрових (онлайн) форматів створює нову якість навчання, де освітній простір набуває ознак гнучкості, адаптивності та персоналізації. У дослідженні зауважено, що електронне навчання поступово переростає межі допоміжного інструменту і стає провідним елементом архітектури цифрового університету. Гібридна модель навчання визначається як перехідна форма між традиційною та повністю цифровою освітою, яка забезпечує безперервність навчання, гнучкість часових і просторових меж, а також можливість реалізації індивідуальних освітніх траєкторій. Визначено, що ефективність таких моделей залежить від рівня розвитку електронного освітнього середовища університету, цифрової компетентності педагогічних працівників, використання інструментів аналітики навчальних даних і систем моніторингу результатів. Доведено, що цифровий університет є новою інституційною формою організації освіти, у якій технологічна інфраструктура, педагогічна методологія та управлінська культура формують єдину екосистему. Запровадження цифрових і гібридних моделей навчання потребує не лише технічного забезпечення, а й глибоких психолого-педагогічних трансформацій, що сприяють розвитку критичного мислення, саморегуляції та відповідальності студентів за результати навчання. Цифровий університет розглядається як соціотехнологічна модель нового покоління, здатна забезпечити стійку конкурентоспроможність вищої освіти, інтеграцію у світовий освітній простір і підготовку фахівців, адаптованих до викликів цифрової економіки та суспільства знань.

Ключові слова: цифровий університет, онлайн-навчання, діджиталізація, цифровізація, електронне освітнє середовище, цифрова трансформація, вища освіта.

Summary. *The article systematizes, summarizes, and scientifically substantiates contemporary models of organizing the educational process at universities undergoing active digital transformation. It examines the main forms of e-learning and distance learning – online, web-supported, and blended (hybrid) – which are not only technological innovations but also structural stages in the development of the digital university. It has been shown that the digitalization of the educational process changes the very logic of pedagogical interaction, transforming it into a dynamic digital environment that integrates educational, research, and management processes. It has been substantiated that the combination of traditional (offline) and digital (online) formats creates a new quality of learning, where the educational space acquires the characteristics of flexibility, adaptability, and personalization. The research emphasizes that e-learning is gradually transcending its role as a supplementary tool and becoming a leading element in the architecture of the digital university. The hybrid learning model is defined as a transitional form between traditional and fully digital education, which ensures continuity of learning, flexibility of time and space constraints, and the possibility of implementing individual educational trajectories. It has been determined that the effectiveness of such models depends on the level of development of the university's electronic educational environment, the digital competence of teaching staff, and the use of learning analytics tools and performance monitoring systems. It has been proven that the digital university is a new institutional form of educational organization in which technological infrastructure, pedagogical methodology, and management culture form a single ecosystem. The introduction of digital and hybrid learning models requires not only technical support but also profound psychological and pedagogical transformations that promote the development of critical thinking, self-regulation, and student responsibility for learning outcomes. The digital university is seen as a new-generation socio-technological model capable of ensuring the sustainable competitiveness of higher education, integration into the global educational space, and the training of specialists adapted to the challenges of the digital economy and knowledge society.*

Key words: *digital university, online learning, digitalization, e-learning environment, digital transformation, higher education.*

Introduction. Modern higher education is undergoing a profound transformation caused by the digitalization of society, changes in communication practices, and the emergence of new formats for organizing knowledge. The educational space is increasingly taking on the characteristics of an integrated digital ecosystem, within which technological, pedagogical, managerial, and value components interact. As a result, a digital university is being formed – a new type of educational institution based on the comprehensive integration of electronic, distance, mobile, and analytical learning. This format changes not only the ways of transferring knowledge, but also the very logic of organizing the educational process, which is moving from fixed structures to flexible and personalized models. The relevance of the research is determined by the need for a theoretical understanding of contemporary models of the educational process that correspond to the conditions of universities' digital transformation. The issue of aligning pedagogical traditions with new digital practices, defining the boundaries between offline, online, and hybrid formats, and studying their impact on the quality of educational outcomes is of scientific interest. The growing role of data analytics, platform technologies, and artificial intelligence highlights the problem of methodological and value balance in digital solutions in the higher education system.

Analysis of recent publications. The issue of organizing the educational process in the context of digital transformation is attracting increasing attention from scholars, as reflected in the growing number of studies devoted to the examination of electronic, distance, and hybrid learning in higher education. The works of leading researchers (O. Tymoshenko, H. Lan, G. Kortemeyer, L. Leiva, A. Komninos, S. Kubiv, V. Kozub, and others) analyze trends in the development of digital education, the impact of digital technologies on the quality of the educational process, and the formation of new roles for teachers in the digital environment. Considerable attention is paid to methodological approaches to the study of blended learning, among which the systemic, activity-based, competence-based,

praxeological, and axiological approaches dominate, reflecting the complexity and interdisciplinarity of modern digital pedagogy. A separate group consists of studies aimed at examining the digital competence of teachers and their readiness to introduce innovative technologies (H. Lan, Y. Zhang, W. Liu, O. Tymoshenko, S. Yahodzynski), which highlight the importance of developing a pedagogical culture of digital interaction. A number of works (G. Kortemeyer, C. Merki, M. Matera, L. Leiva) emphasize the effectiveness of hybrid learning models that combine the advantages of offline and online communication, particularly in the context of universities with a technical and applied focus. Thus, the results of the research review confirm the trend towards the formation of a new educational paradigm, at the center of which is the digital university as a comprehensive socio-technological model that ensures the integration of learning, research, and management in the digital economy.

The purpose of the article. The purpose of the article is to analyze contemporary models of organizing the educational process in the context of universities' digital transformation and to substantiate their role in the establishment of the digital university as a new institutional form. The tasks are: to systematize the main organizational formats; to identify the psychological and pedagogical and technological factors of their effectiveness; to determine the features of the hybrid model as a transition to a fully digitized educational environment. The scientific novelty lies in the interpretation of the digital university as an evolutionary result of the development of mixed educational models, within which the institutional integration of learning, research, and management based on digital technologies takes place.

Presentation of the main material. In the modern higher education system, there is a wide variety of models for organizing the educational process based on different options for the use of e-learning (EL) and distance learning (DL). These models vary depending on the extent to which digital technologies are used in the educational process, the methods of communication between participants in the educational environment, and the level of integration of online components into the structure of educational programs.

Currently, researchers distinguish three main organizational forms of implementing e-learning and distance learning: online learning, web-supported learning, and blended (hybrid) learning [1; 2; 3]. They differ in the ratio of offline and online components, the nature of interaction between teachers and students, and the level of technological integration into the learning process. The choice of a specific model depends on the content of educational programs, the technical capabilities of the institution, the qualifications of teaching staff, and the degree of development of the university's electronic educational environment.

Online learning involves the maximum use of electronic resources and distance technologies, where most or all of the learning process takes place in an electronic information and educational system (EIES), which is a key element of the digital university architecture. In this model, classroom sessions are either absent or reduced to a minimum, and the educational process is implemented in the format of flexible digital interaction. The characteristic features of online learning are:

- the use of interactive educational content based on multimedia, analytical, and adaptive solutions;
- regular interaction between students and teachers and among students themselves in the university's digital environment;
- the organization of educational activities without the need for physical presence in the classroom, which reinforces the concept of a spatially independent educational environment [4, p. 260].

The online model, which has become the basic form of the educational process in the context of digital transformation, is being actively implemented in part-time, continuing, and open education systems. It provides access to knowledge for students living in remote regions and

supports the implementation of programs that combine elements of massive open online courses. This format, underlying the functioning of the digital university, has proven its effectiveness in crisis conditions, particularly during the COVID-19 pandemic, when educational institutions around the world made a complete transition to distance learning. An important feature of online learning is that its organization does not reduce the participation of the teacher, but only changes their role.

Web-supported learning involves integrating e-learning elements into the traditional educational process, with up to 30% of the time allocated to mastering a discipline being spent in the university's electronic educational environment [5, p. 11246]. In this model, digital infrastructure serves not as a substitute for, but as a supplement to, traditional forms of learning. It is used to organize independent work by students, conduct individual and group consultations using online communication tools, monitor learning outcomes, and carry out research and project activities. This format increases the flexibility of learning, expands access to educational resources, and ensures closer feedback between teachers and students.

In international educational practice, during the transitional stage of digital transformation, a blended learning model prevails, combining traditional and digital approaches, providing a flexible combination of classroom and distance learning in the university's electronic educational environment [6; 7]. Some of the lessons are conducted in an electronic educational environment, which includes online communication between the teacher and the student in a synchronous or asynchronous format. It is believed that working in an electronic environment can cover up to 80% of the time allocated for studying a discipline, which allows optimizing the ratio between classroom and extracurricular activities [7, p. 160].

Blended learning is a key component of modern digital education, as it ensures the continuity of the learning process, adapts content to the individual needs of students, and enhances the effectiveness of knowledge acquisition. In this model, classroom work is combined with learning activities in an electronic environment, which helps to develop self-regulation skills, analytical thinking, and digital literacy.

Contemporary scientific works have developed a classification of technologies that demonstrates the evolution of forms and approaches to organizing learning in the digital educational space, in particular:

- offline learning – traditional classroom learning under the direct guidance of a teacher;
- distance learning (d-learning) – a remote form that provides learning without synchronous interaction with a student;
- electronic learning (e-learning) – learning using computer and network technologies;
- mobile learning (m-learning) – mobile learning carried out using portable devices with access to the Internet;
- ubiquitous learning (u-learning) – comprehensive or ubiquitous learning focused on a continuous educational process anywhere and anytime using information and communication technologies [8; 9].

During the transitional stage of the digital transformation of education, e-learning, mobile learning, and blended learning are developing most dynamically. The separate use of each of these forms is insufficient to ensure the integrity of the educational process in higher education, which is why hybrid learning is becoming particularly popular during this period. Hybrid learning is an intermediate integrative model that combines the possibilities of offline and online education and includes elements of mobile and cross-cutting learning (see Figure 1). This format is a transitional stage towards the formation of a digital university, in which the educational process is implemented in a single integrated digital ecosystem.

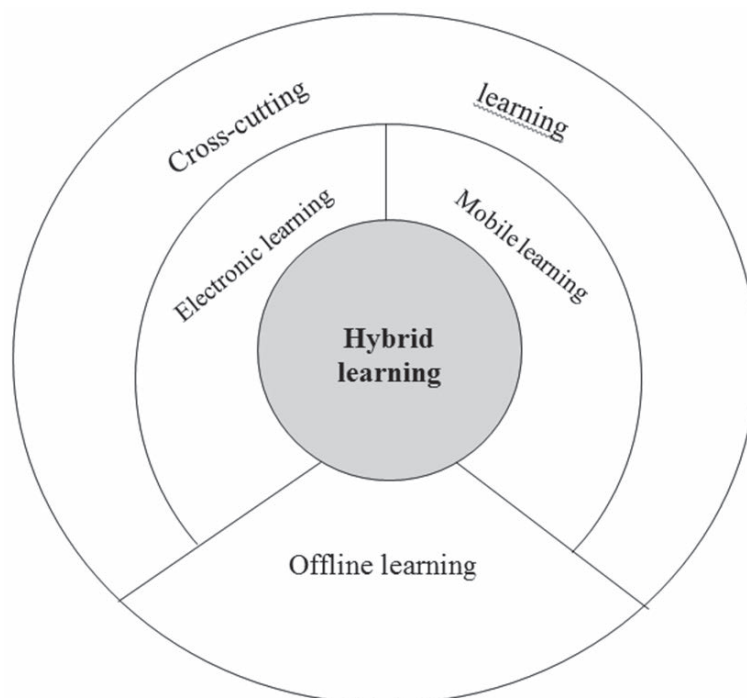


Figure 1. Hybrid learning scheme

The study uses an approach in which the concepts of blended and hybrid learning are considered synonymous. This position is entirely substantiated, since it is the hybrid model that is most fully implemented in an interactive digital educational environment and represents an intermediate stage on the path to the formation of a fully digital university. Despite the widespread use of online education, its implementation is accompanied by certain difficulties, including a decrease in student motivation, the difficulty of maintaining their involvement in the learning process, and an increase in the proportion of independent work, which requires a high level of self-regulation [10, p. 7].

The transition to a hybrid learning model requires a profound renewal of pedagogical technologies and the creation of new didactic models and organizational mechanisms for interaction in a digital environment that ensure the quality and effectiveness of the educational process comparable to traditional classroom formats. The hybrid format opens up new opportunities for teachers that are unattainable in the traditional university model. Modern digital platforms enable real-time monitoring of educational outcomes, tracking individual student trajectories, and timely adjustments to the learning process. Teaching takes on an analytical character: the educator becomes a facilitator, analyst, and mentor who guides the dynamics of educational progress.

Learning with the use of electronic and distance technologies is increasingly seen as a continuous process of self-education that implements the principle of lifelong learning [2; 4]. Along with the pragmatic goal of developing subject knowledge and professional competencies, it is aimed at personal development, cognitive and psychophysiological qualities, as well as the formation of the ability to learn independently, self-organization, and responsibility for the results of one's own activities.

Another important effect of the digital environment is the development of organizational and communication skills through project and team work, which is actively implemented in virtual learning communities. It is worth noting that e-learning and distance learning models make it possible to significantly update the structure of the educational process in accordance with the needs of a new generation of students, for whom digital technologies are a natural environment for communication and learning. At the same time, the process of digitalization is accompanied by a number of challenges – regulatory and legal, technical, psychophysiological, economic, and social. Among the risks are overload of the visual and nervous systems, a decrease in the level of live social

communication, as well as information risks associated with violations of confidentiality, integrity, and authenticity of educational content [6, pp. 1–2].

Despite existing problems and risks, online learning continues to develop actively and is now considered one of the most significant systemic shifts in the paradigm of modern education. The organization of e-learning is based on the development of new methods and technologies, the construction of knowledge maps for disciplines, the creation of mechanisms for navigation, control, and monitoring of learning outcomes, the formation of effective feedback models, the development of digital analytics systems, motivational self-education, and tracking the digital footprint of students.

The development of e-learning is based on a broad interdisciplinary methodological basis that combines digital and pedagogical technologies. The leading research methods include system analysis, operational and intellectual data processing technologies, machine learning, as well as sociological methods of collecting and analyzing empirical data. Such integration of scientific approaches ensures the formation of a new type of educational environment that combines analytical, communication, and pedagogical tools of a new generation university.

According to analytical reports by Technavio (2024), Grand View Research, and MarketDataForecast, the global online education market is showing steady growth, reaching a volume of over US\$300 billion in 2024, with a forecast of further growth to over US\$800 billion by 2030 (CAGR 18–20 %) [11; 12]. The main segments remain academic education, school education, and corporate training. Higher education accounts for over 65 % of the global academic segment, and over 90 % of universities offer online courses or blended learning formats. At the same time, corporate training covers about 27–30 % of the market, demonstrating increased demand for digital platforms for professional development and lifelong learning [13; 14]. These trends confirm the transition to integrated educational ecosystems, within which a digital university is being formed as the main organizational model for the development of modern education.

An analysis of current pedagogical research and practical experience in implementing e-learning allows us to identify a number of its key advantages:

- increased accessibility of education by removing spatial and temporal barriers;
- possibility of implementing individual educational trajectories;
- economic feasibility and optimization of teachers' workload;
- development of independence and responsibility among students;
- formation of motivation to achieve high educational outcomes.

According to analytical reviews of the global EdTech market, the following trends have been identified in the development of online education:

- the globalization of education, made possible by machine translation and speech recognition technologies;
- the creation of a unified educational space and an integrated communication environment for participants in the educational process;
- project-based learning;
- the spread of hybrid formats as an intermediate stage in the development of the digital university;
- the use of simulations and gamification to model real professional situations;
- the implementation of the principle of lifelong learning;
- the development of peer assessment mechanisms (P2P assessment);
- strengthening the role of the teacher as an expert, mentor, and motivator in the digital learning environment;
- increasing the role of video content (webinars, interactive video, on-demand formats) in the structure of educational programs.

An analysis of the psychological and pedagogical aspects of organizing the educational process in higher education institutions in an electronic environment shows that the active implementation of online learning will be facilitated by the integration of its methods with the best practices of traditional (offline) learning, the effectiveness of which has been proven by many years of experience in developing academic and professional competencies.

The combination of modern digital technologies with proven pedagogical approaches creates conditions for mass accessibility of education, personalization of educational trajectories, application of online analytics of learning outcomes, as well as effective management of the educational process in real time. The most important aspect of such integration is the development of an approach to personalizing the educational process by combining online and offline components, which enables universities to train a new generation of specialists who are flexible, innovation-oriented, capable of self-education, and adaptable to the digital transformation of the economy and labor market.

Conclusions. Scientific results confirm that the formation of a digital university is a natural stage in the evolution of the higher education system in the context of digitalization. Blended and hybrid learning models are not only pedagogical technologies but also structural components of institutional transformation of the university, ensuring its adaptability and competitiveness in the global educational space. It has been substantiated that the digital ecosystem of the university functions as an integrative environment that combines educational, scientific, analytical, and managerial processes aimed at improving the quality of educational outcomes and developing future competencies. It is concluded that the digital university is not only a technical infrastructure, but also a conceptual model of a new generation that enables the implementation of the principles of innovation, openness, and continuity of education in the 21st century.

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