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ARTIFICIAL INTELLIGENCE AS A TRANSFORMATIVE FORCE IN THE MODERN HIGHER EDUCATION SYSTEM
ШТУЧНИЙ ІНТЕЛЕКТ ЯК ТРАНСФОРМАЦІЙНА СИЛА В СУЧАСНІЙ СИСТЕМІ ВИЩОЇ ОСВІТИ

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Polezhaieva O. Artificial intelligence as a transformative force in the modern higher education system. *Ukrainian Journal of Applied Economics and Technology*. 2026. Volume 11. № 2. pp. 385 – 389.

The article presents a comprehensive analysis of the impact of artificial intelligence (AI) on the transformation of the modern higher education system in the context of global digitalization, the development of the information society, and the knowledge economy. The relevance of studying artificial intelligence as a key driver of modernization in the educational, research, and administrative activities of higher education institutions is substantiated. The evolution of the concept of artificial intelligence is examined, and the main theoretical and methodological approaches to its study in higher education are characterized, including systemic, competency-based, activity-based, and axiological approaches. The article analyzes the key areas of AI application in the educational process. It is established that the use of adaptive educational platforms and intelligent learning systems personalizes learning pathways, increases student motivation, improves academic performance, and promotes the development of self-directed learning skills. It is demonstrated that integrating artificial intelligence changes the traditional role of teachers, shifting them from knowledge transmitters to mentors, consultants, and facilitators of the learning process. The study also identifies the potential of generative artificial intelligence technologies to develop educational materials, process information, and foster students' critical thinking skills. Special attention is paid to the use of artificial intelligence in university management and research activities. The findings indicate that intelligent analytical systems support evidence-based decision-making, educational forecasting, resource optimization, and increased administrative efficiency. Furthermore, the application of AI in research enhances the processing of large datasets, promotes interdisciplinary collaboration, and increases scientific productivity and capacity for innovation. The article also examines the socio-economic, ethical, and legal aspects of AI implementation in higher education. Key challenges related to data privacy, algorithmic bias, digital inequality, transparency, and academic integrity are identified. A comparative analysis of international practices in the use of artificial intelligence in higher education is presented, highlighting successful experiences and innovative approaches across different countries. Attention is devoted to the concept of the AI-driven university as a promising model for the future development of higher education institutions. The study concludes that artificial intelligence serves as a powerful catalyst for the digital transformation of higher education, contributing to improvements in educational quality, institutional management, and research effectiveness. At the same time, its successful implementation requires comprehensive regulatory support, ethical governance, strategic planning, and the continuous development of digital competencies among students, academic staff, and administrators. The findings may serve as a theoretical foundation for further research and as a practical guide for policymakers, university leaders, and educators involved in the digital transformation of higher education.

Keywords: *artificial intelligence, higher education, digital transformation, personalized learning, adaptive learning systems, generative artificial intelligence, academic integrity, quality assurance, digital competencies, university management, AI-driven university.*

У статті здійснено комплексний аналіз впливу технологій штучного інтелекту на трансформацію сучасної системи вищої освіти в умовах глобальної цифровізації, розвитку інформаційного суспільства та економіки знань. Обґрунтовано актуальність дослідження штучного інтелекту як одного з провідних чинників модернізації освітньої, наукової та управлінської діяльності закладів вищої освіти. Розкрито еволюцію поняття «штучний інтелект», охарактеризовано основні теоретичні та методологічні підходи до його вивчення у сфері вищої освіти, зокрема системний, компетентнісний, діяльнісний та аксіологічний. Проаналізовано ключові напрями застосування штучного інтелекту в освітньому процесі. Встановлено, що використання адаптивних освітніх платформ та інтелектуальних систем навчання сприяє персоналізації освітніх траєкторій, підвищенню мотивації здобувачів освіти, покращенню академічних результатів і формуванню навичок самостійного навчання. Доведено, що впровадження штучного інтелекту змінює традиційну роль викладача, який поступово переходить від функції транслятора знань до ролі наставника, консультанта та фасилітатора освітнього процесу. Визначено особливості використання генеративного штучного інтелекту для підготовки навчальних матеріалів, аналізу інформації та розвитку критичного мислення здобувачів вищої освіти. Окрему увагу приділено використанню штучного інтелекту в системі управління закладами вищої освіти та організації наукових досліджень. Показано, що інтелектуальні аналітичні системи забезпечують підтримку управлінських рішень, прогнозування освітніх показників, оптимізацію використання ресурсів і підвищення ефективності адміністративної діяльності. Встановлено, що застосування штучного інтелекту у науковій сфері сприяє обробці великих масивів даних, розвитку міждисциплінарних досліджень та підвищенню продуктивності наукової діяльності. У статті розглянуто соціально-економічні, етичні та правові аспекти впровадження штучного інтелекту у вищій освіті. Визначено основні ризики, пов'язані із захистом персональних даних, алгоритмічною упередженістю, цифровою нерівністю та забезпеченням академічної доброчесності. Проведено порівняльний аналіз міжнародного досвіду використання технологій штучного інтелекту в системах вищої освіти різних країн світу та окреслено перспективи впровадження моделі AI-driven university як інноваційної концепції розвитку сучасного університету. Зроблено висновок, що штучний інтелект є потужним каталізатором цифрової трансформації вищої освіти, сприяє підвищенню якості освітніх послуг, ефективності управління та результативності наукових досліджень. Наголошено на необхідності формування стратегій відповідального використання технологій штучного інтелекту, удосконалення нормативно-правового забезпечення, розвитку цифрових компетентностей учасників освітнього процесу та створення умов для сталого розвитку закладів вищої освіти в цифрову епоху.

Ключові слова: *штучний інтелект, вища освіта, цифрова трансформація, персоналізоване навчання, адаптивні освітні системи, якість освіти, академічна доброчесність, цифрові компетентності, управління закладом вищої освіти, AI-driven university.*

Problem statement

The rapid digital transformation of society, the development of the knowledge economy, and the widespread adoption of information and communication technologies have fundamentally changed the operating environment of higher education institutions. Artificial intelligence (AI) has emerged as one of the most influential technologies driving these changes, significantly affecting educational processes, university governance, research activities, and quality assurance mechanisms. Despite the growing implementation of AI technologies in higher education worldwide, there remains a lack of a comprehensive understanding of their pedagogical effectiveness, organizational implications, ethical challenges, and long-term impact on university functioning.

The increasing integration of AI into higher education creates new opportunities for personalized learning, adaptive educational systems, learning analytics, administrative decision-making, and scientific research

support. However, these opportunities are accompanied by significant challenges, including concerns about academic integrity, data privacy, algorithmic bias, transparency in AI-driven decision-making, and digital inequality among learners and institutions. The rapid development of generative AI technologies further intensifies the need for universities to reconsider traditional approaches to teaching, assessment, and quality assurance.

At the same time, higher education institutions, particularly in Ukraine, face the challenge of integrating artificial intelligence into educational and administrative processes while ensuring compliance with ethical principles, legal requirements, and quality standards. Although international experience demonstrates the potential benefits of AI implementation, there remains insufficient theoretical and practical guidance on developing effective institutional strategies, regulatory frameworks, and mechanisms for the responsible use of AI technologies in higher education.

Therefore, the problem addressed in this study is the need to investigate and substantiate the theoretical, methodological, organizational, and ethical foundations for the integration of artificial intelligence into the modern higher education system, as well as to identify its impact on teaching and learning processes, university management, research activities, educational quality, and the development of future-oriented competencies. Addressing this problem is essential to ensuring the effective, responsible, and sustainable implementation of artificial intelligence technologies in higher education institutions amid ongoing digital transformation.

Artificial intelligence has become one of the most actively researched areas in educational science, educational management, and digital transformation studies. Contemporary scholars such as Holmes, Bialik, and Fadel (2019), Selwyn (2019), Luckin et al. (2016), as well as international organizations including UNESCO (2021; 2022) and OECD (2021; 2023), emphasize the growing role of artificial intelligence in transforming higher education. Existing studies focus on personalized learning, adaptive educational systems, learning analytics, digital competencies, and the ethical implications of AI implementation. At the same time, despite the significant number of publications, there remains a need for a comprehensive analysis of artificial intelligence as a systemic factor influencing educational, managerial, research, and quality assurance processes within higher education institutions. Therefore, further research is required to substantiate effective models and strategies for the responsible integration of AI into university activities [4].

Formulation of the article's objectives

The aim of the article is to analyze the role of artificial intelligence in transforming the modern higher education system and to identify the main directions, opportunities, challenges, and prospects of its implementation across the educational, managerial, and research activities of higher education institutions. The study also aims to substantiate the theoretical and practical foundations for the responsible use of artificial intelligence technologies in higher education within the context of digital transformation.

Presentation of the main research material

The modern higher education system is undergoing profound and multidimensional transformations caused by globalization, digitalization, the development of the knowledge economy, and the rapid advancement of information and communication technologies. In the twenty-first century, universities are no longer viewed solely as institutions responsible for transmitting knowledge; instead, they have become dynamic centers of innovation, research, technological development, and social progress. These changes require higher education institutions to adapt continuously to emerging societal needs and technological challenges. Among the technologies with the greatest transformative potential, artificial intelligence (AI) holds a particularly significant position.

Artificial intelligence has evolved from a specialized area of computer science into a comprehensive technological and socio-cultural phenomenon that affects nearly all spheres of human activity. In higher education, AI is increasingly integrated into teaching and learning processes, administrative management, scientific research, quality assurance systems, and stakeholder engagement. As a result, artificial intelligence is becoming a key driver of institutional transformation and a strategic factor influencing the competitiveness and sustainability of universities in the global educational landscape [1].

The growing importance of AI in higher education stems from its ability to process large volumes of data, identify patterns, generate predictions, automate routine tasks, and support decision-making. These capabilities create opportunities for improving the efficiency and effectiveness of educational activities while simultaneously raising important pedagogical, ethical, and legal questions. Consequently, understanding the role of artificial intelligence in higher education requires a comprehensive and interdisciplinary approach that considers technological, educational, managerial, social, and ethical dimensions.

The concept of artificial intelligence emerged in the mid-twentieth century and has since developed significantly. Contemporary definitions generally describe AI as a set of computational systems capable of performing tasks that typically require human intelligence, including learning, reasoning, problem-solving, decision-making, language processing, and pattern recognition. In the context of higher education, AI should not be viewed merely as a technological tool but rather as a transformative force capable of reshaping educational ecosystems.

Several theoretical approaches provide a framework for understanding AI integration in higher education. The systems approach views universities as complex socio-technical systems in which educational, managerial, and research functions interact. Within this perspective, artificial intelligence becomes a component of the university's digital infrastructure, contributing to the optimization of institutional processes.

Table1. A comparative analysis of traditional education and AI-based education

Criterion	Traditional education	AI-powered education
Learning model	Standardized	Personalized, and adaptive
Role of the teacher	Source of knowledge	Mentor, facilitator
Role of the student	Passive consumer	Active participant
Assessment	Primarily test-based	Formative, analytical
Pace of learning	The same for everyone	Individual
Use of data	Limited	Learning data analytics
Academic integrity	Traditional monitoring	Ethical use of AI

The competency-based approach emphasizes the development of digital, analytical, and metacognitive competencies necessary for successful participation in a technology-driven society. The activity-based approach focuses on how AI changes the nature of educational activities, transforming traditional teaching and learning practices. Finally, the axiological approach examines the influence of artificial intelligence on values, ethics, academic culture, and social responsibility within higher education institutions. The application of these theoretical perspectives demonstrates that AI is not merely a technical innovation but a catalyst for educational transformation, influencing institutional structures, stakeholder relationships, and educational outcomes [2].

One of the most significant areas of AI application in higher education is the organization of the educational process. Artificial intelligence technologies enable the transition from standardized mass education toward personalized, adaptive, and learner-centered educational models. This transformation reflects broader changes in educational philosophy, which increasingly recognizes the importance of individual differences, learner autonomy, and lifelong learning.

Adaptive learning systems are among the most advanced applications of AI in education. These systems collect and analyze data regarding students' learning behaviors, academic performance, preferences, and progress. Based on this analysis, they provide individualized learning pathways, personalized recommendations, and customized educational content. Such systems help students learn at their own pace while receiving targeted support in areas where difficulties are identified.

Table 2. The main components of such a model

Component	Content	Expected outcome
Educational process	Adaptive learning, AI tutors	Personalization, improved quality
Management	Learning analytics, forecasting	Evidence-based governance
Research	Big data analysis	Accelerated innovation
Quality of education	AI QA systems	Transparency and trust

Research indicates that adaptive learning technologies contribute to increased student engagement, higher academic achievement, improved retention rates, and stronger motivation to learn. Personalized learning environments allow students to focus on their specific educational needs while simultaneously encouraging greater responsibility for their learning outcomes.

Another important application involves intelligent tutoring systems. These systems simulate aspects of human tutoring by providing real-time feedback, answering questions, identifying misconceptions, and guiding learners through complex educational tasks. Intelligent tutors can supplement traditional instruction and provide additional support outside the classroom.

Learning analytics constitutes another rapidly developing field within AI-enhanced education. By analyzing educational data, universities can identify students at risk of academic failure, monitor engagement levels, evaluate educational effectiveness, and design targeted interventions. Predictive analytics allows institutions to proactively address challenges before they negatively affect student outcomes.

The widespread availability of generative artificial intelligence tools has introduced new possibilities for educational practice. Generative AI can assist students and instructors in creating educational materials, summarizing information, generating examples, designing assignments, and supporting creative problem-solving. These technologies provide opportunities to enhance learning experience and improve educational productivity.

However, integrating generative AI also poses challenges. Concerns regarding plagiarism, authorship, originality, academic integrity, and assessment validity have become increasingly significant. Universities must therefore develop comprehensive guidelines and policies governing the ethical use of generative AI technologies within educational environments [2]. The integration of artificial intelligence into higher education has significant implications for the role of academic staff. Traditionally, university teachers were viewed primarily as sources of knowledge responsible for delivering information to students. In contemporary AI-supported educational environments, this role is evolving considerably.

As intelligent systems increasingly perform routine instructional tasks, educators are becoming mentors, facilitators, advisors, and learning designers. Rather than focusing primarily on information transmission, teachers now emphasize critical thinking, problem-solving, creativity, collaboration, and ethical reasoning. These competencies cannot easily be replicated by artificial intelligence and therefore remain central to human-centered education. Teachers are also expected to develop new digital competencies to effectively integrate AI technologies into their teaching practice. Professional development initiatives focused on digital literacy, data interpretation, AI ethics, and educational technology have become essential components of academic staff training [3].

The transformation of the teacher's role does not diminish educators' importance. On the contrary, it highlights the unique value of human judgment, empathy, ethical reflection, and interpersonal communication within educational processes. The emergence of AI technologies necessitates substantial revisions to university curricula. Educational programs increasingly incorporate subjects such as artificial intelligence, machine learning, data science, digital literacy, computational thinking, and the ethical aspects of technology use. Universities must prepare graduates for labor markets characterized by automation, digital transformation, and technological innovation. Consequently, curricula should support the development of interdisciplinary competencies, adaptability, creativity, and lifelong learning abilities [5].

The growing demand for AI-related knowledge extends beyond technical disciplines. Students in education, business, law, healthcare, social sciences, and humanities increasingly require an understanding of artificial intelligence and its implications for professional practice. Therefore, AI literacy should be viewed as a fundamental component of contemporary higher education. Beyond educational applications, artificial intelligence significantly influences university governance and management [1]. Modern higher education institutions generate vast amounts of data related to admissions, enrollment, student performance, finance, human resources, infrastructure, and research activities. AI technologies enable institutions to analyze these data efficiently and support evidence-based decision-making.

Predictive analytics systems help administrators forecast enrollment trends, student retention rates, graduation outcomes, and resource requirements. Such forecasts improve strategic planning and facilitate more effective allocation of financial and material resources. AI-powered administrative systems also contribute to process automation. Routine tasks such as scheduling, document processing, student support services, and communication management can be performed more efficiently through intelligent technologies. This allows administrative staff to focus on higher-value activities requiring human expertise and judgment.

Furthermore, AI supports institutional quality assurance by providing comprehensive monitoring and evaluation tools. Educational data can be analyzed continuously to identify strengths, weaknesses, risks, and opportunities for improvement. Consequently, universities can make more informed decisions regarding curriculum development, resource management, and organizational strategy [5].

Scientific research represents another area where artificial intelligence demonstrates transformative potential. Contemporary research increasingly relies on large-scale datasets, interdisciplinary collaboration, and advanced analytical techniques. AI technologies facilitate the processing and interpretation of complex information that would be difficult or impossible to analyze using traditional methods.

Machine learning algorithms support data mining, pattern recognition, predictive modeling, and knowledge discovery across numerous scientific disciplines. Researchers utilize AI to accelerate literature reviews, identify research trends, analyze bibliometric indicators, and generate new hypotheses. Artificial intelligence also facilitates interdisciplinary collaboration by

enabling the integration of diverse datasets and analytical methodologies [3]. This contributes to the development of innovative solutions to complex scientific and societal challenges.

Despite these benefits, the use of AI in research raises important ethical concerns. Questions related to authorship, intellectual property, transparency, reproducibility, and accountability require careful consideration. Universities and research organizations must establish ethical frameworks governing the responsible use of AI in scientific activities.

Although artificial intelligence offers substantial benefits, its implementation in higher education also creates significant ethical, legal, and socio-economic challenges. One of the most important concerns is data privacy and the protection of personal information. AI systems rely heavily on data collection and analysis, which can pose risks to confidentiality and surveillance.

Algorithmic bias represents another major challenge. AI systems may reproduce existing inequalities or discriminatory patterns present within training data. Such biases can influence admissions processes, assessment systems, learning recommendations, and administrative decisions. Transparency and explainability are essential requirements for responsible AI implementation. Students, educators, and administrators must understand how AI systems generate recommendations and decisions. The principle of explainable AI is therefore increasingly recognized as fundamental within educational contexts [4].

Digital inequality also remains a serious concern. Differences in technological infrastructure, digital literacy, and access to resources may create disparities between institutions and learners. Without appropriate policies, AI implementation could inadvertently exacerbate existing educational inequalities.

Table 3. Summary of the impact of artificial intelligence on the main areas of activity of higher education institutions

Scope of application	Key areas of AI application	Summary of results	Expected effect
Education	Adaptive learning, personalized learning pathways, support for learning activities	Improved retention of course material, increased student motivation	Improving the quality of educational services, reducing academic failure
Science	Analysis of big data, support for interdisciplinary research	Improving the effectiveness of scientific research and speeding up the delivery of results	Improving universities' research output and competitiveness
Management	Analytical systems, forecasting, decision support	Optimization of management processes, improving the soundness of decisions	Improving the efficiency of resource management and utilization
Social impact	Digital inclusion, development of digital skills	Expanding access to high-quality education and developing modern skills	Enhancing the university's social role and its alignment with the needs of the labour market

Academic integrity has become one of the most widely discussed issues associated with generative AI technologies. Universities face the challenge of maintaining academic standards while encouraging innovation and responsible use of technology. This requires new assessment methods, revised academic policies, and ongoing educational efforts promoting ethical behavior.

International experience demonstrates diverse approaches to AI integration in higher education. In the United States, universities actively employ learning analytics, adaptive learning platforms, and predictive systems to improve student success and retention. British institutions emphasize intelligent tutoring systems and personalized learning environments. South Korea has pioneered the development of smart campuses integrating AI into educational and administrative infrastructure.

Within the European Union, particular attention is devoted to ethical and trustworthy artificial intelligence. European initiatives emphasize transparency, accountability, human oversight, and respect for fundamental rights. These principles provide valuable guidance for educational institutions implementing AI technologies.

Comparative analysis indicates that successful AI integration depends not only on technological capacity but also on institutional readiness, regulatory support, staff training, and organizational culture [5]. The concept of the AI-driven university represents a promising vision for the future of higher education. In this model, artificial intelligence is systematically integrated into educational, managerial, research, and quality assurance activities. Such universities utilize intelligent technologies to support personalized learning, evidence-based governance, advanced research, and stakeholder engagement.

Implementing an AI-driven university requires strategic planning, investment in digital infrastructure, professional development programs, ethical governance frameworks, and continuous performance evaluation. Successful implementation also depends on fostering a culture of innovation, collaboration, and responsible technology use.

Ultimately, the AI-driven university represents not merely a technological transformation, but a comprehensive institutional evolution aimed at improving educational quality, operational efficiency, research excellence, and societal impact [4].

Conclusions and prospects for further exploration

Artificial intelligence has emerged as one of the most influential drivers of transformation in contemporary higher education. Its integration into educational, research, and administrative activities is reshaping traditional approaches to teaching and learning, institutional governance, and knowledge production. The findings of this study demonstrate that artificial intelligence contributes significantly to the development of personalized and adaptive learning environments, enhances the quality and accessibility of educational services, improves the efficiency of university management, and increases the productivity and effectiveness of scientific research.

The implementation of AI technologies enables higher education institutions to move from standardized educational models toward more flexible, learner-centered approaches that address individual needs, abilities, and learning trajectories. At the same time, artificial intelligence supports evidence-based decision-making through learning analytics, predictive modeling, and intelligent data processing, thereby strengthening institutional effectiveness and strategic planning capabilities. The growing use of generative AI tools also creates new opportunities for innovation in teaching, learning, and research, while simultaneously requiring the development of appropriate regulatory and methodological frameworks [4].

The study confirms that artificial intelligence should be viewed not merely as a technological innovation but as a systemic phenomenon that influences educational paradigms, organizational structures, management models, and quality assurance mechanisms. AI is increasingly becoming an integral part of universities' digital transformation and a strategic factor in determining their competitiveness in the global educational environment. Consequently, higher education institutions must adopt comprehensive approaches to AI implementation that combine technological advancement with pedagogical effectiveness, ethical responsibility, and institutional sustainability.

At the same time, the widespread adoption of artificial intelligence raises important ethical, legal, and socio-economic challenges. Issues related to academic integrity, data privacy, algorithmic transparency, accountability, digital inequality, and responsible use of intelligent technologies require particular attention from policymakers, university leaders, and educators. The successful integration of AI, therefore, depends not only on technological infrastructure but also on the establishment of clear governance frameworks, ethical standards, regulatory support, and mechanisms for continuous monitoring and evaluation.

Furthermore, the transformation of higher education driven by artificial intelligence requires continuous development of digital competencies among students, academic staff, and administrators. Universities must invest in professional development, digital literacy initiatives, and interdisciplinary collaboration to ensure that stakeholders are prepared to use AI technologies effectively and responsibly in their professional and educational activities.

In conclusion, artificial intelligence represents both an opportunity and a challenge for the future of higher education. Its effective implementation has the potential to improve educational quality, strengthen research capacity, enhance institutional performance, and support innovation-driven development. The findings of this study may serve as a theoretical foundation for further scientific investigations and as practical guidance for policymakers, university administrators, researchers, and educators involved in the strategic digital transformation of higher education institutions.

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