



ARTIFICIAL INTELLIGENCE AS A KEY TREND IN THE TRANSFORMATION OF HIGHER EDUCATION

LA INTELIGENCIA ARTIFICIAL COMO TENDENCIA CLAVE EN LA TRANSFORMACIÓN DE LA EDUCACIÓN SUPERIOR

Ilyos Abdullayev^{1*}

E-mail: ilyos.a@urdu.uz

ORCID: <https://orcid.org/0000-0002-9601-7434>

Vladimir Kurikov²

E-mail: v_kurikov@ugrasu.ru

ORCID: <https://orcid.org/0000-0002-1440-8870>

Asiyat Tagibova³

E-mail: a.a.tagibova@mail.ru

ORCID: <https://orcid.org/0000-0002-6731-5395>

Nailya Khadasevich⁴

E-mail: khadasevich@mirea.ru

ORCID: <https://orcid.org/0000-0002-7908-618X>

Olga Kirillova⁵

E-mail: olvkirillova@kpfu.ru

ORCID: <https://orcid.org/0000-0001-5987-6304>

¹ Urgench State University, Urgench, Uzbekistan.

² Yugra State University, Khanty-Mansiysk, Russia.

³ Moscow State Institute of International Relations (MGIMO), Moscow, Russia.

⁴ MIREA - Russian Technological University, Moscow, Russia.

⁵ Kazan Federal University, Kazan, Russia.

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ABSTRACT

This article explores the significance of artificial intelligence (AI) as a major trend in the transformation of higher education. It focuses on the analysis and reflection on the dynamic range of opportunities that emerge with the implementation of AI in the educational process of universities, and how AI is transforming higher education by making it more accessible, flexible, and effective. The article presents modern tools for the use of AI in higher education, encouraging consideration of its potential in educating future generations. It also draws attention to the challenges associated with integrating AI into higher education. The study employed a comprehensive research approach that combined descriptive and comparative analysis methods, along with expert surveys, to provide a deep and multifaceted understanding of the role and potential of AI in higher education. The analysis revealed that AI is set to revolutionize teaching and learning in higher education. Rapid adaptation to dynamically changing technologies will be required, leading to changes in existing educational practices and opening the door to new teaching and learning methods. However, the integration

of AI into education raises concerns about the potential limitations on natural interpersonal relationships, which are crucial in the processes of education and socialization.

Keywords:

Artificial Intelligence, Higher Education, Educational Technology, Digital Transformation, Adaptive Learning, Human Interaction, Educational Challenges.

RESUMEN

Este artículo explora la importancia de la inteligencia artificial (IA) como una tendencia clave en la transformación de la educación superior. Se centra en el análisis y la reflexión sobre el amplio abanico de oportunidades que surgen con la implementación de la IA en el proceso educativo universitario, y cómo la IA está transformando la educación superior al hacerla más accesible, flexible y eficaz. El artículo presenta herramientas modernas para el uso de la IA en la educación superior, fomentando la consideración de su potencial en la formación de las futuras generaciones. Asimismo, destaca los desafíos asociados a la integración de la IA en la educación superior.



El estudio empleó un enfoque de investigación integral que combinó métodos de análisis descriptivo y comparativo, junto con encuestas a expertos, para proporcionar una comprensión profunda y multifacética del papel y el potencial de la IA en la educación superior. El análisis reveló que la IA está llamada a revolucionar la enseñanza y el aprendizaje en la educación superior. Se requerirá una rápida adaptación a las tecnologías en constante evolución, lo que conllevará cambios en las prácticas educativas existentes y abrirá la puerta a nuevos métodos de enseñanza y aprendizaje. Sin embargo, la integración de la IA en la educación plantea inquietudes sobre las posibles limitaciones en las relaciones interpersonales naturales, cruciales en los procesos de educación y socialización.

Palabras clave:

Inteligencia Artificial, Educación Superior, Tecnología Educativa, Transformación Digital, Aprendizaje Adaptativo, Interacción Humana, Desafíos Educativos

INTRODUCTION

In a global context characterized by rapid technological transformation, artificial intelligence (AI) has become one of the main drivers of change across multiple sectors of contemporary society. Its presence extends from everyday applications such as smartphone cameras and video games to more complex domains including e-commerce, education, healthcare, cybersecurity, recommendation systems, search engines, and advertising (Xiang et al., 2022). Over the past decade, the development of AI has generated profound changes in how individuals interact with technology and access knowledge. Within this scenario, higher education stands out as one of the fields with the greatest potential for transformation, as AI increasingly reshapes pedagogical models and learning environments.

The integration of AI into education offers an opportunity to rethink traditional teaching and learning approaches. According to Shefiyeva & Isaeva (2020), AI functions as a powerful educational tool capable of radically transforming educational processes through personalization, automation, and data-driven decision-making. In this regard, educational systems face the challenge of adapting to a constantly evolving environment, where the integration of emerging technologies is essential to ensure quality, relevance, and innovation in education.

The challenges of 21st-century education are closely linked to ongoing digitalization and the demands of a dynamic labor market, which requires new competencies such as critical thinking, problem-solving, and digital literacy. Additionally, there is a pressing need to ensure equitable access to these technologies for diverse student

populations, raising important concerns related to inclusion and educational equity (Hussin, 2018). In this context, AI emerges as a strategic resource with significant potential to reduce access barriers, optimize teaching and learning processes, and foster more flexible, accessible, and adaptive educational environments.

The concept of artificial intelligence has been approached from multiple perspectives, reflecting its complex, dynamic, and multidimensional nature. In general terms, AI is defined as a set of technologies capable of performing tasks that traditionally require human intelligence, such as learning from data, decision-making, problem-solving, and natural language understanding (Anokhin et al., 2022; Denning & Denning, 2020). It is also considered a branch of computer science focused on developing systems capable of executing intelligent tasks, including machine learning, pattern recognition, planning, and reasoning (Chen et al., 2020). From a more applied perspective, AI is understood as a set of tools designed to solve complex problems autonomously through data analysis (Pearlman, 2020), as well as a process that enables machines to learn, adapt, and respond to new situations (Ryazanov, 2020; Selenko et al., 2022).

The diversity of these definitions highlights the evolving nature of artificial intelligence and its growing importance across various domains. While some perspectives emphasize its capacity to simulate human cognitive processes (Anokhin et al., 2022; Lund et al., 2023), others focus on its practical applications in real-world contexts (Crompton et al., 2024; Godwin-Jones, 2022). This multiplicity of approaches allows AI to be understood not only as a technological tool but also as an interdisciplinary phenomenon that is reshaping social, economic, and educational dynamics.

Within higher education, artificial intelligence plays a particularly significant role due to its ability to transform both pedagogical processes and institutional models. In this context, AI can be understood as the use of advanced algorithms and machine learning technologies to develop systems that support, optimize, and enhance teaching and learning processes (Castrillón et al., 2020). Key applications include personalized learning pathways that adapt content and pace to individual student needs (Valko & Osadchyi, 2020), automated assessment systems (Chen et al., 2022), interactive educational chatbots (Kooli, 2023), educational data analytics for informed decision-making (Perrotta & Selwyn, 2020), and adaptive learning materials tailored to diverse learners (Rincon-Flores et al., 2020).

In line with these developments, Rodríguez-Morales (2026) emphasizes that AI is contributing to the creation of more inclusive and neurodiverse learning ecosystems,

where cognitive diversity is recognized as a fundamental element of the educational process. This perspective promotes the development of environments that not only adapt to individual needs but also foster equity and active participation among students with different learning profiles. Consequently, AI is not only transforming teaching methodologies but also redefining pedagogical principles toward more inclusive and personalized models.

Similarly, López-Fernández (2026) highlights that the integration of artificial intelligence into universities opens new horizons for educational innovation, research, and inclusion. AI not only enhances teaching processes but also enables new forms of knowledge production and management, fostering more dynamic, collaborative, and interdisciplinary academic environments. Furthermore, this integration strengthens the ability of higher education institutions to respond to the challenges of the digital society by promoting flexible, student-centered learning models.

In a globalized context, AI is also facilitating new forms of borderless education. Sadri-Damirchi (2026) argues that higher education is evolving toward global learning models characterized by virtual mobility and international collaborative projects. In this regard, artificial intelligence plays a crucial role by enabling the creation of virtual environments that connect students and educators worldwide, promoting knowledge exchange and intercultural learning experiences. This approach expands access to education and enhances students' global competencies.

Despite its numerous advantages, the integration of artificial intelligence into higher education also raises significant challenges. Among these are concerns related to the potential dehumanization of educational processes, as the extensive use of technology may limit interpersonal interaction, which is essential for teaching, learning, and socialization. Additionally, ethical issues such as data privacy, algorithmic transparency, and technological dependency must be carefully considered, requiring a critical and responsible implementation of AI tools in educational contexts.

In this framework, it is essential to conduct a comprehensive analysis of the role of artificial intelligence in higher education, considering both its opportunities and limitations. Understanding this phenomenon allows for the identification of strategies to improve educational quality while anticipating the challenges associated with technological integration.

From this perspective, the working hypothesis of this study is that artificial intelligence constitutes a major trend in the transformation of contemporary higher education and plays a key role in updating teaching methods. Accordingly, the main objective of this article is to analyze AI as a key factor in the transformation of higher education

and to define its role in the renewal of educational practices. To achieve this objective, two specific aims are proposed: first, to identify the AI tools currently transforming higher education; and second, to analyze the benefits and risks associated with their implementation.

MATERIAL AND METHODS

This study adopts a comprehensive and systematic methodological approach aimed at providing an in-depth analysis of the impact of artificial intelligence (AI) on higher education. To achieve this, a combination of qualitative research methods was employed, including descriptive analysis, comparative analysis, desk research, and an expert survey. The integration of these methods allowed for a multidimensional understanding of the phenomenon, facilitating both theoretical reflection and empirical insight into the current role and potential of AI in higher education.

The descriptive analysis method was applied to examine and characterize the current state of AI implementation in higher education. This approach enabled the identification and detailed description of the main applications, trends, and developments associated with AI in educational contexts. Through the analysis of existing literature and documented cases, this method provided a structured overview of how AI technologies are being used in universities, including their role in teaching, learning, assessment, and academic management. Furthermore, descriptive analysis facilitated the identification of recurring patterns and emerging practices, allowing for a clearer understanding of the transformative potential of AI in education. It also supported the exploration of specific case studies, which contributed to a more nuanced and contextualized interpretation of AI's impact on the learning process.

Complementing this approach, comparative analysis was employed to evaluate the implementation of AI in higher education in relation to traditional teaching methods, alternative educational models, and other technological innovations. This method enabled the identification of similarities, differences, and distinctive features of AI-based educational approaches. By comparing AI-supported learning environments with conventional educational practices, it was possible to assess the added value of AI in terms of efficiency, personalization, scalability, and learning outcomes. Additionally, comparative analysis provided insights into how different educational systems and institutional contexts adopt and integrate AI technologies, highlighting both best practices and existing gaps. This broader perspective contributed to a more comprehensive understanding of the strategic role of AI in transforming higher education on a global scale.

To further strengthen the analytical framework, a desk research method was conducted. This involved a systematic

review and synthesis of existing academic literature, institutional reports, and statistical data related to artificial intelligence in education. The desk research process allowed for the consolidation of current knowledge on the topic, ensuring that the study was grounded in up-to-date and relevant sources. It also enabled the identification of key theoretical frameworks, methodological approaches, and research trends in the field of AI in higher education. By integrating findings from multiple sources, this method contributed to the development of a robust conceptual foundation for the study and supported the triangulation of data obtained through other research methods.

In addition to the literature-based analysis, an expert survey was conducted to incorporate empirical perspectives and validate the findings. The survey aimed to identify and assess the perceived benefits and risks associated with the use of AI in higher education. A purposive sampling strategy was used to select participants with a high level of expertise in the field. The selection criterion required that each expert had at least three publications on the topic in peer-reviewed academic journals, ensuring the credibility and relevance of their contributions. A total of 42 experts were invited via email to participate in the study, of whom 39 agreed to take part.

The data collection process was carried out through structured email correspondence, in which participants were asked to provide their insights regarding the advantages and potential threats of AI implementation in higher education. The responses included qualitative assessments, lists of key benefits and risks, and expert judgments based on their academic and professional experience. These responses were subsequently analyzed using a content analysis approach, allowing for the categorization, ranking, and weighting of the identified factors. This process facilitated the identification of the most significant opportunities and challenges associated with AI in education, as perceived by specialists in the field.

Overall, the combination of descriptive and comparative analysis, desk research, and expert consultation provided a comprehensive methodological framework for examining the role of artificial intelligence in higher education. This integrated approach not only enabled a detailed understanding of current applications and trends but also offered valuable insights into the future implications of AI for educational systems. By incorporating both theoretical and empirical perspectives, the study ensures a balanced and rigorous analysis of the opportunities and challenges associated with the integration of AI in higher education.

RESULTS AND DISCUSSION

Based on the analysis of scientific literature, Table 1 presents various AI tools that are currently revolutionizing higher education by offering new methods and pathways for shaping educational trajectories.

Table 1. AI tools for shaping educational trajectories in higher education.

Tool	Description	Examples
Personalized Learning Platforms	Use AI to adapt learning materials and educational programs to individual needs of stakeholders.	Khan Academy, Coursera, DreamBox Learning
Intelligent Assistants and Chatbots	Used to quickly answer questions, help solve problems, or explain complex concepts.	Duolingo (language-learning chatbot), Replika (AI chatbot), Engati (chatbot platform), ChatGPT
Assessment and Analytics Systems	AI can automatically grade responses and analyze results to identify areas needing more attention. These systems can assess both multiple-choice and descriptive answers.	Turnitin (writing analysis and assessment), Gradescope (automated task grading), Knewton (student performance analytics)
Educational Games and Simulations	AI-powered games and simulations that offer interactive and engaging ways of learning through hands-on experience and experimentation.	DragonBox (math games), CodeCombat (learn programming through gaming)
Natural Language Processing (NLP) Tools	Help analyze texts and support the development of language and literacy skills. Can be used for automatic text summarization or language learning.	Grammarly (writing enhancement tool), QuillBot (paraphrasing tool), Rosetta Stone (language learning tool)
Educational Resource Recommendation Systems	Automatically suggest learning materials—books, articles, videos—most suitable for students based on their learning paths.	Edmodo (education platform with content recommendations), Quizlet (study set creation tool)
Emotion and Engagement Analysis	AI systems can monitor and analyze students' responses to learning content, adapting approaches to increase engagement and learning effectiveness.	Affectiva (emotion analysis), GoReact (presentation and performance feedback), Emotiv (brain activity and emotion monitoring)

Speech Recognition and Voice Assistants	Enable interactive learning via voice commands, especially useful for language learning or students with disabilities.	Google Assistant, Amazon Alexa, Dragon NaturallySpeaking
Virtual and Augmented Reality (VR/AR)	Learning through simulations and visualization.	zSpace (educational VR/AR), Oculus Rift (VR for education)

Based on the expert survey, a list of benefits (Table 2) and risks (Table 3) associated with the use of AI in higher education was obtained. This can serve as a valuable resource for those interested in integrating modern technologies into teaching and learning. Analysis of the data presented in Tables 2 and 3 helps to understand both the potential and challenges of AI integration in higher education.

Table 2. Benefits of using AI in higher education.

Benefit	Description	Rank	Weight
Personalized Learning	AI analyzes data such as test results, learning progress, preferences, and styles to adapt materials and methods to each learner's needs.	1	0.20
Teacher Support	Educators can use AI to create personalized learning plans that consider individual student goals and needs, as well as to adjust materials in real time.	2	0.16
Automated Assessment	AI helps teachers automatically grade tests, assignments, and homework, saving time and ensuring objectivity.	3	0.14
Early Detection of Learning Difficulties	Through data analysis, AI can help identify learning challenges early, allowing for timely intervention.	4	0.12
Interactive Learning	AI can act as an interactive tutor, helping students understand material, answer questions, and provide extra practice.	5	0.10
Development of Soft Skills	AI systems can simulate scenarios for developing soft skills such as emotional regulation and problem-solving.	6-7	0.08
Foreign Language Learning	Advanced AI-based translation systems can facilitate the study of foreign languages.	6-7	0.08
Information Search	AI-based search engines provide more accurate and relevant search results.	8	0.06
Homework Assistance	AI assists with solving math problems, analyzing data and graphs, and creating visuals and animations.	9-10	0.03
Simulation and Experimentation	AI can be used to create simulations and virtual learning environments for interactive exploration across disciplines.	9-10	0.03

Source: Expert survey results; concordance coefficient $W = 0.68$ ($p < 0.01$), indicating strong agreement among expert opinions

Table 3. Risks of using AI in higher education.

Risk	Description	Rank	Weight
Lack of Critical Thinking	Students may rely too heavily on AI as an information source, limiting the development of independent problem-solving and critical thinking skills.	1	0.33
Blind Trust in AI	There is a risk that students may accept AI-generated answers without question, leading to the spread of misinformation.	2	0.24
Reduced Social Interaction	Excessive use of AI in education may limit interactions between students and teachers, which are vital for social skill development.	3	0.19
Technological Dependence	Dependence on AI as a primary educational tool could negatively affect students' ability to think independently and solve problems.	4	0.15
Lack of Empathy and Understanding	While AI can simulate conversations, it lacks genuine empathy and deep understanding, which are critical in providing emotional support during learning.	5	0.09

Source: Expert survey results; concordance coefficient $W = 0.71$ ($p < 0.01$), indicating strong agreement among expert opinions.

As the study results have shown, artificial intelligence (AI) is transforming the world of higher education by opening up new opportunities for teaching and learning. Thanks to AI, higher education is becoming more personalized, adapting to the individual needs and learning styles of each student. AI-based tools provide a more effective and interactive educational experience and facilitate access to knowledge. Furthermore, AI contributes significantly to the transformation of the higher education sector by offering a range of tools—from personalized learning platforms that tailor instruction to individual needs, to advanced assessment and analytics systems. Together, these tools not only enhance teaching and learning methodologies but also help create a more effective, accessible, and flexible learning environment.

The integration of AI-driven innovations into education fosters the development of essential skills such as problem-solving and adaptability to rapidly changing technologies. By learning how to use AI and understanding its applications, students acquire not only technical knowledge but also skills that are essential for living in an increasingly automated and tech-driven world.

The topic of AI in education is gaining growing popularity among educators. In 2022, new tools emerged: OpenAI introduced ChatGPT, and Microsoft launched Bing—advanced language models capable of generating content on a wide range of topics. It is important to note that these tools are capable of interacting with humans, which means they can play a key role in interpersonal communication, supporting both individuals and organizations (Anokhin et al., 2022).

According to the findings of a study (Perrotta & Selwyn, 2020), ChatGPT has attracted widespread interest in the education sector in a very short time since its launch. A significant proportion of teaching staff (51%) have begun using this tool, with 40% using it regularly on a weekly basis. The outlook for future usage is optimistic, as more than half of the educators (53%) plan to increase their use. Among students—22% of whom use ChatGPT weekly—there is a prevailing belief (63%), shared by the majority of educators (72%), that this tool signals the need to rethink traditional approaches to education. This aligns with student opinions (68% and 75%, respectively) that ChatGPT can improve their academic performance and learning efficiency, as well as with 73% of teachers who believe it enhances learning outcomes and acts as a catalyst in students' educational processes. These findings suggest that ChatGPT may become a key factor in the evolution of teaching methods and strategies.

AI offers a wide range of innovative solutions in higher education that have the potential to shape future generations. The benefits of implementing these technologies are invaluable for adapting the educational process to the needs of each learner.

As shown by the results of this study (see Table 2), the use of AI in education positively impacts the learning process, primarily through the personalization of instruction, support for educators, automation of assessment, early detection of learning difficulties, interactive tutoring, development of soft skills, facilitation of language learning, enhanced information retrieval, assistance with assignments, and opportunities for simulation and experimentation. AI allows for the customization of educational content and teaching methods to suit each student's needs, resulting in more effective and engaging learning experiences. Educators gain tools to create personalized learning plans, increasing the efficiency of the educational process. Automated

assessment saves teachers time and ensures greater objectivity. AI also helps identify learning challenges early on, allowing for timely intervention. Interactive learning resources, soft skill development, language acquisition, precise information retrieval, task support, and immersive simulation experiences further enrich the educational process, making it more engaging, interactive, and aligned with the demands of the modern world.

However, it is equally important to consider the potential risks that may arise, for example, from excessive dependence on AI (see Table 3). In the context of shaping future generations, it is crucial to strike a balance between leveraging the advantages of AI and preserving vital aspects of traditional education that nurture social skills, empathy, and critical thinking. The responsible and mindful integration of AI technologies into higher education will have a decisive impact on the development and preparedness of young people for future challenges.

At the same time, the development of AI demands careful attention to ethical aspects to ensure its responsible and safe use (Ryazanov, 2020). AI ethics is a field that examines the moral dimensions related to the development, implementation, and use of AI systems. As technology advances, especially in the realm of AI, numerous ethical issues emerge (Chen et al., 2020). The scope of these issues extends beyond the direct impact of AI on individuals, as AI can also influence the processes and structures that underpin society (Pearlman, 2020). In the face of rapid technological development, greater attention is being paid to values and the support of technologies that preserve our humanity. It is therefore critical to maintain the quality of education and uphold the humanistic values of pedagogy.

The goals of new academic programs must be based on the emerging demands of an interconnected world of digital platforms, intelligent support systems, and real-time mass data transmission. As such, it is urgent to assess—and potentially transform—existing standards in university education models and equip them with the digital capabilities needed by a new generation of educated citizens in an increasingly networked society.

CONCLUSIONS

The traditional role of higher education is to prepare students for their future professional lives. Today, this is reflected in the continuous changes in the educational and professional environment, which is becoming increasingly infused with technologies aimed at replacing routine tasks with automated procedures and devices.

The phenomenon of AI is especially important in the context of modern educational challenges, such as adapting

to diverse student needs, efficiently delivering knowledge, and constantly improving teaching methods. In light of these challenges, AI becomes not just a tool to facilitate the learning process but a dynamic partner capable of adapting to students' individual predispositions.

Artificial intelligence is transforming education by enabling personalized learning and more effective performance management. AI allows teaching methods to be better tailored to individual needs while also reducing the administrative workload. Its use in education contributes to faster acquisition of knowledge and skills, offering flexibility in terms of time and place of learning.

The integration of AI into higher education is reshaping the learning process, making it more accessible through tools like language translation and personalized learning paths that adjust the pace and style of learning to the individual needs of each student. These tools provide access to educational materials and resources anytime, anywhere. Educational effectiveness is enhanced by AI-powered systems that can analyze learning outcomes in real time, identify knowledge gaps, and provide personalized recommendations to help students reach their goals more quickly and effectively. AI can be valuable in many areas, including learning data analysis, automation of educational processes, strengthening cognitive skills, planning and designing learning programs, and adapting content and teaching methods to learners' individual preferences and goals. Education has gained a wealth of new tools, but it also requires a shift in approaches to teaching and learning, for both students and educators.

Thus, AI is a technology that opens up enormous educational opportunities, as knowledge—its acquisition, dissemination, and application—has become a key factor in economic development and social well-being. It empowers individuals and organizations to succeed, enhancing their value and competitiveness in the market.

In the future, AI will revolutionize education. Rapid adaptation to dynamically evolving technologies will be necessary. Understanding the impact of AI on these areas will be critical. Educational systems that were previously tailored to the demands of the industrial era will begin—under the influence of AI—to reconsider some of their traditional functions as outdated, while placing greater emphasis on others. At the same time, AI will pave the way for new methods of teaching and learning.

As a still-emerging and under-researched field in the educational context, AI in education requires further in-depth analytical study.

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