

THE IMPACT OF ARTIFICIAL INTELLIGENCE ON THE QUALITY OF CLASSES CONDUCTED BY TEACHERS OF HIGHER EDUCATION INSTITUTIONS

ВПЛИВ ШТУЧНОГО ІНТЕЛЕКТУ НА ЯКІСТЬ ПРОВЕДЕННЯ ЗАНЯТЬ ВИКЛАДАЧАМИ ЗАКЛАДІВ ВИЩОЇ ОСВІТИ

In the article, the author analyses the impact of artificial intelligence on the quality of teaching for engineering students. The study was conducted using an integrated approach that involved a detailed analysis of psychological and pedagogical literature. A thorough study of scientific papers, articles and other sources of information related to the problem under study was carried out. On the basis of the data obtained, a synthesis and systematisation of knowledge was carried out, which allowed us to clearly define the key concepts and aspects of the topic under study. It is established that the rapid development of artificial intelligence (AI) requires international cooperation to develop common approaches to its regulation. Leading international organisations, such as UNESCO, the EU and the OECD, are actively working to create a unified regulatory framework for AI. An important step in this direction is to define the key terms and principles that form the basis of the European strategy for the development of artificial intelligence. It is noted that the continuous development and improvement of artificial intelligence technologies open up great prospects for the future of education, providing powerful tools for improving the efficiency of learning, teaching and administrative efficiency.

The study is relevant because today artificial intelligence is actively penetrating all spheres of life, including education. Understanding how AI can affect the learning process is important for adapting educational systems to new conditions and identifying the main vectors of learning.

In order to determine whether artificial intelligence affects the quality of classes for engineering students, the author conducted a survey among 165 students of the National Technical University of Ukraine 'Igor Sikorsky Kyiv Polytechnic Institute'. The obtained results emphasise the effectiveness of artificial intelligence in the learning process.

Key words: *educational process, higher education students, future engineers, artificial intelligence, innovations.*

У статті автором проаналізований вплив штучного інтелекту на якість проведення

занять викладачами для здобувачів інженерних спеціальностей. Дослідження було проведено з використанням комплексного підходу, що передбачав детальний аналіз психолого-педагогічної літератури. Було здійснене ретельне вивчення наукових праць, статей та інших джерел інформації, що стосуються досліджуваної проблеми. На основі отриманих даних було проведено синтез та систематизацію знань, що дозволило чітко визначити ключові поняття та аспекти досліджуваної теми. Встановлено, що швидкий розвиток штучного інтелекту (ШІ) вимагає міжнародного співробітництва для розробки спільних підходів до його регулювання. Провідні міжнародні організації, такі як ЮНЕСКО, ЄС та ОЕСР, активно працюють над створенням єдиної нормативно-правової бази для ШІ. Важливим кроком у цьому напрямку є визначення ключових термінів та принципів, які лягли в основу європейської стратегії розвитку штучного інтелекту. Зазначено, що постійний розвиток і вдосконалення технологій штучного інтелекту відкривають великі перспективи для майбутнього освіти, надаючи потужні інструменти для підвищення ефективності навчання, викладання та адміністративної ефективності.

Дослідження актуалізується тим, що в умовах сьогодення штучний інтелект активно проникає в усі сфери життя, в тому числі й в освіту. Розуміння того, як ШІ може вплинути на процес навчання, є важливим для адаптації освітніх систем до нових умов, визначення основних векторів навчання.

З метою визначення, чи впливає штучний інтелект на якість проведення занять для здобувачів інженерних спеціальностей, авторкою було проведено опитування серед 165 здобувачів освіти НТУ України «КПІ імені Ігоря Сікорського». Отримані результати підкреслюють ефективність штучного інтелекту в процесі навчання.

Ключові слова: *освітній процес, здобувачі вищої освіти, майбутні інженери, штучний інтелект, інновації.*

UDC 378:004.8

DOI <https://doi.org/10.32782/2663-6085/2024/75.51>

Pryhalinska T.G.,

Candidate of Pedagogical Sciences,
Senior Lecturer at the Department
of Mathematical Analysis
and Probability Theory

National Technical University of Ukraine
«Igor Sikorsky Kyiv Polytechnic Institute»

General statement of the issue. Artificial intelligence is rapidly penetrating education and science, radically changing the economy and society. This technology has not only marked a new era in the development of digital technologies, but has also become the driving force behind the global transformations taking place in modern civilisation. In order to realise the full potential of AI, it is necessary to ensure its human-centricity, ethics and sustainability, while respecting fundamental human rights [3]. In late 2022, OpenAI introduced a number of innovative digital services based on the principles of the human brain. In particular, the ChatGPT chatbot and the DALL-E image generator. According to The Guardian,

in just two months after the launch, the number of users of these services exceeded 100 million, which is an absolute record for Internet products. At the same time, it is worth noting that despite the recognised potential of AI in transforming higher education, there is a significant lack of strategic planning and institutional frameworks for the effective use of this technology. Higher education institutions (HEIs) introduce AI tools periodically and unsystematically, which leads to fragmented and inconsistent implementation. The absence of a coherent strategy is manifested in the minimal integration of AI into broader educational policy and the lack of a comprehensive framework to guide its quality implementation.

Analysis of scientific research and observations. Research related to the use of AI in education can be found in the works of O. Spirin, I. Drach, L. Kartashova, O. Humennyi, N. Volkova, A. Kviatkovska, I. Drach, O. Gurman, and other scholars. Artificial intelligence applications can optimise resource allocation and improve online learning processes by providing a reliable platform for curriculum development and quality learning [7]. Integrating AI into higher education requires careful consideration of the ethical implications, in particular in terms of bias and academic integrity[6]. According to scholars [2], the integration of artificial intelligence (AI) into higher education has become a transformative force that has changed various aspects of teaching, learning, and institutional operations.

The purpose of the article is to present the theoretical foundations of the problem of AI use by higher education students of engineering specialities. To identify the peculiarities of AI application in the educational process of higher education institutions, in particular, in the National Technical University of Ukraine 'Igor Sikorsky Kyiv Polytechnic Institute'.

The main part of the study. The rapid development of artificial intelligence (AI) and its increasing use in everyday life have prompted leading international organisations such as UNESCO, the European Union and the OECD to actively discuss this phenomenon. To ensure the efficient and ethical use of AI, the above-mentioned organisations have developed common approaches and defined key terms that form the basis of the European strategy for the development of artificial intelligence. In the European Union, according to the Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions on Artificial Intelligence for Europe, the following definition of an 'AI system' is used: They are software (and possibly hardware) systems designed by humans that, given a complex goal, act in a physical or digital dimension, perceiving the environment by collecting data, interpreting the resulting structured or unstructured data, reasoning from knowledge or processing information derived from this data, and deciding on the best action to take to achieve the goal [3; 4].

As noted in [8], «...as traditional teaching methods and assessment systems become increasingly outdated, there is an urgent need for in-depth research and discussion on the future of education in the AI era. The emergence of artificial intelligence (AI) technology has prompted a paradigm shift in various sectors, including higher education. The potential of AI to automate administrative tasks, provide personalised learning experiences, and improve resource management is noteworthy».

A key issue in the development and use of artificial intelligence is ensuring its ethics, trust and

reliability. This is reflected in the recommendations of the OECD and the European Union, which define the fundamental principles that should guide the development of AI. Such principles are extremely important as they relate to fundamental human rights, data protection, competition, and many other aspects of our lives.

The quality of teaching and the educational environment are critical components of the success of engineering students. Teacher development programmes, innovative teaching methods and the integration of artificial intelligence into the educational process open up new opportunities to improve educational outcomes and adapt students to the requirements of modern engineering practice. AI allows creating personalised learning paths, automating routine tasks, and promoting the development of independent thinking and critical analysis skills, which is important for engineers. Innovative technologies also increase the motivation of students and make the educational process more interactive and accessible, which will ultimately help to achieve success in training highly qualified specialists.

According to foreign scientists A. Kaplan and M. Haenlein, artificial intelligence involves three C-models: confidence, change, and control. Thus, it increases the efficiency of learning and teaching [9]. These models reflect the key aspects of AI implementation in various fields, including education.

In addition, AI measures the cognitive learning process of students through neurolearning and responds in time to provide constructive feedback.

After analysing a number of scientific studies and documents, we note that the European Union identifies four levels of risk associated with the use of artificial intelligence: unacceptable, high, limited, and minimal. Systems with unacceptable risk include those that pose a threat to human safety. High risk systems are used in critical areas such as law enforcement, migration management, and education. Systems that require additional transparency, such as chatbots, are of limited risk. Systems with minimal risk include entertainment apps, spam filters, and others.

For the effective implementation of artificial intelligence (AI) tools in higher education institutions (HEIs), it is necessary to develop a systematic approach that will avoid fragmented and inconsistent use of technology. The main recommendations for improving the educational process of engineering students are outlined below:

1. Developing an AI implementation strategy

– HEIs should create a long-term strategy for introducing AI into the educational process, including the identification of key areas of technology application (teaching, assessment, research) and setting specific goals.

– It is necessary to ensure a clear understanding of the role of AI as a tool that supports teachers and students, rather than replacing their work.

2. *Teacher training, professional development, and certified courses.*

– Regular professional development of teachers in the use of AI and digital tools. Teachers should have the opportunity to be trained in the latest technologies, understand their potential and be able to use them in practice.

– Creation of interdisciplinary teams of IT specialists and educators for the effective implementation of AI in the educational process.

3. *Systematic integration of technologies.*

– The introduction of AI tools should be systemic, not one-off or pointed. It is necessary to integrate AI at all levels: from the creation of educational materials to the assessment of students and monitoring their progress.

– It is recommended to use integrated AI platforms that cover all stages of the educational process, rather than separate tools for different tasks.

4. *Evaluation of results and process improvement.*

– It is necessary to regularly evaluate the effectiveness of implemented AI technologies through surveys of students and teachers, analysis of learning outcomes and academic performance. This will help to understand which tools work best and where improvements are needed.

– Based on the collected data, the strategy should be adjusted, constantly improving the implementation process.

5. *Provide technical support.*

– It is important to have a stable technical infrastructure and support for all participants in the educational process. AI implementation should be accompanied by the deployment of the necessary hardware and software.

– Provide access to technical assistance for teachers and students in case of problems with the use of AI tools.

Summarising the above, it is worth noting that an integrated approach to AI implementation will help higher education institutions avoid fragmentation by ensuring consistent, ethical and effective use of technology at all stages of the educational process.

In order to determine whether artificial intelligence affects the quality of classes in the process of training engineering students, the author developed a Google Form survey. A total of 165 engineering students of the National Technical University of Ukraine 'Igor Sikorsky Kyiv Polytechnic Institute' took part in the survey. The results of the survey are presented in Fig. 1.

As the survey shows, the answers to the question 'How often do you use artificial intelligence (AI) tools in your educational process?' were distributed as follows:

- Very often (65%).
- From time to time (28%).
- Rarely (4%).
- Never (3%).

The question 'Do you feel that teachers use AI for an individual approach to each student?' was answered as follows: very often (45%), from time to time (37%), rarely (15%), never (3%).

The analysis of the results shows that the majority of students positively assess the use of artificial intelligence to individualise the educational process.

The next question was aimed at determining which AI tools are used in the classroom by teachers (Fig. 2).

The analysis of answers to the question about artificial intelligence (AI) tools used by teachers in the classroom shows different levels of technology

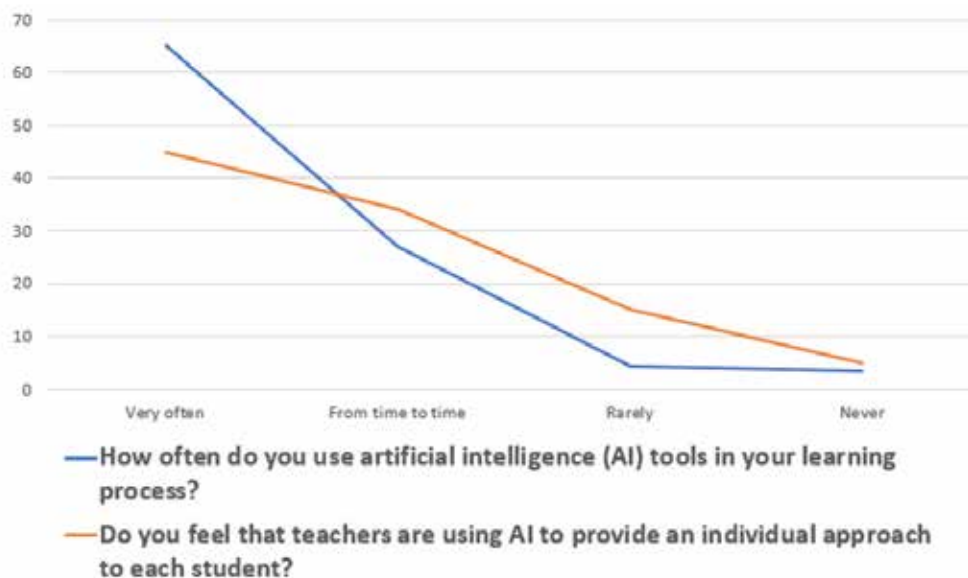


Fig. 1. Survey of students

What AI tools are used in the classroom? (several options are available)

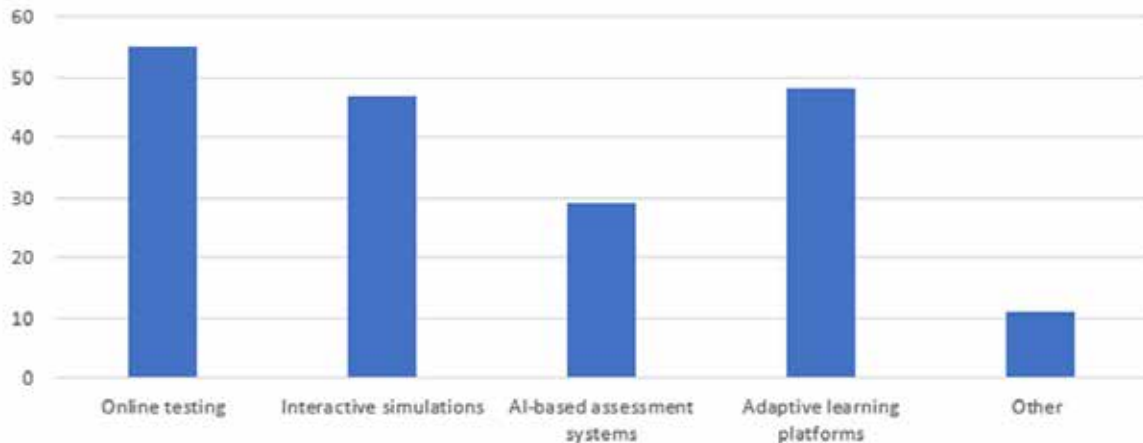


Fig. 2. Survey of students

implementation in the educational process. The most common tool is online testing (57%). This shows that teachers are actively using AI to automate the process of assessing the knowledge of future engineers. Interactive simulations were mentioned by 48% of students, AI-based assessment systems by 27.5%, and adaptive learning platforms by 48.5%.

To the question ‘How do you assess the impact of AI on the quality of material presented by teachers?’, engineering students answered as follows:

- Positive impact (contributes to a better understanding of the material) – 76.4%.
- Neutral (does not affect the quality of presentation) – 14.5%.
- Negative impact (complicates the learning process) – 9.1%.

According to the survey, the majority of students believe that the use of AI improves the quality of presentation by teachers and contributes to a better understanding of the material. This demonstrates the effectiveness of AI tools in increasing the individualisation of the educational process, its quality, adapting curricula, and creating interactive and personalised materials.

Conclusions. The study has shown that artificial intelligence (AI) plays an important role in transforming the educational process, affecting the quality of classes taught by teachers of higher education institutions. The use of AI allows teachers to adapt the educational process to the individual needs of engineering students, automate routine tasks such as assessment and analysis of results, which allows them to spend more time interacting directly with students and preparing for classes in depth. In addition, intelligent systems can help develop interactive learning materials and simulations, which increases the effectiveness of teaching and the

engagement of future professionals in the educational process. However, the introduction of AI also poses new challenges for teachers, including dependence on technology, the need for new professional skills, and ethical issues related to the use of personal data and fairness of assessment. Teachers need to find a balance between the use of new technologies and traditional teaching methods in order to maintain high quality teaching while avoiding possible negative consequences. The study highlights the profound impact of artificial intelligence on higher education, emphasising its potential to personalise learning, increase student engagement and optimise administrative processes

REFERENCES:

1. Crompton H., Song D. The potential of artificial intelligence in higher education. *Revista virtual Universidad catolica del Norte*, 2021. 62. <https://doi.org/10.35575/RVUCN.N62A1>.
2. Drach I., Petroie O., Borodienko O., Regeylo I., Bazeliuk O., Bazeliuk N., Slobodianiuk O. The use of artificial intelligence in higher education. *International scientific journal ‘Universities and Leadership’*. 2023. 15, 66–82. <https://doi.org/10.31874/2520-6702-2023-15-66-82>
3. European Commission. Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions on Artificial Intelligence for Europe. 2018 URL:<https://eur-lex.europa.eu/legalcontent/EN/TXT/?uri=COM:2018:237:FIN>
4. European Commission. White Paper on Artificial Intelligence – A European approach to excellence and trust. 2020. URL:https://commission.europa.eu/system/files/2020-02/commissionwhite-paper-artificial-intelligence-feb2020_en.pdf
5. Farrokhnia M., Banihashem S., Noroozi O., Wals A. A SWOT analysis of CHATGPT: Implications

for educational practice and Research. *Innovations in Education and Teaching International*. 2023. 1–15. <https://doi.org/10.1080/14703297.2023.2195846>

6. Gurman O., Kviatkowska A. The impact of industry 4.0 on the modern world educational process and in Ukraine. *Scientific Journal of Polonia University*. 2023. 59 (4). 23–29.

7. Hearn A. Chat GPT AI bot wows scientists with essay writing skills and usability. *The Guardian*. URL: <https://www.theguardian.com/technology/2022/dec/04/ai-bot-chatgpt-stuns-academics-with-essay-writing-skills-and-usability>

8. Kaplan A., Haenlein M. Siri, Siri, in my hand: Who is the most beautiful in the country? On the interpretations, illustrations, and implications of artificial intelligence. In *Business Horizons*. 2021. 62 vols. pp. 15–25.

9. Slimi Z. The impact of AI implementation in higher education on educational process future: A systematic review. 2023. <https://doi.org/10.21203/rs.3.rs-1081043/v1>

10. *The Guardian*. Chat GPT reaches 100 million users two months after launch. 2023. URL: <https://www.timeshighereducation.com/campus/spotlight/ai-and-university>