

The Future of the Learning Process with AI

Senad Orhani^{1*}

¹Faculty of Education, University of Prishtina "Hasan Prishtina", Prishtina, Kosovo *Corresponding author: senad.orhani@uni-pr.edu

Abstract: In the digital age, artificial intelligence (AI) is profoundly reshaping all aspects of human life, including education systems. This theoretical paper addresses the potential impact and directions of the development of the learning process through the integration of AI in the future. First, the growing role of AI as a supporting tool in the personalization of learning is examined, including digital tutors, student data analysis, and adaptive learning. Next, the ethical, social, and pedagogical implications of this development are discussed, with particular emphasis on the transformation of the teacher's role from transmitter of knowledge to guide and mentor. The paper also explores the challenges related to access, professional preparation, and maintaining humanity in learning. Drawing on existing theoretical literature, this study provides a comprehensive overview of how AI can reshape educational practices sustainably and inclusively, reinforcing the importance of a balanced approach between technology and the human dimensions of education.

Keywords: Adaptive learning, Artificial Intelligence, learning process, digital tutors, future education.

To cite this article: Orhani, S. (2025). The Future of the Learning Process with AI. Kosovo Educational Research Journal, 6(1), 27-43.

1. Introduction

The technological transformations taking place in the digital age are having profound impacts on all sectors of life, including education. One of the most promising areas expected to fundamentally change the way we learn and teach others is Artificial Intelligence (AI). AI is no longer seen as just a supporting tool but as a fundamental factor in redesigning the learning process itself (Petergova, Sokolova & Agopyan, 2025).

The integration of AI in education has begun to take concrete form through adaptive learning systems, virtual tutors, student data analysis, and intelligent platforms for personalizing learning content (Testov, Perminov & Golubev, 2025). AI is increasingly able to analyze student performance in real time and automatically adapt didactic approaches, which gives the learning process a new, more sensitive, and personalized dimension (Kumar, Raj & Kumar, 2025).

Following on from Orhani's (2024) research, this study makes a valuable contribution to the field of artificial intelligence and education, demonstrating that AI personalization systems have significant potential to improve student performance and motivation in mathematics. Our findings show significant improvement in the performance of students who used the AI personalization system compared to those who participated in a traditional learning environment (Orhani, 2024).

However, alongside the benefits, there are also significant challenges. These include ethical and social issues such as digital surveillance, data privacy, and the risk of reducing the role of the teacher to a "technological extension" (Malicse, 2025). In this context, teachers should not be replaced, but transformed into leaders of the learning process, capable of interacting with AI tools critically and creatively (Roider et al., 2025).

Recent studies also highlight the need for professional preparation of teachers to adapt to these changes, as well as for educational policies that promote an equitable and inclusive approach to the use of AI (Jaiswal, 2025).

1.1. Background of the problem

Digital transformation has caused a visible revolution in all areas of social life, and one of the most affected sectors is undoubtedly education. Recent developments in the field of artificial intelligence (AI) have opened new ways to think and reconceptualize the way learning occurs, as well as the role that teachers and students play in this process. The integration of AI into

educational systems is no longer a matter of the distant future, but an emerging reality that is challenging traditional approaches to teaching and learning (Roider, Wang, Zanca, & Matzner, 2025).

Al has the potential to personalize the learning experience for each student, using advanced data analytics to tailor the content, pace, and method of learning to individual needs. This has fueled the development of adaptive learning systems, digital tutors, and platforms that provide personalized recommendations in real time (Testov, Perminov, & Golubev, 2025). At the same time, artificial intelligence is changing the role of the teacher – from transmitter of knowledge to mentor, pedagogical leader, and builder of technology-enabled learning environments (Petergova, Sokolova, & Agopyan, 2025).

However, despite the enthusiasm for the potential of AI in education, there is also a spectrum of important challenges that include ethical, social, and practical issues. Questions related to data privacy, equal access to technology, as well as the impact that this technology can have on pedagogical autonomy and the teacher-student relationship have become increasingly important (Malicse, 2025). Consequently, the debate on the future of the learning process with AI is not simply a technological issue, but a multidimensional challenge that requires a deep theoretical and ethical understanding of the transformations that are taking place.

This field, still in development, requires a structured analysis that examines not only the opportunities that AI offers in learning, but also the impacts it may have on the philosophy of education, on institutional structures, and on the way the act of learning itself is understood.

1.2. Elaboration of the problem

Although the potential of artificial intelligence to improve the education system is immense, the process of integrating it into pedagogical practice and educational institutions is not without challenges. A fundamental problem underlying this development is the structural and professional unpreparedness to cope with the complexity of the digital transformation in education (Whitmore, 2025). Teachers often feel unprepared to use AI-based tools effectively, and professional development programs rarely provide them with the necessary competencies.

Another serious issue concerns the lack of clear ethics and transparency in the algorithms used in AI learning systems. Many of these technologies operate as "black boxes," without disclosing the basis for their decisions, which can affect educational equity and reinforce existing biases (Khalaf et al., 2025).

The challenges are not only technological or pedagogical but also social and political. For example, schools in rural areas or with limited resources face difficulties in providing the necessary infrastructure to implement advanced technologies. As a result, there is a risk of widening the digital divide and reinforcing inequalities in access to quality education (Hales, Elfarargy, & Durr, 2025).

Furthermore, the use of AI in education raises important questions about the role of the teacher in the classroom of the future. Will teachers be rendered redundant by digital tutors? Or will they be transformed into new roles as mentors and designers of the learning experience? This uncertainty has created a tense environment and requires deep theoretical analysis (Kerr & Kim, 2025).

Precisely for these reasons, it is necessary to develop a critical and theoretical approach to the integration of AI into the learning process, so that it can address not only the technological advantages, but also the human, cultural and institutional implications of this transition.

1.3. **Purpose of the study**

The main aim of this paper is to provide a comprehensive theoretical review of the potential impact and challenges of integrating artificial intelligence into the learning process. Unlike empirical approaches that aim to statistically measure concrete impacts, this study aims to explore the conceptual, ethical, and pedagogical foundations related to the use of AI in education, addressing questions such as:

How can learning be understood in an automated age?

What are the boundaries between technology and humanism in education? and

How should the role of the teacher develop in this new reality?

This study aims to contribute to the development of a theoretical framework that helps researchers, policymakers, and educational practitioners analyze the impact of AI in a systematic and critical manner. A core goal is to emphasize that the use of technology in education should not be an end in itself, but should be guided by the principles of equity, ethics, and inclusion (Melnychenko, 2025).

Furthermore, the paper helps build a theoretical knowledge base to understand how concepts such as personalization, interaction, and formative assessment can be reconceptualized in an AI-mediated environment. It also addresses the potential of AI to reshape not only teaching methods but also institutional structures and learning cultures, contributing to the development of contemporary educational theories (Florou, 2025; Mohamad et al., 2025).

2. Theoretical framework

2.1. Historical development of AI in education

The development of artificial intelligence (AI) in education is a process that has gone through several transformative phases, from the simple use of computers in the classroom in the 1970s and 1980s to today's learning systems based on advanced algorithms and neural networks. Initially, technology in education served mainly to automate simple functions such as testing and assessment, but with the advancement of AI, the focus has shifted towards personalized learning, intelligent tutors, and platforms that dynamically analyze student data to provide tailored content (Kocak & Genc, 2025).

In the last decade, the integration of AI has intensified due to developments in machine learning. Learning and data analytics, have enabled the creation of learning environments that continuously learn and improve (Zhu et al., 2025). Furthermore, the COVID-19 pandemic accelerated the adoption of digital technologies in education and catalyzed the testing of AI-based solutions on a global scale (Samuels & Singh, 2025).

In addition to technological developments, AI has also influenced the philosophy of learning, raising new questions about the role of the teacher and the student in a technology-mediated reality. Historically, traditional approaches to education have been built on direct, human relationships, while today we are witnessing a shift towards interaction mediated by algorithmic intelligence. This constitutes an important turning point in the history of

education, requiring a deep theoretical and interdisciplinary analysis (Odilova & Iskandarova, 2025).

2.2. Educational theories related to technology

The use of artificial intelligence in education cannot be understood without a solid theoretical foundation related to how humans learn. Educational theories such as constructivism, cognitivism, and adaptive learning have played an important role in guiding the development of AI-based technologies for teaching and learning.

Constructivism, represented by authors such as Vygotsky and Piaget, emphasizes that learners construct knowledge through experience and active interaction with the environment. AI, especially through interactive platforms and virtual reality simulations, enables this type of learning by creating rich environments that encourage exploration, discovery, and reflection (Pachava & Lasekan, 2025).

Cognitivism focuses on mental processes such as information processing, memorization, and problem-solving. AI-based systems, such as intelligent tutors and recommender systems, are built on cognitive models that simulate how the human brain works to process information and provide appropriate interventions in real-time (Lee et al., 2025).

Adaptive learning is an approach that matches the content, style, and pace of learning to the individual needs of the learner. Al enhances this approach by using data analysis algorithms to build personalized learning profiles and provide dynamic recommendations that improve efficiency and motivation (Lee et al., 2025).

The combination of these theories with AI represents not just a technological improvement, but a paradigm shift in education, where learning becomes more personalized, interactive, and data-driven. This development requires educational practitioners to understand and critically employ the theoretical foundations upon which technological tools in the classroom are built.

2.3. Existing models of using AI in learning

The development of artificial intelligence in education has brought to the fore advanced models that aim to personalize and improve the learning process. The most widespread models include intelligent tutoring systems (ITS), recommender systems, and adaptive learning platforms, which are playing an increasingly important role in contemporary education.

Intelligent Tutors (Intelligent Tutoring Systems – ITS)

ITS are computer programs designed to simulate the interaction of a real teacher with a student. These systems analyze the student's performance in real-time and provide personalized feedback, using cognitive models and machine learning algorithms. According to the study by Chtouki and Bekkar (2025), intelligent tutors have shown significant improvements in learning efficiency, especially in disciplines such as programming, mathematics, and foreign languages.

Recommended systems in education

Recommender systems work by analyzing students' preferences and behaviors to suggest materials, exercises, or courses that match their needs. These systems are comparable to those used by platforms like Netflix or YouTube, but are adapted for educational use. According to Apelehin et al. (2025), educational recommenders are particularly useful in distance learning and e- learning, improving student engagement and success.

Advanced adaptive learning models

At the heart of these models is the idea of automatically adapting content to an individual's learning style. AI monitors the learner's progress, reactions, and difficulties to adjust the pace and complexity of the materials. According to Umar and Javaid (2025), the use of these approaches has increased significantly after the pandemic, when the demand for personalized learning became critical.

These models represent a profound change from traditional methods and require new pedagogical approaches, teacher training, and ongoing evaluations to maintain effectiveness and ethics in use.

2.4. Theoretical and ethical challenges in using AI in education

As the use of artificial intelligence in education grows rapidly, discussion of theoretical and ethical challenges becomes increasingly necessary. Al algorithms are not neutral: they carry assumptions, priorities, and decision-making structures that, if not carefully examined, can reinforce social, educational, or cultural inequalities (Khreisat et al., 2024).

One of the most frequently cited challenges is the lack of transparency in how algorithms work. When teachers and students cannot understand or challenge the recommendations coming from AI systems, pedagogical and student autonomy is put at risk. This problem is compounded by the fact that many commercial algorithms are privately owned and protected by closed-source code (Yamin et al., 2024).

Another issue is algorithmic bias – when models learn from data that reflects existing inequalities, they reinforce them rather than mitigate them. For example, a tutoring system may produce different results for students from different backgrounds due to training on unbalanced data (Kamak, 2024).

The impact on the teacher's role is also an ethical and theoretical concern. Will the teacher become a "technical assistant" overseeing a system, or will he or she continue to be the center of educational interaction? Studies show that many teachers feel devalued when technologies replace pedagogical decision-making in the classroom (Adams, Pente, & Lemermeyer, 2023).

Finally, the use of AI in education requires an ethical institutional and regulatory framework that protects students' data and ensures fairness at all levels of the education system. Without this framework, the benefits of technology can be transformed into tools for control, manipulation, or exclusion (Nguyen et al., 2023).

2.5. Critical perspectives and alternative approaches

As enthusiasm for incorporating artificial intelligence (AI) into education continues to grow, an increasingly visible stream of research literature warns of the dangers of an uncontrolled and over-centralized approach to technology in education. Critical perspectives emphasize that AI, if not structured on human values, can transform from an auxiliary tool into a mechanism that replaces pedagogical sensitivity with algorithmic efficiency (Sposato, 2025).

One of the strongest criticisms concerns the erosion of human interaction and the diminishing role of the teacher in the classroom. Instead of functioning as a supportive tool, AI is often seen to usurp decision-making spaces, influencing the educational process without full understanding by human actors (Raza et al., 2024). This leads to a dehumanization of education, where the learning experience risks becoming sterile and standardized.

As a counterbalance to this trend, new humanistic and human factors-based approaches are gaining ground. Various researchers propose a human-centered education, where AI serves as a tool to increase empathy, inclusivity, and critical reflection, not just to optimize outcomes (Mustafa & Ali, 2025).

Such approaches suggest developing AI systems with ethical design, which involve users (teachers, students, parents) in the design process and ensure that the technology is explainable, transparent, and inclusive (Chun et al., 2025). This also includes developing critical AI literacy that helps students understand and evaluate the impacts of technology on their lives and education (Ekvitayavetchanukul, 2025).

Thus, critical perspectives do not oppose technology itself but rather call for a balanced approach, where technology coexists with the human dimension of education and promotes a more sensitive, just, and ethical education.

3. Methodology

This paper is based on a theoretical and analytical approach, which aims to examine in a structured and critical manner the role of artificial intelligence (AI) in education, through the analysis of contemporary scientific literature. Instead of collecting empirical data, this study focuses on the systematic review of academic sources, identifying trends conceptual

frameworks, and theoretical approaches that have influenced the discourse around AI in modern education.

Thematic analysis was followed as a guiding method to structure the content around key themes such as technological integration, learning theories, ethical challenges, and critical approaches. This approach allows for the identification of key areas of debate and helps in building a balanced, interdisciplinary, and reflective narrative (Snyder, 2019).

3.1. Literature selection

The sources have been selected through advanced searches in reliable academic databases such as Springer, Scopus, and Google. Scholar, ResearchGate, MDPI, and Emerald. Keywords used include: "AI in education", "critical perspectives on AI", "intelligent tutoring systems", "adaptive learning", etc. Only articles and books published from 2020 onwards are included, to reflect the latest developments in the field.

3.2. Methodological limitations

Like any theoretical approach, this methodology has limitations. First, the lack of empirical data means that the conclusions are not verified in practice but are based on comparative and theoretical analysis. Second, the selection of sources is subjective and may be influenced by the author's research biases.

However, the purpose of this paper is not to test hypotheses, but to build an in-depth theoretical framework that can serve as a foundation for subsequent empirical studies, as well as for more technologically and ethically aware educational policies.

4. Theoretical discussion and interpretation

This chapter aims to synthesize the theoretical findings discussed earlier and provide an indepth analysis of the impact of artificial intelligence on education. By combining constructivist, cognitivist, and humanistic perspectives, it discusses how AI technologies not only transform learning but also challenge the classical understanding of teaching. Through this discussion, the balances between technological efficiency and pedagogical humanism are assessed. At the core of the theoretical debate on AI in education lies the need for an interdisciplinary approach, combining pedagogical, technological, and ethical knowledge. Many researchers emphasize that the education of the future cannot depend solely on the power of algorithms, but must be guided by a humanistic vision that prioritizes the development of critical, empathetic, and creative capacities in students (Ekvitayavetchanukul, 2025). In this context, AI should be treated not as a substitute for humans, but as a partner in building a sustainable and inclusive education.

One of the most profound dilemmas emerging from the literature is the tension between technological efficiency and pedagogical sensitivity. Al-based systems can provide instant personalization and data-driven recommendations, but they cannot yet understand the emotional, cultural, or social context of the learner (Mustafa & Ali, 2025). Therefore, educational decision-making cannot be entrusted to technology alone; it must remain a human process that takes into account the complexity and dynamics of the classroom.

The use of artificial intelligence in education is a transformation that affects not only learning methods, but also the concept of education itself, the teacher-student relationship, and the role of the educational institution itself. Theoretically, this encourages a revision of the traditional paradigm of education, where the teacher is no longer the central source of knowledge, but an intermediary between the student and technology (Cui, 2025).

If constructivism sees learning as an active construction of knowledge, AI faces the challenge of designing environments that foster interaction, reflection, and self-construction of meaning, not simply the automation of data. This requires educational systems to use AI not to control the process, but to augment it with immersive and contextualizing experiences, as Jacobs (2025) points out.

On the other hand, cognitivism is close to the way AI approaches information processing. But while AI follows logical and algorithmic structures, human cognitive processes include emotional, social, and intuitive elements, which technology does not yet fully simulate (Vallverdú & Redondo, 2025).

The use of AI often implies access to technological infrastructure and digital competencies – conditions that are not equal at all levels of society. The theoretical debate here focuses on

the risk of a deepening digital divide, and the importance of developing approaches that prioritize social justice in education (Villegas & Rivas, 2025).

Theoretical analyses increasingly suggest the construction of collaborative systems between humans and AI, where technology does not replace human actors but co-creates the educational experience. This requires an interdisciplinary approach, combining pedagogical with technological and philosophical knowledge (Vallverdú & Redondo, 2025).

5. Conclusion

The integration of artificial intelligence in education is not just a technological innovation, but a profound transformation that affects the theoretical, ethical, and structural foundations of the education system. This paper has pointed out that while AI offers tremendous potential for personalization, automation, and efficiency in teaching, it also raises fundamental questions about teacher autonomy, educational equity, algorithmic transparency, and pedagogical ethics.

From a theoretical perspective, AI strongly intersects with constructivist and cognitivist approaches, but these need to be reimagined to address the reality mediated by algorithms. The teacher should not lose his humanizing function, while technology should serve as a partner for the development of critical and inclusive thinking.

In conclusion, this paper emphasizes that the future of education in the era of artificial intelligence does not lie in replacing the role of humans with technology, but in building a balanced partnership between human and artificial intelligence. Only through a reflective theoretical approach, which combines pedagogical principles with digital ethics, can we ensure that AI serves as an empowering and not dominant tool in the learning process. To achieve this, not only technological progress is required, but also humanistic care, where the center of education continues to be the human as teacher, student, and citizen.

5.1. Recommendations

By the theoretical analysis carried out, the following actions are recommended:

- **Developing ethical and inclusive educational policies** for the use of AI that respect privacy, fairness, and transparency in decision-making (Vallverdú & Redondo, 2025).
- Training teachers not only in technical terms, but also in ethical and theoretical terms to understand the long-term impact of AI on their role and on learning (Jiang et al., 2025).
- Using AI to support, not replace, the process of reflection, collaboration, and meaning-making in students while preserving the human character of education (Govender & Ramatea, 2025).
- Creating an AI evaluation system in education that relies on theoretical and not just technical criteria, to ensure compatibility with pedagogical objectives and learning philosophy.
- Encouraging interdisciplinary approaches that involve educators, psychologists, philosophers, developers, and politicians in the design and implementation of AI technologies in education.

References

- Adams, C., Pente , P., & Lemermeyer , G. (2023). Ethical principles for artificial intelligence in K-12 education. *Computers and Education: Artificial Intelligence*, 4(1), 100152. <u>https://doi.org/10.1016/j.caeai.2023.100152</u>
- Apelehin, A. A., Imohiosen, C. E., & Ajuluchukwu, P. (2025). Reviewing the role of artificial intelligence in personalized learning and education. *World Journal of Innovative Management and Technology*, 9(2), 86–94.
 <u>https://iiardjournals.org/get/WJIMT/VOL.%209%20NO.%202%202025/Reviewing</u> %20the%20Role%20of%20Artificial%2086-94.pdf
- Chtouki, Y., & Bekkar, H. A. (2025). Chatbots in education: A systematic literature review. *ResearchGate*. <u>https://www.researchgate.net/publication/384551046</u>
- Chun, J., Kim, J., Kim, H., Lee, G., Cho, S., Kim, C., & Chung, Y. (2025). A comparative analysis of on-device AI-driven, self-regulated learning and traditional pedagogy in university health sciences education. *Applied Sciences*, 15(4), 1815. <u>https://www.mdpi.com/2076-3417/15/4/1815</u>

- Cui, J. (2025). The impact of general artificial intelligence on university students' research and technological innovation: A case study of DeepSeek AI and ChatGPT. ResearchGate. <u>https://www.researchgate.net/publication/389875427</u>
- Ekvitayavetchanukul, P. (2025). Artificial intelligence-driven design thinking: Enhancing learning efficiency in pre-medical education. *Educación XX1*, 28(1), 50–65. <u>https://educacionxx1.net/index.php/edu/article/view/51</u>
- Ekvitayavetchanukul, P. (2025). Artificial intelligence-driven design thinking: Enhancing learning efficiency in pre-medical education. *Educación XX1*, 28(1), 50–65. <u>https://educacionxx1.net/index.php/edu/article/view/51</u>
- Florou, K. (2025). *Optimizing language analysis: A comparative study of advanced digital tools in teacher training contexts* [PDF]. ResearchGate.

https://www.researchgate.net/publication/390208905

- Govender, S., & Ramatea, M. (2025). *Current trends in artificial intelligence application* for pre-service teacher training in Africa. IGI Global. <u>https://www.igi-global.com/chapter/current-trends-in-artificial-intelligence-application-for-pre-service-teacher-training-in-africa/373251</u>
- Hales, P. D., Elfarargy, H., & Durr, T. (2025). Exploring rural school principals' perceptions of artificial intelligence for implementation and challenges in PK–12 schools.
 Journal of Educational Leadership and Administration, 9(3), Article 3.
 https://digitalcommons.lindenwood.edu/ela/vol9/iss3/3/
- Jacobs, C. (2025). Examining multimodal AI resources in medical education: The role of immersion, motivation, and fidelity in AI narrative learning. JMIR Medical Education, 11(1), e72190. <u>https://mededu.jmir.org/2025/1/e72190/</u>
- Jaiswal, A. D. (2025). Leveraging knowledge and data-driven approaches in case-based reasoning to aid physiotherapists in addressing non-specific musculoskeletal disorders. Norwegian University of Science and Technology (NTNU). <u>https://ntnuopen.ntnu.no/ntnu-xmlui/handle/11250/3185556</u>
- Jiang, L., Wei, B., Qiu, N., & Huang, L. (2025). What influences ChatGPT's adoption and diffusion in Chinese higher education? A study based on the TOE framework.
 Interactive Learning Environments.
 https://www.tandfonline.com/doi/abs/10.1080/10494820.2025.2479166

- Kamak, R. (2024). Exploring ethical considerations of artificial intelligence in educational settings: An examination of bias, privacy, and accountability. *ResearchGate*. <u>https://www.researchgate.net/publication/388890763</u>
- Kerr, R. C., & Kim, H. (2025). From prompts to plans: A case study of pre-service EFL teachers' use of generative AI for lesson planning. ResearchGate. <u>https://www.researchgate.net/publication/390184505</u>
- Khalaf, B. K., Mahmood, I. M., & Al-Abbas, L. S. (2025). Necessity for artificial intelligence in higher education: Learners' motivation for continuous use of AI-powered tools. *International Journal of Innovation and Research in Social Sciences*, 8(2), 1123– 1137.
 <u>https://econpapers.repec.org/article/aacijirss/v 3a8 3ay 3a2025 3ai 3a2 3ap</u> <u>3a1123-1137 3aid 3a5413.htm</u>
- Khreisat, M. N., Khilani, D., & Rusho, M. A. (2024). Ethical implications of AI integration in educational decision making: Systematic review. *Educational Futures Journal*, 8(2), 105–124. <u>https://www.researchgate.net/publication/380855490</u>
- Kocak, N., & Genc, H. N. (2025). Bibliometric analysis of studies on artificial intelligence in environmental and health education. *Journal of Education in Science, Environment, and Health*, 11(1), 35–48.
 <u>https://jeseh.net/index.php/jeseh/article/view/806</u>
- Kumar, R. R., Raj, K. K., & Kumar, S. (2025). A comparative machine learning approach. In J. Roider, W. Wang, D. Zanca, & M. Matzner (Eds.), *Process Mining Workshops* 2025 (pp. 227–238). Springer.
 https://books.google.com/books?id=CRdSEQAAQBAJ
- Lee, C. Y., Lee, C. H., Lai, H. Y., Chen, P. J., & Lee, H. J. (2025). Emerging trends in gamification for clinical reasoning education: A scoping review. *Journal of Medical Education*, 29(1), 112–128. <u>https://pmc.ncbi.nlm.nih.gov/articles/PMC11938692/</u>
- Malice, A. (2025). *The future of AI-human brain integration: A path to balanced intelligence*. PhilArchive. <u>https://philarchive.org/rec/MALTFO-30</u>
- Melnychenko, O. (2025). Development of artificial intelligence in education: An ecological aspect. Continuing Professional Education: Theory and Practice, (2), 83–92. http://npo.kubg.edu.ua/article/view/325555
- Mohamad, S. A., Zaharudin, R., Ariffin, H. F., & Deli, M. M. (2025). Gagne's instructional design in vocational training: Insights from a bibliometric analysis [PDF].
 ResearchGate. <u>https://www.researchgate.net/publication/390224518</u>

- Mustafa, F., & Ali, K. (2025). Blended learning in the post-pandemic world: AI, ICT and design-based research for STEAM education. *ResearchGate*. <u>https://www.researchgate.net/publication/389676935</u>
- Mustafa, F., & Ali, K. (2025). Blended learning in the post-pandemic world: AI, ICT and design-based research for STEAM education. *ResearchGate*. <u>https://www.researchgate.net/publication/389676935</u>
- Nguyen, A., Ngo, H. N., Hong, Y., & Dang, B. (2023). Ethical principles for artificial intelligence in education. *Education and Information Technologies*, 28(6), 7401–7420. <u>https://link.springer.com/article/10.1007/s10639-022-11316-w</u>
- Odilova, R., & Iskandarova, D. (2025). The role of etymology in understanding modern vocabulary and its educational implications. *International Journal of Artificial Intelligence*, 3(1), 29–41. <u>https://inlibrary.uz/index.php/ijai/article/view/74148</u>
- Orhani, S. (2024). Personalization of Math Tasks for each Student through AI, *Research Inventory: International Journal of Engineering and Science*, 14(3). 18-28. <u>https://www.researchinventy.com/papers/v14i3/E14031828.pdf</u>
- Pachava, V., & Lasekan, O. A. (2025). Advancing SDG 4: Harnessing generative AI to transform learning, teaching, and educational equity in higher education. *Journal* of Lifestyle Education and Innovation, 12(2), 45–61. https://sdgsreview.org/LifestyleJournal/article/view/3774
- Petergova, A. V., Sokolova, N. E., & Agopyan, N. E. (2025). A study of the application practices of Artificial Narrow Intelligence (ANI). In *AI and Artificial Intelligence for Education* (pp. 397–410). Springer.
 https://books.google.com/books?id=BRdSEQAAQBAJ
- Raza, A., Shahroz, M., & Iram, A. (2024). Argumentation and AI: Bridging linguistic and technological perspectives in education. *Contemporary Journal of Social Sciences*, 5(2), 134–149. <u>https://contemporaryjournal.com/index.php/14/article/view/245</u>
- Roider, J., Wang, W., Zanca, D., & Matzner, M. (2025). Monitoring with previously unseen categorical values. In J. Roider, W. Wang, D. Zanca, & M. Matzner (Eds.), *Process Mining Workshops 2025* (pp. 227–238). Springer.
 https://books.google.com/books?id=CRdSEQAAQBAJ
- Samuels, A. B., & Singh, U. (2025). Education reimagined: South Africa's journey through the 4IR and beyond. *Transformation in Higher Education*, 10(2), 145–162. <u>https://thejournal.org.za/index.php/thejournal/article/view/482</u>

- Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, 104, 333–339. https://doi.org/10.1016/j.jbusres.2019.07.039
- Sposato, M. (2025). A call for caution and evidence-based research on the impact of artificial intelligence in education. *Quality Education for All*, 11(1), 92–107. <u>https://www.emerald.com/insight/content/doi/10.1108/QEA-09-2024-</u> <u>0087/full/html</u>
- Testov, V., Perminov, E., & Golubev, O. (2025). Transdisciplinary trend in education in the post-pandemic era. In *The Future of Education in the Post-Pandemic Era* (pp. 152–168). Springer. <u>https://books.google.com/books?id=7xZSEQAAQBAJ</u>
- Umar, R., & Javaid, T. (2025). The role of AI in redesigning pandemic-affected STEAM education: Insights from ICT and blended learning research. *ResearchGate*. <u>https://www.researchgate.net/publication/389676668</u>
- Vallverdú, J., & Redondo, I. (2025). *Disembodied meaning? Generative AI and understanding*. ResearchGate. https://www.researchgate.net/publication/390023062
- Vallverdú, J., & Redondo, I. (2025). *Disembodied meaning? Generative AI and understanding*. ResearchGate. https://www.researchgate.net/publication/390023062
- Villegas, M. A. Q., & Rivas, E. E. P. (2025). Evidence from the literature on the motivations, consequences, and concerns regarding the use of artificial intelligence in higher education. *ResearchGate*. <u>https://www.researchgate.net/publication/390096930</u>
- Whitmore, J. (2025). *Teacher professional development for delivering AI-enhanced adult learning*. ResearchGate. <u>https://www.researchgate.net/publication/390175314</u>
- Yamin, S., Natividad, L. R., & Rafique, T. (2024). Navigating the ethical landscape: Al integration in education. *Educational Ethics Quarterly*, 6(1), 58–77. <u>https://www.researchgate.net/publication/381195074</u>
- Zhu, G., Song, Y., Lu, Z., Yi, Q., & Xu, R. (2025). Machine learning models for predicting metabolic dysfunction-associated conditions in educational settings. *Journal of Translational Medicine*, 23(1), 63–72. <u>https://translational-</u> <u>medicine.biomedcentral.com/articles/10.1186/s12967-025-06387-5</u>