References:

HUANG, W., HEW, K. F., & FRYER, L. K. (2022). Chatbots for language learning – Are they really useful? A systematic review of chatbot-supported language learning. *Journal of Computer Assisted Learning, 38* (1), 237-257. https://doi.org/10.1111/jcal.12610.

JOHN, M. (Ed.). (2025). *The Routledge handbook of global sustainability education and thinking for the 21st century*. Routledge.

SETTLES, B., & MEEDER, B. (2016). A trainable spaced repetition model for language learning. *Proceedings of the 54th Annual Meeting of the Association for Computational Linguistics*, 1848-1858. https://doi.org/10.18653/v1/P16-1174.

UNESCO (2017). Education for Sustainable Development Goals: Learning Objectives. Paris: UNESCO. https://doi.org/10.54675/CGBA9153.

UNESCO (2020). Education for sustainable development: a roadmap. https://doi.org/10.54675/YFRE1448.

ZDRAVKOVA, K. (2023). Personalized education for sustainable development. *Sustainability*, *15* (8), 6901. https://doi.org/10.3390/su15086901.

ДАЦКІВ, О. П., & ЗАДОРОЖНА, І. П. (2025). Впровадження освіти для сталого розвитку у підготовку майбутніх учителів іноземних мов. *Педагогічна Академія: наукові записки*. https://doi.org/10.5281/zenodo.16809755.

THE STATE AND CHALLENGES OF USING ARTIFICIAL INTELLIGENCE IN VOCATIONAL EDUCATION INSTITUTIONS OF UKRAINE

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Artificial intelligence (AI) is becoming an integral part of modern education, including vocational education (Uhlova, 2025; Kniazieva, 2024). Its implementation has the potential to transform learning processes, promote personalized learning, strengthen digital

competence, and improve the quality of training for future specialists in response to labor market demands (Androshchuk, & Maluga, 2024). At the same time, the rapid development of these technologies gives rise to significant challenges that require attention both at the level of individual institutions and at the level of state educational policy and regulatory frameworks (Sadovyi, & Tryfonova, 2025).

In the vocational education sector of Ukraine, interest in the use of AI tools in the educational process is gradually increasing. Research shows that artificial intelligence is applied for:

- supporting pedagogical activities, automating routine tasks, and analyzing learning outcomes;
- personalizing educational trajectories of learners;
- creating adaptive learning environments (Uhlova, 2025; Kniazieva, 2024).

This opens up opportunities for transforming approaches to the training of skilled workers, especially in the context of the digital economy (Kryshtanovych et al., 2024).

At the same time, the main advantages of integrating artificial intelligence into education include:

- Improved learning efficiency: AI can support individual learning needs, adapt educational materials, and accelerate feedback (Androshchuk, & Maluga, 2024);
- Automation of administrative and diagnostic tasks: automated assessment, progress analysis, and test generation (Uhlova, 2025);
- Support for teachers: AI tools assist in analyzing large volumes of data and selecting optimal teaching methods (Kniazieva, 2024).

In our view, these practices are important for improving the quality of vocational training.

Among the most serious barriers to the use of AI in the educational process is the insufficient level of digital preparedness of teaching staff, which complicates the integration of relevant technologies into instruction and the development of effective methodological models (Kniazieva, 2024; Kovtunets, 2025).

In addition, the lack of generalized methodological guidelines, tested models for AI application, and adapted educational programs for vocational education slows down the implementation process. This creates a need to develop standardized approaches, training sessions, and professional development courses for teachers (Uhlova, 2025).

Significant challenges remain related to the ethics of AI use, particularly ensuring academic integrity, protecting learners' personal data, and mitigating the risks of incorrect

or biased information generated by algorithms (Sadovyi, & Tryfonova, 2025). The absence of clear institutional policies and regulations creates legal gaps.

Not all vocational education institutions have equal access to modern equipment, high-speed internet, and commercial AI services. This leads to digital inequality among educational institutions, especially in rural areas (Kovtunets, 2025).

Scientific studies emphasize the importance of practical examples of AI use in the educational process, including:

- automated tutoring systems;
- adaptive support systems for studying complex disciplines;
- models for supporting group projects and collaboration (Uhlova, 2025).

At the same time, the results of such applications demonstrate the need to maintain a balance between the automation of educational processes and active pedagogical involvement, as well as the key role of the teacher as a learning facilitator (Karpova, & Bublik, 2025).

Another important aspect is the transition to the concept of Education 5.0, which involves the comprehensive implementation of innovative technologies, including artificial intelligence, in educational processes. This opens new opportunities for automated analysis of academic performance, integration of education with labor market requirements, and the development of future-oriented competencies (Kryshtanovych et al., 2024).

There is also an urgent need to develop educational programs aimed at training specialists to work with artificial intelligence technologies, encompassing both pedagogical and technical competencies. This will enable vocational education institutions not only to use AI in the educational process but also to prepare professionals capable of developing, implementing, and maintaining such technologies (Kovtunets, 2025).

In addition, state educational policy and the education governance system play an important role in the development and effective use of artificial intelligence in vocational education institutions of Ukraine (Uhlova, 2025; Kniazieva, 2024). At the current stage of digital transformation, strategic directions, regulatory frameworks, and financial mechanisms that determine the possibilities for implementing innovative technologies, including AI, are formed at the state level (Kryshtanovych et al., 2024).

One of the key problems is the fragmented nature of regulatory oversight regarding the use of artificial intelligence in education. Although Ukraine has adopted a number of documents related to the digitalization of education and the development of digital competencies, specialized provisions on the application of AI in vocational education institutions remain insufficiently developed (Sadovyi, & Tryfonova, 2025). This creates

uncertainty for administrators and teaching staff, who are forced to independently determine acceptable forms and limits of using such technologies (Pryhodii, 2024).

Particular attention should be paid to issues of financial and material-technical support. The implementation of AI tools requires modern computer equipment, licensed software, stable internet access, and technical support (Uhlova, 2025). For many vocational education institutions, especially those located in regions or affected by military actions, these conditions are difficult to achieve without targeted state programs and support from international partners (Kovtunets, 2025).

An important area is change management at the institutional level. Effective implementation of artificial intelligence requires not only technical solutions but also the formation of an appropriate organizational culture in vocational education institutions (Kniazieva, 2024). Administrations should provide support for teachers, encourage innovative activities, create conditions for experimental implementation of new technologies, and prevent formal or uncritical use of AI (Sadovyi, & Tryfonova, 2025).

Equally significant is the issue of partnership with employers and the IT sector. Vocational education institutions can leverage cooperation with businesses to implement practice-oriented AI-based solutions, update the content of educational programs, and ensure alignment between graduate training and real labor market requirements (Kryshtanovych et al., 2024). Such partnerships contribute to the development of learners' skills in working with modern digital tools and enhance their competitiveness (Kovtunets, 2025).

Thus, the role of state policy and managerial decisions in the process of implementing artificial intelligence in vocational education is decisive. A systemic approach that combines regulatory frameworks, financial support, workforce training, and cross-sectoral interaction creates the prerequisites for sustainable and responsible use of AI in vocational education institutions of Ukraine (Uhlova, 2025; Kryshtanovych et al., 2024).

The use of artificial intelligence in vocational education in Ukraine has significant potential for modernizing educational processes and improving the quality of specialist training. At the same time, there are a number of challenges related to insufficient digital competence of teachers, ethical and regulatory constraints, unequal access to technologies, and a lack of systematic methodological support (Uhlova, 2025; Sadovyi, & Tryfonova, 2025).

Effective integration of AI requires training and professional development of teaching staff, the development of appropriate educational policies and standards, and

the implementation of comprehensive measures at both the level of vocational education institutions and the education system as a whole (Kryshtanovych et al., 2024).

References:

ANDROSHCHUK, A., & MALUGA, O. (2024). Use of artificial intelligence in higher education: state and trends. *International Science Journal of Education & Linguistics*, *3* (2), 27-35.

KARPOVA, O., & BUBLIK, V. (2025). Стан проблеми використання штучного інтелекту в закладах вищої освіти на практиці та його вплив на якість навчання. *Вища освіта України.*

KNIAZIEVA, M. O. (2024). *The use of artificial intelligence in the activities of a teacher of vocational education and training*. Digital Library NAES of Ukraine.

KOVTUNETS, V. V. (2025). *Challenges in educational and professional training of specialists in the field of artificial intelligence.* Digital Library of the NAES of Ukraine.

KRYSHTANOVYCH, S., BEKH, Y., STADNICHENKO, O., SHEVCHENKO, Z., & MAIKHER, V. (2024). Education 5.0: The development of the Ukrainian educational system in the conditions of artificial intelligence. *Edelweiss Applied Science and Technology, 8* (6), 549-558.

PRYHODII, M. A. (2024). *Scientific and methodological support for the digital transformation of vocational education.* Digital Library of the NAES of Ukraine.

SADOVYI, M. I., & TRYFONOVA, O. M. (2025). Методика відповідального використання штучного інтелекту в закладах освіти. *Наукові записки. Серія: Проблеми природничо-математичної, технологічної та професійної освіти.*

UHLOVA, O. V. (2025). *Use of artificial intelligence in vocational education: Informational and analytical support* [Unpublished manuscript]. Digital Library of the NAES of Ukraine.