IMPROVING THE METHODOLOGY OF DEVELOPING STUDENTS' PROFESSIONAL COMPETENCE THROUGH ARTIFICIAL INTELLIGENCE-BASED EDUCATIONAL TECHNOLOGIES

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Abstract: This thesis examines the potential of artificial intelligence (AI) based educational technologies for developing the professional competence of university students. The main groups of AI tools used in higher education are classified, their contribution to individual components of professional competence is analysed, and a four-stage methodological model for integrating AI tools into the learning process is proposed, together with conditions for their responsible and ethical use.

Keywords: *professional competence, artificial intelligence, generative AI, adaptive learning, intelligent tutoring systems, learning analytics, digital competence, higher education.*

INTRODUCTION

Artificial intelligence is rapidly changing the nature of professional work in almost every field, and therefore it is changing the requirements placed on university graduates. Employers increasingly expect young specialists not only to possess subject knowledge, but also to analyse data, solve non-standard problems, work with intelligent digital tools and evaluate their outputs critically. Consequently, the methodology of

developing students' professional competence must take AI into account both as a learning tool and as part of future professional activity.

In the Republic of Uzbekistan, Presidential Resolution No. PQ-4996 of 17 February 2021 "On measures to create conditions for the accelerated introduction of artificial intelligence technologies" and the "Digital Uzbekistan – 2030" strategy (Decree No. PF-6079 of 5 October 2020) set the task of applying AI in key sectors, including education. Internationally, UNESCO has published guidance for policy-makers on AI in education (2021) and guidance for generative AI in education and research (2023), emphasising a human-centred approach. These documents create a strong basis for research on AI-supported methods of professional training.

MAIN PART

Following the competency-based approach, professional competence is understood as an integrated quality of a specialist that combines knowledge, skills, values, motivation and experience and is manifested in effective professional activity. The systematic review by O.Zawacki-Richter and colleagues identified four main areas of AI application in higher education: profiling and prediction; assessment and evaluation; adaptive systems and personalisation; and intelligent tutoring systems. Taking into account the emergence of generative AI, we group the relevant tools and their pedagogical functions as shown in Table 1.

Table 1. AI-based educational technologies and their role in developing professional competence

Group of AI tools	Pedagogical function	Competence component developed
Adaptive learning platforms	Adjust content and pace to the individual learner	Cognitive (subject knowledge)

Group of AI tools	Pedagogical function	Competence component developed
Intelligent tutoring systems	Step-by-step guidance and instant feedback on problem solving	Operational (practical skills)
Generative AI assistants	Generating examples, explanations, professional cases and drafts	Creative and analytical thinking, critical evaluation of information
Learning analytics	Monitoring progress and predicting learning difficulties	Reflective (self-assessment, self-regulation)
AI-based simulators and virtual labs	Modelling realistic professional situations	Operational and communicative

However, the mere availability of these tools does not guarantee the development of competence. Uncontrolled use of generative AI may lead to superficial learning and academic dishonesty. Therefore, we propose a four-stage methodological model for integrating AI into the educational process.

Stage 1 – Diagnostic. Students' initial level of professional knowledge and digital competence is identified with the help of adaptive tests; the results are used to build individual learning paths.

Stage 2 – Familiarisation. Students learn the capabilities and limitations of AI tools, principles of prompt formulation, verification of AI-generated information and rules of academic integrity.

Stage 3 – Practice-oriented application. AI tools are used to solve professionally oriented tasks: analysing cases generated or enriched by AI, working with intelligent simulators, comparing AI-produced solutions with expert solutions and improving them. The key principle is that AI supports, but does not replace, the student's own thinking.

Stage 4 – Reflection and evaluation. Learning analytics data, e-portfolios and peer assessment are used to analyse each student's progress. Students reflect on how AI was used and what they themselves contributed to the result.

The effectiveness of the model depends on several pedagogical conditions: teachers' own digital and AI competence, in line with frameworks such as DigCompEdu and TPACK; alignment of AI-supported tasks with professional standards and learning outcomes; transparent assessment criteria that distinguish the student's contribution from that of the AI; and adherence to ethical principles, including data privacy, fairness and human oversight, as recommended by UNESCO.

CONCLUSION

AI-based educational technologies open new opportunities for personalising learning, providing immediate feedback and modelling real professional situations, which makes them an effective means of developing students' professional competence. At the same time, their pedagogical value is realised only within a clear methodological framework. The proposed four-stage model (diagnostic, familiarisation, practice-oriented application, reflection and evaluation) helps to integrate AI into the learning process purposefully and responsibly. Further research should focus on experimental verification of the model and on its adaptation to specific fields of professional training.

REFERENCES

1. Resolution of the President of the Republic of Uzbekistan No. PQ-4996 of 17 February 2021 "On measures to create conditions for the accelerated introduction of artificial intelligence technologies".

2. Decree of the President of the Republic of Uzbekistan No. PF-6079 of 5 October 2020 “On approval of the Digital Uzbekistan – 2030 strategy and measures for its effective implementation”.
3. Miao F., Holmes W., Huang R., Zhang H. AI and Education: Guidance for Policy-makers. – Paris: UNESCO, 2021.
4. UNESCO. Guidance for Generative AI in Education and Research. – Paris: UNESCO, 2023.
5. Zawacki-Richter O., Marín V.I., Bond M., Gouverneur F. Systematic review of research on artificial intelligence applications in higher education – where are the educators? // International Journal of Educational Technology in Higher Education. – 2019. – Vol. 16, No. 39.
6. Holmes W., Bialik M., Fadel C. Artificial Intelligence in Education: Promises and Implications for Teaching and Learning. – Boston: Center for Curriculum Redesign, 2019.
7. Mishra P., Koehler M.J. Technological pedagogical content knowledge: A framework for teacher knowledge // Teachers College Record. – 2006. – Vol. 108, No. 6. – P. 1017–1054.