Mirzarakhimov M.A
Fergana State University

PEDAGOGICAL OPPORTUNITIES FOR USING ARTIFICIAL INTELLIGENCE TECHNOLOGIES IN TEACHING THE SUBJECT OF ELECTRONIC PEDAGOGY

Abstract. *This thesis scientifically examines the pedagogical opportunities, didactic functions, and methodological significance of using artificial intelligence technologies in teaching the subject of “Electronic Pedagogy.” Artificial intelligence technologies are analyzed as a means of personalizing the electronic learning environment, forming individual learning trajectories, monitoring students’ learning activities, providing automated assessment, giving rapid feedback, creating an interactive learning environment, and developing future teachers’ digital competence. The thesis also substantiates the need to follow the principles of academic integrity, ethical responsibility, confidentiality, transparency, and a human-centered approach when using artificial intelligence.*

Keywords: *electronic pedagogy, artificial intelligence, digital education, adaptive learning, individual learning trajectory, digital competence, pedagogical technology, academic integrity, interactive learning.*

Today, digital transformation processes are accelerating in the global education system, and artificial intelligence technologies are becoming an important tool for improving the quality of education, individualizing the learning process, increasing student engagement, and making pedagogical decisions on a scientific basis. Electronic pedagogy, in turn, serves to organize the educational process on a modern basis through the use of information and communication technologies, distance learning, digital resources, mobile applications, electronic assessment, and interactive learning environments. In the dissertation abstract, electronic pedagogy is described as a new branch of pedagogy that covers the organization, management, and improvement of the effectiveness of the educational process through the use of information and communication technologies. From this perspective, integrating the subject of electronic pedagogy with artificial intelligence technologies is an important condition for preparing future teachers for the modern digital educational environment.

In Uzbekistan, the “Digital Uzbekistan – 2030” Strategy, the Concept for the Development of Higher Education, decisions on the accelerated implementation of artificial intelligence technologies, and reforms aimed at creating digital educational resources require enriching the subject of electronic pedagogy with new content. The dissertation abstract also identifies the improvement of the methodology for using artificial intelligence in preparing future teachers for electronic pedagogy as an urgent scientific and practical issue.

The purpose of this thesis is to identify the pedagogical opportunities of using artificial intelligence technologies in teaching electronic pedagogy and to scientifically substantiate their significance in personalizing the educational process, ensuring adaptive management,

monitoring learning activities, and developing future teachers’ digital competence.

The use of artificial intelligence technologies in teaching electronic pedagogy primarily contributes to renewing the content, methodology, and didactic support of the educational process. In traditional teaching, the student often appears as a subject who receives ready-made knowledge. However, in an electronic pedagogical environment enriched with artificial intelligence, the student actively searches for information, analyzes data, evaluates their own level of knowledge, completes individual assignments, and makes independent decisions. As a result, the educational process changes from a simple form of knowledge transmission into a creative, reflective, and learner-centered activity. One of the most important pedagogical opportunities of artificial intelligence technologies in electronic pedagogy is the formation of an individual learning trajectory. In this process, the student’s level of knowledge, interests, learning pace, mistakes in completing assignments, and learning outcomes are analyzed. Based on this analysis, appropriate learning materials, tests, recommendations, and additional resources are provided to the student. The dissertation abstract also emphasizes that the possibilities of modeling individual learning trajectories, monitoring learning activities, and ensuring adaptive learning effects through artificial intelligence technologies have been clarified.

In AI-based adaptive learning, the educational process is not organized in the same way for all students; rather, it is adjusted according to each student’s level of preparation, needs, and learning dynamics. A student who has mastered a topic well can complete more complex assignments, while a student who faces difficulties can strengthen their knowledge through additional explanations, videos or audio materials, tests, and individual recommendations. This approach practically ensures the principles of learner-centeredness and flexibility in electronic pedagogy. Monitoring learning activities is another important opportunity provided by artificial intelligence technologies. AI tools analyze students’ test results, independent work activity, time spent on assignments, types of mistakes, and frequency of repeated errors, providing the teacher with accurate information. This enables the teacher to make pedagogical decisions not on the basis of subjective assumptions, but on real evidence. Such an approach strengthens evidence-based methodology in educational quality management. The use of artificial intelligence in electronic pedagogy also expands the possibilities of automated assessment and rapid feedback. Tests, interactive tasks, case studies, practical exercises, and reflective questions can be analyzed with the help of artificial intelligence. As a result, the student quickly sees their mistakes, receives recommendations for correcting them, and learns to manage the learning process independently. This process not only saves the teacher’s time, but also develops students’ self-control, self-assessment, and reflection skills.

Artificial intelligence technologies are also important in creating an interactive and communicative learning environment. Chatbots, virtual assistants, intelligent advisory systems, voice assistants, and automated question-answer platforms allow students to understand learning materials, receive guidance on assignments, and work independently at any time. The dissertation abstract states that the “E-Pedagogy” mobile learning application was developed,

and that the possibility of converting lecture texts into speech using artificial intelligence was introduced. This, in particular, creates additional convenience for blind students in inclusive education. Developing the digital competence of future teachers is one of the central tasks of using artificial intelligence in electronic pedagogy. In this process, students learn not only to use AI tools technically, but also to select them in accordance with pedagogical goals, integrate them into lesson scenarios, adapt learning tasks, critically evaluate information, and follow ethical norms. Such preparation forms the basis for future teachers to use digital technologies consciously, responsibly, and effectively in their professional activities.

Table 1

Pedagogical Opportunities for Using Artificial Intelligence Technologies in Teaching Electronic Pedagogy

Pedagogical opportunity	Content	Expected result
Formation of an individual learning trajectory	Selection of learning materials according to the student’s level of knowledge, interests, and learning pace	Students’ independent learning activity and personal growth dynamics increase
Organization of adaptive learning	Adapting learning tasks and resources to the needs of the student	Differences in learning achievement decrease, and the quality of education improves
Monitoring of learning activities	Real-time analysis of test results, assignments, mistakes, and activity	The teacher makes evidence-based pedagogical decisions
Automated assessment and feedback	Analysis of student responses, identification of mistakes, and provision of recommendations	Students develop self-assessment and reflection skills
Interactive communication environment	Use of chatbots, virtual assistants, and intelligent advisory systems	Students’ engagement, communication, and motivation in the learning process increase
Expansion of inclusive opportunities	Use of text-to-speech, audio materials, and adapted electronic resources	A convenient learning environment is created for students with disabilities
Development of digital and ethical competence	Teaching safe, responsible, fair, and academically honest use of artificial intelligence	Digital culture and professional responsibility are formed in future teachers

The methodology of teaching electronic pedagogy on the basis of artificial intelligence should not be limited only to the use of technical tools. On the contrary, it should be based on the

integration of content, methods, tools, assessment, and pedagogical communication. In this process, students’ theoretical and conceptual preparation serves as the initial methodological foundation. At this stage, they become familiar with the essence, types, operating principles, educational opportunities, and limitations of artificial intelligence. In particular, it is explained that artificial intelligence does not replace the teacher, but supports the teacher’s pedagogical activity. At the same time, ethical norms, confidentiality, academic integrity, copyright, and the human-centered approach are also studied.

At the next stage, students transfer theoretical knowledge into the process of practical methodological design. Developing an AI-integrated lesson model, an electronic learning environment, interactive assignments, and individual learning scenarios develops their methodological thinking. Activities such as analyzing pedagogical situations using artificial intelligence tools, creating adaptive assignments, and designing a consultation system through a chatbot strengthen future teachers’ technological and didactic decision-making competence. In project-based practical activity, students are directed toward creating an independent pedagogical product based on artificial intelligence. This may include an interactive lesson plan for electronic pedagogy, a section of a mobile application, a system of electronic tests, an automated assessment tool, a consultation module using a chatbot, or adaptive learning assignments. The dissertation abstract also presents the technology for developing competencies in the use of artificial intelligence through theoretical-conceptual, modeling, and project-practical stages. At the end of this process, analysis, assessment, and reflection become especially important. Students evaluate the AI-based educational products they have created, analyze their advantages and shortcomings, and reflect on their own activity. This process deepens communication between teacher and student, helps identify methodological errors, and supports the improvement of pedagogical solutions.

The use of artificial intelligence technologies also optimizes the teacher’s activity. The teacher can use AI capabilities to automatically check tests, analyze students’ learning indicators, provide individual recommendations, adapt lesson materials, and create electronic resources. However, in this process, the teacher’s leading, guiding, and educational role must be preserved. Artificial intelligence does not replace the teacher; rather, it serves as a tool that strengthens the teacher’s methodological activity and helps manage the educational process effectively. Ethical issues occupy a special place in the use of artificial intelligence in electronic pedagogy. Students must understand the risks of copying ready-made answers from AI, violating academic integrity, generating unsourced texts, and neglecting the security of personal data. Therefore, ethical culture, copyright, anti-plagiarism awareness, transparency, and responsibility should be included as mandatory components in the methodology of using artificial intelligence.

Research results also show that the use of artificial intelligence technologies in electronic pedagogy improves educational effectiveness. The dissertation abstract states that 452 respondent-students from Fergana State University, the Uzbek-Finnish Pedagogical Institute, and the International School of Finance Technology and Science participated in the experimental

work. According to the experimental results, the methodology used in the experimental groups was 14.25 percent more effective. This confirms that an AI-integrated electronic pedagogical methodology has a positive effect on developing future teachers’ digital competence, independent learning skills, and methodological preparedness.

In conclusion, the use of artificial intelligence technologies in teaching electronic pedagogy makes it possible to organize the educational process on a learner-centered, adaptive, interactive, and analytical basis. With the help of artificial intelligence, students’ knowledge levels are identified, individual learning trajectories are determined, learning activities are monitored, and automated assessment with rapid feedback is implemented. These technologies develop important professional qualities in future teachers, such as digital competence, methodological thinking, independent learning, information analysis, modeling of pedagogical situations, and ethical responsibility. At the same time, when using artificial intelligence, the leading role of the teacher, the human-centered approach, academic integrity, and ethical norms must remain priorities. Thus, the systematic integration of artificial intelligence technologies into the subject of electronic pedagogy prepares future teachers to work effectively in the modern digital educational environment, improves the quality of education, and contributes to the innovative improvement of the pedagogical process.

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