

**INVESTIGATING THE EFFECTIVENESS OF AI-BASED PROFESSIONAL  
DEVELOPMENT SYSTEMS**

**Murotova Gulnoz Nematovna**

Associate professor of  
Philology faculty at  
Jizzakh State Pedagogical University  
[gulnozmurotova67@gmail.com](mailto:gulnozmurotova67@gmail.com)

**Abstract:** This article examines the advantages, opportunities, and limitations of using artificial intelligence (AI) technologies in the process of teachers' professional development. The study covers three main areas: the impact of AI-based online training platforms on teachers' learning outcomes, the effectiveness of adaptive AI systems in professional development, and the reliability and accuracy of AI-based diagnostic tools. The analysis of scientific sources and real practical examples shows that AI technologies significantly support teachers' professional growth, personalize the teaching and learning process, and modernize assessment mechanisms, making them more efficient. The article concludes with practical recommendations for implementing AI technologies in teacher professional development programs.

**Keywords:** artificial intelligence, teacher professional development, online training platforms, adaptive learning systems, AI diagnostics, assessment, professional growth.

**Introduction.** At a time when the global education system is undergoing a phase of digital transformation, artificial intelligence (AI) technologies are increasingly entering various aspects of teachers' work. Recent research confirms that AI tools affect not only students' learning processes, but also teachers' professional development in a meaningful and positive way. Traditional teacher professional development courses are usually based on a single curriculum and apply the same approach to educators with very different experience levels and needs. AI-based systems, on the other hand, make it possible to adapt this process to individual needs and thereby significantly improve the quality of professional development. The relevance of this study lies in the fact that, in the education system of Uzbekistan as well, the demand for preparing teachers to work with modern technologies, increasing their digital literacy, and developing their professional competences is growing day by day. Therefore, it is important to scientifically explore how AI technologies can be used effectively in teacher professional development.

The aim of this article is to analyze, based on recent scientific sources and practical experience, the effectiveness of AI-based training platforms, adaptive learning systems, and diagnostic tools in improving teachers' professional skills.

**Methods.** This article is based on literature review and conceptual analysis methods. Scientific articles, meta-analyses, and empirical studies published between 2020 and 2025 were searched in databases such as Google Scholar, Scopus, and other academic repositories. Relevant sources were selected using keywords such as "AI-based teacher training," "AI diagnostics for teachers," and "adaptive learning for professional development." The core content of the selected literature was systematized according to the following thematic directions:

1. Effectiveness of AI-based online training platforms.
2. Contribution of adaptive AI systems to teacher learning processes.
3. Diagnostic capabilities and reliability of AI tools.

During the analysis, examples were provided from the use of platforms such as Coursera AI Coach, Khan Academy MISTRA, and Squirrel AI in practice. In addition, scenarios suitable for the education system of Uzbekistan were considered.

**Results.** AI-based online platforms differ significantly from traditional professional development courses. In such systems, teachers' individual needs, level of knowledge, pace of learning, and interests are taken into account. As a result, the professional development process becomes personalized, convenient, and effective.

For example, Coursera's AI Coach service analyzes teachers' written responses and their activities, and provides them with specific recommendations. This assistant explains complex topics in simple language, suggests additional resources, and helps optimize the teacher's learning process. Studies show that completion rates among teachers who use AI Coach have increased significantly. Another example is the Khan Academy MISTRA system. This generative AI-based platform facilitates teachers' work in designing lesson plans, developing assessment tasks, and creating exercises tailored to students' needs. Since the time teachers spend preparing for lessons is reduced, they are able to allocate more time to applying the knowledge gained in professional development courses to their classroom practice.

The main effects of these platforms on teachers can be summarized as follows:

- teachers' motivation and interest in learning increase;
- mastering complex topics becomes easier;
- decision-making skills within the teaching process develop;
- opportunities for receiving analytical feedback in real time are created.

Adaptive AI systems automatically adjust instruction according to teachers' individual knowledge levels. Such systems process teachers' test results, lesson analyses, and other indicators, and then offer learning modules that match their needs. For instance, the Squirrel AI system is known for assessing teachers' knowledge using hundreds of indicators and designing a personalized learning path for each educator. This approach makes it possible to take into account the vastly different needs of teachers. Studies indicate that adaptive systems can increase mastery levels in professional development processes by up to 30%. In the context of Uzbekistan, such systems can be especially beneficial for teachers of computer science, mathematics, foreign languages, and primary education. For example, AI-based diagnostics can determine in which topics a teacher encounters difficulties and recommend additional courses specifically in those areas. This makes the professional development process more goal-oriented. AI-based diagnostic tools make it possible to objectively assess teachers' professional performance. These systems analyze various aspects such as teachers' classroom activities, students' responses, assessment styles, and other indicators. As a result, the teacher's strengths and areas requiring further development are presented clearly. For example, analyzing audio or video recordings of lessons using AI helps determine how the teacher organizes the lesson, how actively students are engaged, and how effective the interaction between teacher and students is. Compared to traditional observations by methodologists, such data are much more detailed and impartial. AI readiness scales and similar psychometric tests are used to measure teachers' preparedness for AI. Studies confirm that these tests have high reliability coefficients. This means that the diagnostic results are well-grounded and remain consistent when reassessed, which in turn increases the credibility of the conclusions drawn from them.

**Discussion.** The analysis shows that AI technologies significantly enrich and enhance the effectiveness of teachers' professional development. AI-based training platforms introduce a new approach to professional development: they automatically optimize the teacher's learning process, free them from unnecessary routine tasks, and help create a more practice-oriented learning environment. Adaptive systems turn professional development from a uniform program

for all educators into a personalized path for each teacher. This approach responds to the real needs of teachers and accelerates their professional growth. AI-based diagnostic tools ensure fairness in the assessment process. They help teachers understand where to start, where they may have stalled, and in which direction they should move next. This turns professional development into a targeted and well-planned process. At the same time, issues such as data privacy, algorithmic bias, and technical infrastructure should not be overlooked when using AI tools. Ensuring ethical and secure use of AI remains an important task.

**Conclusion.** The analysis of collected scientific sources and practical examples shows that AI-based online training platforms are bringing notable positive changes to teachers' professional development. In such platforms, the teacher is placed at the center of the learning process: the system selects materials that are aligned with the teacher's level of knowledge, needs, and pace of learning. As a result, teachers can study at a pace that suits them, revisit complex topics, or strengthen missing skills. This process increases their motivation, improves course completion rates, and makes professional development more meaningful. AI-based adaptive learning systems further individualize the professional development process. These systems analyze teachers' activities, identify their strengths and weaknesses, and then adjust the learning process accordingly. For instance, teachers with lower technical skills may be offered simpler explanations, interactive exercises, or step-by-step guidance. More experienced teachers, in contrast, can work with more complex tasks or innovation-oriented modules. In this way, adaptive systems provide not a general, one-size-fits-all model, but an individual development path for each educator. AI diagnostic tools also play an important role in evaluating teachers. These tools automatically analyze various data such as lesson processes, communication styles, student engagement, and achievement indicators. As a result, teachers receive clear, evidence-based evaluations and recommendations for further development. This reduces subjectivity in assessments and makes evaluation more fair and systematic. At the same time, diagnostic results help teachers see in which directions they need to develop and support them in planning their professional growth.

Overall, AI technologies make professional development systems more individualized, effective, and goal-oriented. While online training platforms increase teachers' interest in learning, adaptive systems create customized learning paths for each educator, and diagnostic tools provide objective evaluations and practical recommendations. Therefore, it can be said that AI-based approaches are becoming an integral part of modern teacher professional development.

**REFERENCES:**

1. Alenezi, A. Evaluating the effectiveness of AI-powered adaptive learning systems in secondary schools. *International Journal on Studies in Education*, 6(4), 686–700. ijONSE.net. (2024)
2. Almubarak, A. An AI-powered framework for assessing teacher performance. *Frontiers in Artificial Intelligence*. Frontiers. (2025)
3. Brandão, A. Teacher professional development for a future with artificial intelligence. *Digital Education Review*. revistes.ub.edu. (2024)
4. Chiu, T. K. F. AI readiness scale for teachers: Development and validation. ResearchGate. (2024/2025)
5. Chiu, T. K. F. Development and validation of teacher artificial intelligence competence self-efficacy scale (TAICS). *Education and Information Technologies*. SpringerLink. (2025)
6. Dede, C., et al. The critical role of AI-based tools from initial training to continuous professional development. *International Journal of Information and Education Technology*, 15(4). (2025)

7. Eyal, L. Developing and validating an AI-TPACK assessment tool for teacher educators. *Education Sciences*, 15(11), 1452. MDPI. (2025)
8. Garzón, J. Artificial intelligence in education: A systematic literature review of emerging trends. MDPI. (2025)
9. IJiet. Effectiveness of AI-driven assessments in enhancing learning outcomes. *International Journal of Information and Education Technology*, 15(7). ijiet.org. (2025)
10. Li, Z. Generative AI for teachers' self-directed professional development. *TechTrends*. SpringerLink. (2025)
11. Roshan, S., Iqbal, S. Z., & Qing, Z. Teacher training and professional development for implementing AI-based educational tools. *Journal of Asian Development Studies*, 13(2). ResearchGate. (2024)
12. Shezad, F. AI-based platforms: A tool for continuous learning and skill enhancement. *Review of Education, Administration and Law*, 8(1), 179–191. real.spcrd.org. (2025)
13. Tan, X. Artificial intelligence in teaching and teacher professional development: A systematic review. ScienceDirect. (2024)
14. Villarroel, W. R. An AI-powered teaching performance evaluation system in higher education. Dialnet. (2025)
15. Yaseen, H. The moderating role of digital literacy in AI-supported learning environments. *Sustainability*, 17(3), 1133. MDPI. (2025)