UDK 37.013

INDIVIDUALIZING INDEPENDENT LEARNING WITH THE USE OF ARTIFICIAL INTELLIGENCE.

SULAYMANOVA DILDORA BAKHTIYOROVNA
Associate professor, department of mathematics and natural sciences, almalyk state technical institute
Tel: +998 93 668 36 45., e-mail: sdildora75@gmail.com

ABSTRACT

The article explores the relevance and potential of applying artificial intelligence (AI) technologies in modern education, emphasizing their role in enhancing the individualization of independent learning. It provides a scientific analysis of AI-based systems capable of assessing students' knowledge, identifying learning needs, and generating personalized educational pathways aimed at improving learning efficiency. Furthermore, the paper discusses the pedagogical and practical significance of AI tools in adaptive learning environments, highlighting the ways digital platforms and interactive technologies facilitate a more individualized and student-centered approach to education.

Keywords: independent learning, artificial intelligence, individualization, digital technologies, adaptive learning, ChatGPT.

INTRODUCTION

In the 21st century, digital technologies are widely used in all areas of life, particularly in the education system. Organizing education on an innovative basis has become one of the most important requirements of today. One such direction is the individualization of students' independent learning through artificial intelligence (AI).

Artificial intelligence technologies automate the educational process, become an assistant to the teacher, and make it possible to analyze the learner's personal learning needs. Therefore, individualizing education with the help of AI not only increases efficiency but also strengthens the learner's independent thinking, self-development, and motivation to learn.

The Essence and Importance of Independent Learning

Independent learning is the process in which an individual acquires, updates, deepens, and expands their knowledge on their own. This process includes not only becoming familiar with learning materials, but also independently analyzing the obtained knowledge, applying it in practice, and being able to justify one's own opinions. In higher education, independent learning is carried out through students finding necessary information on time, studying it, comparing it, drawing conclusions, and generating new ideas based on the acquired knowledge.

In the process of independent learning, the student becomes an active participant in gaining knowledge. This process develops the student's responsibility, self-management, effective time allocation, and internal motivation toward learning. Moreover, independent learning is one of the most important factors in shaping lifelong learning competencies. This is because in the modern world, knowledge is rapidly updated, and every specialist is required to continually work on self-development.

In traditional independent learning, all students are usually given the same assignments. Such an approach does not fully consider students' individual learning styles, levels of

preparedness, interests, and intellectual capacities. As a result, assignments may be too easy for some students and too difficult for others, which decreases the effectiveness of learning.

Therefore, in the modern education system, a learner-centered, or individualized, approach is becoming increasingly important. Individualized independent learning is organized based on the student's level of knowledge, learning pace, interests, and needs. This approach ensures the development of independent thinking, creativity, and active engagement of students in the learning process.

The Role of Artificial Intelligence in Education.

Artificial intelligence is a set of software and technological systems capable of partially replicating human cognitive processes such as analysis, learning, reasoning, problem-solving, and decision-making. AI technologies automate the learning process, create personalized education, and make the daily activities of learners and teachers easier. Today, artificial intelligence is widely used in various areas of education and performs the following tasks:

- ChatGPT, Gemini, Copilot – provide quick and accurate answers to students' questions, explain complex scientific concepts in simple terms, offer practice through examples, and assist in writing tasks. These tools function as virtual teachers or tutors.

- Khanmigo (Khan Academy AI) – diagnoses the learner's knowledge level, analyzes their mistakes, and generates individualized exercises accordingly. This creates an effective learning environment that matches the learner's actual level without overloading them.

- Duolingo Max – offers interactive exercises, conversation simulations, and real-life scenario-based tasks for language learning. The AI monitors the learner's style, identifies strengths and weaknesses, and provides personalized recommendations.

- Coursera AI Coach – develops a suitable learning path based on the student's interests, goals, career direction, and existing knowledge. It acts as a digital assistant aimed at supporting the student's independent development by offering personalized study plans.

Overall, artificial intelligence tools complement the teacher's work and make the learning process more efficient and convenient. Most importantly, AI creates an individualized learning environment tailored to each learner's needs: some learn quickly, while others require more repetition — AI identifies these differences and proposes appropriate learning strategies, making it highly valuable.

The Process of Personalizing Independent Learning with Artificial Intelligence

Personalizing independent learning with artificial intelligence (AI) is the process of creating a learning environment tailored to each learner's individual needs, knowledge level, and learning pace. In this approach, AI systems continuously monitor and analyze the learner's activities and design the most optimal learning path for them. The process is typically carried out in the following stages:

Data Collection. First, the system gathers various information about the learner's activities: test results, time taken to complete assignments, difficulty level, learning speed, interests, common mistakes, and even the resources the learner uses. This stage creates a fundamental database necessary for qualitative analysis.

Analysis. AI deeply analyzes the collected data to identify the learner's strengths and weaknesses. During this process, AI not only evaluates the learner's knowledge level but also determines their learning style (visual, auditory, or practical), which topics are challenging, and which assignments are most effective.

Adaptation (Personalization). Based on the analysis results, the system selects the most suitable lessons, exercises, video tutorials, or tests for the learner. If necessary, learning materials are reorganized from easier to more complex levels. This stage provides each learner with an individualized learning path tailored to their specific needs.

Feedback and Recommendations. AI continuously evaluates the learner's results in real time. If the learner makes a mistake, the system immediately provides explanations and recommends

additional exercises or clarifications. As achievements increase, AI suggests new goals, more challenging tasks, or strategies for individual development.

As a result, each learner can study at their own pace, using their preferred learning style and focusing on their interests. This not only increases the overall effectiveness of the learning process but also fosters independent thinking, self-development, and responsibility for learning.

Advantages of Personalized Learning with Artificial Intelligence

Personalized Approach: A unique learning path is created for each student. AI selects learning materials that match the learner's level and needs, guiding them along an individualized development trajectory.

Increased Motivation: Students can monitor their results in real time, see their mistakes, and immediately evaluate their achievements. Such instant feedback enhances the learner's interest and engagement in the learning process.

Fast and Accurate Feedback: Artificial intelligence evaluates every response immediately and provides well-reasoned explanations in case of mistakes. This helps the student understand the topic more quickly.

Reduces Teacher's Workload: Processes such as automatic grading, creating learning plans, and providing individualized recommendations are handled by AI. This allows teachers to focus more on creative and methodological tasks.

Flexibility: Each student receives exercises suited to their knowledge level. Some may prefer more complex assignments, while others start with simpler materials — AI automatically adjusts all of this.

Overall, personalized learning with AI does not replace the teacher. Instead, it becomes a reliable digital assistant, making the educational process more effective, engaging, and student-centered.

Prospects for Implementing Artificial Intelligence in Uzbekistan's Education System

In recent years, extensive reforms have been carried out in Uzbekistan's education system under the "Digital Education" concept. These reforms aim to modernize the educational process, develop digital competencies, and align the learning process with international standards. The integration of artificial intelligence (AI) technologies is one of the key directions of this concept. Specifically, the following practical measures are being implemented:

- Creating digital learning platforms: National platforms are being developed to support the educational process online, including interactive lessons, video materials, tests, and virtual laboratories.

- Developing adaptive testing systems: Tests are based on AI algorithms that automatically adjust the difficulty level according to the learner's knowledge. This increases the accuracy and fairness of the assessment system.

- Introducing AI literacy courses for teachers: Special training programs are organized to develop teachers' skills in effectively using artificial intelligence technologies.

- Establishing AI laboratories in higher education institutions: These laboratories teach students to work with modern AI technologies and support scientific research and startup projects.

The future prospects are even broader, with plans to develop the following AI-based educational technologies:

- Personalized learning platforms: Systems that offer individualized learning paths tailored to each student's knowledge level, interests, and learning pace.

- AI-based assessment systems: Automated intelligent evaluation platforms that accurately and objectively assess students' knowledge and skills.

- Virtual teacher (AI tutor) systems: Digital teaching assistants that provide instant answers to students' questions, explain assignments, and guide the independent learning process.

Psychological Aspects of Organizing Independent Learning with AI

- Increased motivation: AI systems allow students to monitor their results in real time, track achievements, and analyze development dynamics. This strengthens intrinsic motivation for learning.
- Reduced stress: In traditional education, students are required to learn at the same pace. With AI, students can learn at their own comfortable speed, significantly reducing psychological pressure.
- Development of self-management skills: Students independently create their study plans, set goals, and monitor them with AI support. This enhances their ability to organize themselves, manage time effectively, and make independent decisions.

RECOMMENDATIONS

- Special modules and practical sessions on the use of multimedia technologies should be organized in professional development courses for teachers.
- Higher education institutions are recommended to create a rich, interactive, and adaptive database of independent assignments using multimedia tools and to update it regularly.
- Students can be brought closer to real-life experience by integrating virtual laboratories and simulation platforms into local educational programs.
- Implementing a system for students' self-assessment and portfolio management is useful for tracking their level of knowledge acquisition and development.
- Designing independent tasks based on gamification elements (points, levels, assignments, rewards) ensures that the tasks are engaging and competitive.

CONCLUSION

In modern education, guiding students to work independently is one of the most important factors for deep knowledge acquisition and the development of creative and analytical thinking skills. Multimedia tools and innovative technologies play an invaluable role in organizing this process effectively.The research has shown that the independent learning process can be organized more effectively through the use of information and communication technologies, interactive learning materials, gamification approaches, virtual laboratories, individualized assignments, and multi-format materials. This also increases students' motivation, enhances their interest in independently mastering learning materials, and develops their self-management skills.

Overall, independent learning activities organized based on innovative approaches prepare students to work with modern technologies and guide them toward solving real-life problems independently.

References

1. Xolmurodov A. Raqamli ta'lim va sun'iy intellekt texnologiyalari. Toshkent: Innovatsiya nashriyoti, 2023.
2. UNESCO (2024). Artificial Intelligence and Personalized Learning in Education.
3. OpenAI (2025). The Future of AI in Education.
4. Khan Academy AI Report, 2024.
5. Sulaymanova D.B. (2024). Elektron darsliklar yaratishda dasturlarning ahamiyati". Innovations in technology and science education. SJIF:5.305. Volume 3. 107-116. http://humoscience.uz/index.php/itse/article/view/98/113
6. Sulaymanova D.B. (2024). "Texnika yo'nalishlarida dasturlashning kasbiy afzalliklari". «Zamonaviy ta'limda fan va innovatsion tadqiqotlar jurnali». 2-son 20–to'plam .203-211. https://zenodo.org/records/14584733
7. Sulaymanova D.B. (2024). Development of educational materials with the help of media technologies American Journal of Interdisciplinary Research and Development ISSN Online: 2771-8948, Website:www.ajird.journalspark.org Volume 33, October. 211-215 https://www.ajird.journalspark.org/index.php/ajird/article/view/1348

8. Khasanova Kh. Directions for improving the efficiency of services in the banking sector in the context of digital transformation. Norwegian Journal of development of the International Science. №149. 2025. P.14-17.

9. Vakhobova, M. A. (2022). Innovative methods of the distance learning process in modern universities. Oriental renaissance: Innovative, educational, natural and social sciences, 2(5-2), 641-645.

10. Mayer R. E. *Multimedia Learning*. – Cambridge University Press, 2021.

11. Clark R. C., & Mayer R. E. *E-Learning and the Science of Instruction*. – Wiley, 2016.

12. ZiyoNET – O'zbekiston Respublikasi elektron ta'lim portali: www.ziyonet.uz