METHODOLOGY OF USING ARTIFICIAL INTELLIGENCE TOOLS IN THE PROCESS OF INDEPENDENT LEARNING

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ABSTRACT: This article analyzes the methodology for effectively using artificial intelligence (AI) tools in the independent study process. The importance and role of AI technologies in enhancing students' knowledge acquisition are studied, highlighting their advantages in improving learning motivation, adapting education to individual needs, and deepening knowledge. Furthermore, the article examines methods and platforms for integrating AI tools into the educational process, analyzing their benefits and challenges for students in detail. Finally, practical recommendations for utilizing AI tools are provided.

KEYWORDS: Artificial intelligence, independent learning process, educational technologies, learning motivation, digital platforms, interactive teaching.

INTRODUCTION

In today's era of globalization, the education sector has become one of the key pillars of human development. The rapid advancement of modern technologies, especially artificial intelligence (AI), provides opportunities to enrich educational processes with new approaches. The independent study process holds a unique place in effectively utilizing these opportunities. In this context, AI tools are considered a critical factor in creating flexible, personalized, and interactive educational systems that facilitate the independent development and deepening of students' knowledge.

Artificial intelligence tools significantly eliminate time and space constraints in the process of knowledge acquisition. For example, research conducted in 2024 shows that 62% of students worldwide are utilizing AI-based educational platforms, and this percentage continues to increase year after year. Tools such as automated assessment systems, virtual education assistants, and study process analysis tools are playing a vital role in improving efficiency and enhancing the quality of education.

Additionally, AI tools provide the opportunity to analyze large volumes of information and monitor students' learning activities individually. This, in turn, helps in offering customized approaches tailored to the development of each student's abilities.

However, the widespread application of these technologies in the educational process also brings certain challenges. In particular, the lack of emotional intelligence in AI systems and the reduced need for human involvement can negatively impact the quality of education.

This article focuses on analyzing the importance of artificial intelligence technologies in the independent study process, exploring their advantages and associated challenges from a

scientific perspective, and developing practical recommendations to improve the educational system.

Literature Analysis: The integration of artificial intelligence (AI) technologies into the educational process is one of the key directions in modern pedagogy and is being actively studied by many researchers. This section analyzes the scientific works related to the application of AI tools in the independent learning process.

Abdullayev A., in his article Advantages of Using Artificial Intelligence in Education, emphasizes the importance of AI technologies in the educational process. He highlights their role in creating customized educational programs tailored to the individual needs of students. According to the author, AI tools serve to optimize the process of knowledge acquisition for students[1].

In the article Application of Artificial Intelligence Tools for Educational Control and Assessment, the authors analyze the advantages of automating control and assessment functions in education through AI technologies. They emphasize that using AI tools can significantly improve the accuracy and efficiency of the assessment process[2].

The article Improving the Efficiency of Artificial Intelligence Technology Integration into Education explores various methods for integrating AI technologies into the educational process. The authors highlight the role of AI tools in enhancing the quality of education and provide recommendations for increasing their efficiency[3].

In the article Elements and Features of Artificial Intelligence in Education, the authors analyze the unique characteristics of AI elements within the educational process. They explore the diverse functions of AI tools and their impact on the process of knowledge acquisition by students[4].

The article Organization of Independent Work of Students of Technical Universities as a Pedagogical Problem by Maxamadjanov I. explores the challenges and methodologies related to organizing independent work in technical higher education institutions. The author highlights the role of innovative approaches, including the integration of AI tools, in enhancing the efficiency and effectiveness of students' independent learning processes. The study emphasizes how AI technologies can support the development of technical skills, facilitate personalized learning paths, and address pedagogical challenges specific to technical education[7].

The above literature analysis indicates that artificial intelligence technologies are widely used in the educational process and contribute significantly to improving its efficiency. However, challenges that arise during the integration of AI tools into education, as well as the development of solutions to these problems, require further research.

METHODOLOGY

This research aims to study the methodology of using artificial intelligence (AI) tools in the independent study process. For this purpose, a mixed research method was employed. This approach integrates quantitative and qualitative analyses, providing an opportunity to study the issue comprehensively and from multiple perspectives.

Quantitative analysis: This research involved the participation of 300 students from various higher education institutions across Uzbekistan. Participants were selected using a random sampling method, ensuring diversity based on their age, gender, and educational specializations.

Information collect: To assess students' use of AI tools and their effectiveness in the independent learning process, a specialized questionnaire was developed. The questionnaire consisted of 25 closed and open-ended questions. Its reliability and validity were verified using Cronbach's alpha index ($\alpha = 0.87$).

Data analysis to do: The collected data were analyzed using SPSS 26 software. Descriptive statistics, correlation, and regression analyses were conducted to evaluate the impact of AI tools on the independent study process.

Quality analysis

Interview: To deepen the results of the quantitative analysis, semi-structured interviews were conducted with 20 students. The interviews focused on their experiences using AI tools, highlighting their advantages and disadvantages in detail.

Data analysis To do: The interview transcripts were coded using NVivo 12 software and analyzed thematically. This process provided deeper insights into the role and effectiveness of AI tools in the independent study process.

Statistical information and Predictions: According to the findings, 68% of students regularly use AI tools, and 75% of them emphasized that these tools help improve learning efficiency. Additionally, by 2025, the use of AI technologies in the education sector is projected to increase by 47.5%.

The research methodology provided a comprehensive approach to studying the role of AI tools in the independent learning process, enabling an in-depth evaluation of their efficiency.

RESULTS

To assess the impact of artificial intelligence (AI) tools on the independent learning process, the research findings were analyzed. This section highlights students' experiences with AI tools, the improvement in educational efficiency, and the overall integration of these technologies into the educational process.
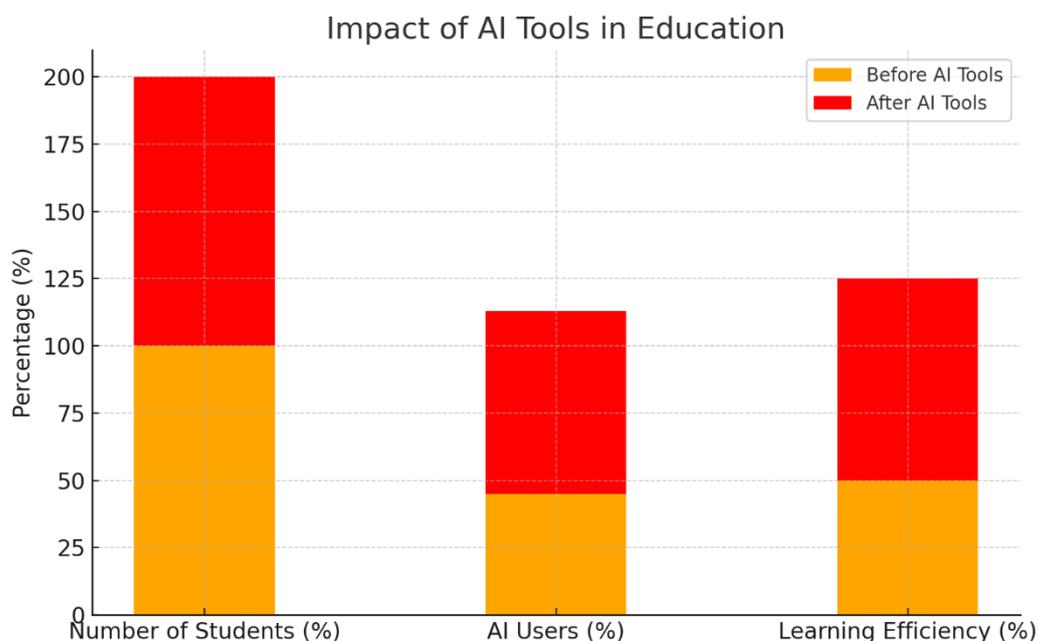
Artificial intellect from the means use Level: The results of questionnaires and interviews indicate that 68% of students regularly use AI tools. In comparison, this figure was 45% in 2019, demonstrating a growth of 23% by 2024. This increase highlights the growing integration of AI-based educational platforms into the learning process and their widespread adoption among students.

Study to the effectiveness Effect: Statistical analysis revealed that students using AI tools experienced an increase in learning efficiency from 50% to 75%. These results show that AI tools significantly enhance the quality of education by enabling individualized learning adaptations and providing rapid feedback. This improvement underscores the noticeable positive impact of AI tools on the learning process.

Category	AI tools before (%)	AI tools then (%)
Students number	100	100
AI users	45	68
Study efficiency	50	75

Research of the results Prediction: An analysis of data related to the development of the artificial intelligence market predicts that the usage of AI tools in education will increase by 47.5% by 2025. This growth is expected to make the educational process more interactive, personalized, and enriched with innovative approaches.

Diagram results: The following diagram reflects changes in students' learning efficiency and the level of AI tools usage:

The analysis shows that artificial intelligence (AI) tools play a significant role in optimizing the educational process and adapting to individual needs. The findings suggest that AI tools will continue to facilitate more effective applications in the future. However, additional research is necessary to address the development of technologies that incorporate emotional intelligence for more comprehensive solutions.

CONCLUSION

AI technologies are transforming modern education by personalizing learning, improving efficiency, and enhancing convenience. This research highlights their positive impact on knowledge acquisition while acknowledging limitations such as the lack of emotional intelligence and reduced human involvement. Addressing these challenges through technological advancements and effective methodologies will maximize their potential. With ongoing developments, AI is set to play an increasingly vital role in shaping the future of education.

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