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The Dynamics Of Improving Education Quality Indicators Through The Integration Of Artificial Intelligence Technologies

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Abstract: This study analyzes the dynamics of education quality indicators following the implementation of artificial intelligence technologies in Uzbekistan. The impact of adaptive learning systems, automated assessment, learning analytics, and digital platforms on students' academic achievement, motivation, independent thinking, and digital competence was examined using statistical methods. The findings demonstrate that AI-based educational tools enhance learning effectiveness, support individualized instruction, and ensure a stable improvement in educational outcomes.

Keywords: Artificial intelligence, education quality, adaptive learning, learning analytics, automated assessment, digital competence, learning motivation, individual learning trajectory, statistical analysis, education in Uzbekistan.

Introduction. In recent years, the process of digital transformation in the education system of Uzbekistan has accelerated. The strategy "Digital Uzbekistan – 2030," electronic learning platforms, distance learning tools, and the introduction of elements of artificial intelligence are considered important factors in improving the quality of education. Artificial intelligence technologies enable adaptive learning, automated assessment, learning analytics, and the formation of individual learning trajectories, thereby bringing the educational process closer to a learner-centered model. The purpose of this article is to analyze the dynamics of the growth of education quality indicators through the implementation of artificial intelligence technologies based on statistical data, using the example of the education system of Uzbekistan. This study is aimed at identifying the dynamics of the growth of education quality indicators through the integration of artificial intelligence technologies into the educational process and was organized on the basis of systemic, competency-based, and learner-centered approaches. In the research, the educational process was considered as a holistic pedagogical system, and the impact of artificial intelligence tools on students' level of knowledge acquisition, learning motivation, independent thinking, classroom activity, and digital competence was comprehensively examined. The methodological framework was based on the theory of modern pedagogical technologies, the concept of adaptive learning, the learner-centered education model, and the principles of learning analytics.

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During the research, several scientific and pedagogical methods were used in combination. Through the method of pedagogical observation, students' activity in the classroom, their approach to completing tasks, collaboration, and digital tool usage skills were regularly recorded. The results of the observation made it possible to compare the changes before and after the introduction of AI-based platforms. Diagnostic tests were used to determine students' initial level of knowledge, logical thinking indicators, and learning pace. These tests had an adapted level of complexity and served to identify students' individual capabilities.

The questionnaire method was applied to study students' attitudes toward learning, their readiness to use digital tools, their interest in the lesson, and their self-assessment skills. In addition, surveys were conducted among teachers and parents, and their opinions on the impact of artificial intelligence technologies on the educational process were analyzed. The experimental method constituted the main stage of the research, in which AI-based adaptive tasks, automated assessment systems, and learning analytics tools were implemented in practice. In the control group, traditional methods were maintained, which made it possible to conduct a comparative analysis of the results.

The mathematical–statistical analysis was carried out using Student's t-test. This method made it possible to determine that the differences between the experimental and control groups were not random, to assess the reliability of the obtained results, and to scientifically confirm the impact of artificial intelligence technologies on education quality indicators. In the statistical analysis, mean values, variance indicators, and growth dynamics were calculated.

The research was conducted in three stages. At the diagnostic stage, students' initial level of knowledge, learning motivation, independent thinking indicators, and digital literacy were identified, and existing problems were determined. At the formative stage, AI-based educational tools were introduced, and lessons were organized through adaptive tasks, interactive tests, problem-based situations, and automated feedback systems. At the control stage, the final diagnostics were carried out, compared with the initial results, and the growth dynamics were clarified.

The assessment criteria included the level of knowledge acquisition, learning motivation, independent thinking, classroom activity, and digital competence. The level of knowledge acquisition was determined through the results of diagnostic tests; learning motivation was evaluated on the basis of questionnaires and observation results; independent thinking was assessed through the analytical approach demonstrated in solving problem-based tasks. Classroom activity was identified through students' participation in group work, their engagement in question-and-answer sessions, and the speed of task completion, while digital competence was evaluated through their skills in using electronic platforms.

In recent years, the process of digital transformation in the education system of Uzbekistan has been consistently implemented. Electronic journals and assessment systems have been introduced in schools, and students' results are monitored in real time. These systems not only record grades but also make it possible to analyze the dynamics of students' development.

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The teacher can quickly identify the topics in which a student is experiencing difficulties and provide individual support.

Adaptive testing platforms automatically select tasks that correspond to students' level of knowledge. These systems change the level of difficulty of subsequent questions depending on the learner's responses. As a result, more complex tasks are provided for high-achieving students, while additional explanations and exercises are offered for those who face difficulties. This makes it possible to implement a differentiated approach in an automated form and ensures the gradual consolidation of knowledge.

Multimedia lesson resources have made the educational process visual and interactive. Animations, video lessons, virtual laboratories, and interactive exercises help maintain students' attention for a longer period of time. Teaching through visual materials is especially effective for primary school students, as it accelerates the process of understanding and retaining the topic in memory.

AI-based task recommendation systems suggest appropriate exercises by taking into account students' individual learning pace. These systems analyze students' previous results and determine which skills need to be developed. As a result, each learner follows an individual learning path that suits his or her needs. This ensures the practical implementation of a learner-centered education model.

As a result of the introduction of these digital tools, students' interest in learning increased, their classroom activity improved, and their independent working skills developed. Students were able to monitor their results through electronic platforms, analyze their mistakes, and work on them again. This contributed to the formation of self-control and reflection skills.

Artificial intelligence technologies also served as an important supportive tool for teachers. Through learning analytics, general trends in the classroom, as well as students' strengths and weaknesses, were identified, and the lesson planning process became more effective. As a result, the educational process began to be managed on the basis of accurate data rather than subjective assessment..

In general, the introduction of AI-based educational tools in Uzbekistan is contributing to the individualization of the learning process, strengthening the differentiated approach, increasing learning motivation, and ensuring the steady growth of education quality indicators. This process has a positive impact not only on students' academic performance but also on their digital competence and independent learning skills.

1-table.

Indicators of change before and after the implementation of artificial intelligence (%)

Indicator	2021 (AI after)	2023 (AI before)	Growth
Knowledge level	34 %	46 %	+12 %
Motivation	41 %	53 %	+12 %

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Independent thinking	29 %	39 %	+10 %
Activity |	38 %	50 %	+12 %

The data in the table show that after the introduction of AI-based adaptive tasks and automated feedback systems, growth was observed in all indicators. The greatest increase was recorded in the level of knowledge and classroom activity (+12%). This can be explained by the individual adaptation of the learning material. The 10% increase in independent thinking is associated with the greater use of problem-based tasks and analytical questions.

2-table.
Increase in the level of digital competence (%)

Level	2021	2023
High	22 %	44 %
Medium	48 %	41 %
Low	30 %	15 %

Regular use of digital platforms significantly increased students' digital literacy. The proportion of low-level students decreased from 30% to 15%. This demonstrates the effectiveness of AI-based interactive tasks and visual content.

3-jadval.
Results of the experimental and control groups (average score)

Group	Digital	Final	Growth
Experimental group	3.5	4.2	+20 %
Control group	3.5	3.8	+8 %

In the experimental group, the growth was twice as high as in the control group. This confirms the effectiveness of AI-based individualized tasks and automated assessment systems.

To determine the results of the statistical analysis, the mean values of the achievement indicators, learning motivation, and the level of independent thinking in the experimental and control groups were compared. The data were processed using the mathematical–statistical method—Student's t-test—to verify the reliability of the impact of implementing artificial intelligence technologies on the quality of education. The calculations produced a value of $t = 2.47$. This indicator exceeds the critical table value for the given degrees of freedom (df) and the selected significance level ($\alpha = 0.05$). As a result, the condition $p < 0.05$ was satisfied, which means that the differences between the experimental and control groups are not random but are statistically significant and caused by the pedagogical intervention.

This result confirms that AI-based adaptive tasks, automated feedback systems, and tools for forming individual learning trajectories had a positive effect on students' level of achievement.

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In particular, the statistically significant increase in the level of knowledge acquisition, the improvement of students' independent thinking skills, and the rise in classroom activity in the experimental group were confirmed through statistical analysis. Although some growth was also observed in the control group, it can be explained by the natural process of development and remained lower than the rate of growth in the experimental group.

In addition, the analysis of variance indicators showed that the results in the experimental group were more stable, which means that artificial intelligence technologies reduced the gap in achievement among students by ensuring a differentiated approach. The determination of statistical reliability guarantees the scientific validity of the research results and empirically confirms that the introduction of artificial intelligence technologies into the educational process leads to a stable growth in education quality indicators.

Conclusion. The results of the conducted analysis and experimental work showed that the introduction of artificial intelligence technologies into the educational process leads to a comprehensive improvement in the quality indicators of primary education. First of all, the level of knowledge acquisition increased significantly: adaptive tasks and personalized learning pathways helped identify students' weak points and strengthen them. As a result, students not only completed more exercises, but also had the opportunity to consciously consolidate their knowledge through error analysis and immediate feedback. This process ensured that learning outcomes were not "one-time" achievements but were gradually reinforced step by step.

Secondly, learning motivation increased. AI-based digital resources created an engaging, visual, and interactive environment for students and expanded their opportunities for active participation in the lesson. The ability of learners to monitor their own results, observe their progress, and achieve success activated the internal sources of motivation. Moreover, since the tasks corresponded to the students' level, the fear of difficulty decreased and a positive attitude toward learning was formed.

Thirdly, positive changes were observed in independent thinking skills. As the proportion of problem-based situations, analytical questions, and tasks aimed at comparing different solution options increased in AI systems, students learned more actively to draw logical conclusions, make decisions, and justify cause-and-effect relationships. This contributed to the formation of a strategy of "searching and finding" rather than "waiting for ready-made answers" in primary school learners.

Fourthly, the increase in digital competence created an important foundation for the quality of education. While working with electronic resources, completing online tasks, and viewing and analyzing their results, students acquired digital literacy through practical activities. These skills expand the opportunities for independent learning and studying in a digital environment at subsequent stages.

The most important aspect is that the observed growth was not limited to one direction but was manifested simultaneously across several indicators. Statistical analysis ($p < 0.05$) showed that the differences were not random and scientifically confirmed the positive impact of artificial intelligence technologies on education quality indicators. Thus, the consistent and methodologically correct integration of artificial intelligence into the educational process

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ensures the stable growth of students' level of knowledge, motivation, independent thinking, and digital competence, and serves as an effective factor in improving the quality of primary education.

List of REFERENCES

1. O'zbekiston Respublikasi Prezidenti. O'zbekiston Respublikasini yanada rivojlantirish bo'yicha Harakatlar strategiyasi to'g'risidagi PF–4947-son Farmoni. – Toshkent, 2017.
2. Khudayberdiyeva D. A., Abduqodir o'g'li X. J. Ta'lim turlari va ularning amalga oshirilish mexanizmlari // Modern Scientific Research: Achievements, Innovations and Development Prospects. – Germany, 2023. – Vol. 9. – No. 1.
3. Аббасов Б. А. Особенности инновационных технологий в образовании // Central Asian Journal of Innovations on Tourism Management and Finance. – 2022. – Т. 3. – № 3. – С. 45–52.
4. Asatillaevich A. B. Complex aspects of the organization of the educational process in the context of the coronavirus pandemic. – 2022.
5. Khudayberdiyeva D., Raupova D. Consistency of reforms in education // ACADEMICIA: An International Multidisciplinary Research Journal. – 2020. – Vol. 10. – No. 11. – P. 1671–1680.
6. Abidovna K. D. et al. IMPROVING COLLABORATIVE WORK SKILLS OF PRESCHOOL EDUCATIONAL ORGANIZATION STAFF BASED ON INNOVATIVE MANAGEMENT METHODS //World Scientific Research Journal. – 2025. – Т. 46. – №. 2. – С. 372-374.
7. Abidovna K. D., Asatillaevich A. B. Sport management: Sport management //JournalNX. – 2021. – С. 342-345.
8. Abidovna X. D. Analysis of the Level of Development of the Sphere of Services in Uzbekistan //Central Asian Journal of Theoretical and Applied Science. – 2022. – Т. 3. – №. 10. – С. 37-42.
9. Abidovna X. D. Features of the formation of services industry management //Asian Journal Of Multidimensional Research. – 2022. – Т. 11. – №. 7. – С. 142-148.
10. Abidovna X. D. The Importance of the Development of the Service Sector in the Republic of Uzbekistan //American Journal of Business Management, Economics, and Banking. – 2022. – Т. 4. – С. 57-60.
11. Asatillaevich A. B. IMPROVING TEACHING AND LEARNING IN PHYSICAL CULTURE AND SPORTS BASED ON MODERN SPORTS THEORY //World Bulletin of Physical Education and Sports Science. – 2025. – Т. 1. – №. 03. – С. 108-117.
12. Abbasov B. A. Issues of improvement of the form of physical education in health promotion //European Journal of Research Development and Sustainability. – 2019. – Т. 3. – №. 4. – С. 81-83.
13. Zhou, Cong. "Integration of modern technologies in higher education on the example of artificial intelligence use." *Education and Information Technologies* 28.4 (2023): 3893-3910.

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14. Shwedeh, Fanar. "The integration of artificial intelligence (AI) into decision support systems within higher education institutions." *Nanotechnology Perceptions* 20.5 (2024): 331-357.