THE IMPACT OF ARTIFICIAL INTELLIGENCE TOOLS ON BACHELOR STUDENTS' LEARNING OUTCOMES IN HIGHER EDUCATION

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Abstract*:This study aims to investigate the use of artificial intelligence (AI) tools by undergraduate students studying in higher education institutions and their impact on academic performance. In recent years, AI-based technologies, including ChatGPT, Grammarly, and other digital assistants, have become an integral part of the educational process. This study analyzed the frequency of use of AI tools, their impact on academic performance, learning motivation, and independent learning skills. The study was conducted based on a quantitative approach and a questionnaire was administered to undergraduate students. The data obtained were processed using descriptive statistics and correlation analysis methods. The results of the study revealed that the purposeful and conscious use of AI tools has a positive effect on improving students' academic performance. At the same time, it was noted that uncontrolled and excessive use of AI tools can in some cases have a negative effect on the process of independent thinking. The research findings will serve to develop practical recommendations for the effective integration of artificial intelligence technologies in higher education.*

Keywords*: Artificial intelligence, higher education, undergraduate students, learning outcomes, academic performance, digital education, educational technologies.*

Аннотация*:Целью данного исследования является изучение использования инструментов искусственного интеллекта (ИИ) студентами бакалавриата, обучающимися в высших учебных заведениях, и их влияния на успеваемость. В последние годы технологии на основе ИИ, включая ChatGPT,*

Grammarly и другие цифровые помощники, стали неотъемлемой частью образовательного процесса. В данном исследовании анализировалась частота использования инструментов ИИ, их влияние на успеваемость, мотивацию к обучению и навыки самостоятельного обучения. Исследование проводилось на количественной основе с использованием анкеты, заполненной студентами бакалавриата. Полученные данные обрабатывались с помощью методов описательной статистики и корреляционного анализа. Результаты исследования показали, что целенаправленное и осознанное использование инструментов ИИ оказывает положительное влияние на повышение успеваемости студентов. В то же время было отмечено, что неконтролируемое и чрезмерное использование инструментов ИИ в некоторых случаях может негативно влиять на процесс самостоятельного мышления. Результаты исследования послужат основой для разработки практических рекомендаций по эффективной интеграции технологий искусственного интеллекта в высшее образование.

Ключевые слова:*Искусственный интеллект, высшее образование, студенты, результаты обучения, академическая успеваемость, цифровое образование, образовательные технологии.*

Introduction

In recent years, the rapid development of digital technologies has led to fundamental changes at all stages of the education system. In particular, the integration of artificial intelligence (AI) technologies into the educational process is significantly transforming teaching and learning methods in higher education institutions. Tools based on artificial intelligence provide opportunities for individualizing the process of knowledge acquisition, monitoring student activity, and increasing academic performance. Therefore, today the role and importance of AI technologies in higher education is considered one of the urgent scientific problems (UNESCO, 2023).

The use of AI-based digital tools such as ChatGPT, Grammarly, and QuillBot is becoming increasingly popular among undergraduate students. These tools serve as important aids in editing written work, generating ideas, improving the quality of text, and supporting the process of independent learning. At the same time, some researchers have noted that uncontrolled and excessive use of AI tools can negatively affect students' independent thinking, critical analysis, and academic integrity (OECD,2021). This situation requires a deep scientific study of the positive and negative aspects of AI tools in the educational process (Holmes, Bialik,& Fadel, 2019).

Although a number of studies have been conducted in foreign scientific literature on the impact of artificial intelligence technologies on educational effectiveness, this issue has not been sufficiently studied in the context of higher education institutions in Uzbekistan (Zawacki-Richter et al., 2019). In particular, empirical studies aimed at determining the frequency of use of artificial intelligence tools by undergraduate students, the purposes of their use, and their relationship with academic results are limited. Therefore, this study arises from the need to scientifically analyze the impact of artificial intelligence tools on the educational process in local conditions.

The main objective of this study is to determine the use of artificial intelligence tools by undergraduate students studying in higher education institutions and its impact on academic performance. The study will examine the level of use of artificial intelligence tools, their impact on academic performance, learning motivation, and independent learning skills (Luckin et al., 2016).It is also hypothesized that the purposeful and conscious use of artificial intelligence tools can increase the level of student learning, while uncontrolled and excessive use can negatively affect the process of independent thinking (OECD, 2021).

The results of this study will serve to develop practical recommendations for the effective integration of artificial intelligence technologies into the higher education system. The conclusions of the study are expected to be of significant

scientific and practical importance not only for students, but also for teachers and relevant organizations that shape education policy.

Literature review

The introduction of artificial intelligence technologies into the education system has become one of the most important areas of scientific research in the last decade. The role of artificial intelligence tools in optimizing the learning process, increasing the level of student learning, and individualizing education has been widely covered in international scientific literature. Researchers evaluate artificial intelligence as a technology that supports, analyzes, and adapts the learning process (UNESCO,2023).

A number of studies have noted the positive impact of artificial intelligence-based learning tools on students' academic performance. For example, Holmes et al. (2019) emphasize that artificial intelligence technologies serve to deepen the assimilation of knowledge by adapting educational materials to students' needs. Also, a systematic review by Zawacki-Richter et al.(2019) noted that the use of artificial intelligence in higher education can increase student interest in learning and improve academic performance. These studies scientifically confirm the potential of artificial intelligence tools to improve educational effectiveness.

Other studies have focused on analyzing the impact of AI tools on independent learning. Luckin and colleagues (2016) believe that AI-based systems allow students to independently plan their learning, monitor their learning process, and work on errors. In particular, tools aimed at editing written work and developing language skills are widely used by students. A number of empirical studies have confirmed that tools such as Grammarly and ChatGPT can improve the quality of students’ written speech.

At the same time, the scientific literature also notes problems and risks associated with the use of AI tools. Some researchers argue that excessive reliance on AI can weaken students’ independent thinking and critical analysis skills. OECD (2021) reports indicate that the issue of academic integrity is a pressing problem in

the context of the widespread use of AI tools. In cases of uncontrolled use, students may rely on ready-made answers rather than a deep understanding of knowledge.

In addition to international studies, there is a limited number of studies conducted in regional and local contexts. In particular, there is a lack of scientific works devoted to empirically studying the impact of artificial intelligence tools on student learning outcomes in higher education institutions of Central Asian countries, including Uzbekistan. Existing studies are mainly limited to theoretical analysis and provide little practical information.

Therefore, this study aims to complement previous scientific works and to determine the relationship between the level of use of artificial intelligence tools by undergraduate students, their goals of use, and academic performance. The results of the study allow us to draw scientifically based conclusions on the effective and responsible use of artificial intelligence technologies in higher education and partially fill the existing scientific gap.

METHODOLOGY

Research Design

This study is based on a quantitative research approach and aims to determine the use of artificial intelligence tools by undergraduate students and their impact on academic performance. The main reason for choosing a quantitative approach is that it allows analyzing the respondents' opinions through numerical indicators and identifying the relationship between variables. The survey method was used as the main data collection tool in the study.

Participants

The participants of the study are undergraduate students studying at a higher education institution. Respondents were selected on a voluntary basis from among students studying in various educational fields. The total number of respondents :100 was students. The participants consisted of students from 1st–4th year, and their age was mainly between 18–23 years.

Data Collection Instrument

A specially designed questionnaire was used to collect data in the study. The questionnaire consisted of closed-ended questions and was developed on a Likert scale (1 – completely disagree, 5 – completely agree). The questionnaire included the following main sections:

•Frequency of use of artificial intelligence tools;

•Impact of artificial intelligence tools on academic performance;

•Learning motivation and independent learning skills.

Data Collection Procedure

The data collection process was carried out in the 2024–2025 academic year. The questionnaire was provided to respondents via an online platform. The purpose of the study was explained to the respondents and it was emphasized that their participation was voluntary. The survey was conducted anonymously and no personal data was collected.

Data Analysis Methods

The collected data were entered into a spreadsheet program for statistical analysis. Descriptive statistics (percentages, averages) and correlation analysis methods were used to analyze the data. The relationship between the level of use of artificial intelligence tools and students' academic performance was determined using the Pearson correlation coefficient.

The study strictly adhered to ethical principles. Respondents' participation was completely voluntary, and they had the right to stop the survey at any time. No personal data from respondents was collected during the study, and all data was used for scientific purposes only.

Results

The survey data collected as part of this study were analyzed using descriptive statistics and correlation analysis methods. The majority of undergraduate students participating in the study reported regular use of artificial intelligence tools. Approximately two-thirds of respondents reported frequent use of tools such as ChatGPT and Grammarly in the learning process.

According to the results of the analysis, it was found that the purposeful and conscious use of artificial intelligence tools is positively correlated with increased academic performance of students. The majority of respondents noted that these tools help them understand educational materials, prepare written work, and effectively manage their time. The average indicators showed a positive correlation between the level of use of artificial intelligence tools and learning outcomes.

The results of the correlation analysis revealed a moderate positive correlation between the frequency of use of artificial intelligence tools and academic performance. This confirms that artificial intelligence tools, when used correctly and purposefully, have a positive impact on students' academic performance.

At the same time, a certain part of the respondents noted that excessive use of artificial intelligence tools can have a negative impact on the process of independent thinking and independent problem solving. In particular, it was found that reliance on ready-made answers can lead to a weakening of independent analytical skills.

DISCUSSION

The results of this study are partially consistent with the conclusions recorded in the international scientific literature. In particular, the role of artificial intelligence technologies in increasing the effectiveness of education confirms the ideas put forward by Holmes (2019) and Zawacki-Richter (2019). The results of the study showed that the conscious and purposeful use of artificial intelligence tools supports students' educational activities.

At the same time, the results of this study also show that artificial intelligence tools have a dual effect. On the one hand, they facilitate the assimilation of knowledge, on the other hand, in cases of uncontrolled use, they can reduce the activity of independent thinking of students. This is consistent with the risks noted in the OECD (2021) and UNESCO (2023) reports.

The study is significant in that it provides an empirical basis for the role and impact of artificial intelligence tools in the context of higher education institutions

in Uzbekistan. The results show that methodological and pedagogical control is of great importance in integrating artificial intelligence tools into the educational process.

This study has some limitations. In particular, the limited number of respondents and the use of only a quantitative approach require caution in generalizing the results. In the future, it is advisable to enrich these results with qualitative research.

CONCLUSION AND RECOMMENDATIONS

This study aimed to study the use of artificial intelligence tools by undergraduate students and their impact on academic performance. The results of the study showed that the conscious and purposeful use of artificial intelligence tools has a positive effect on increasing the academic performance of students (UNESCO, 2023). At the same time, it was found that uncontrolled and excessive use can lead to a weakening of independent thinking skills.

Based on the results obtained, the following practical recommendations were developed:

•Development of methodological guidelines for students on the use of artificial intelligence tools;

•Pedagogical control of the use of artificial intelligence by teachers;

•Organization of trainings aimed at strengthening the principles of academic honesty.

In the future, it is recommended to conduct scientific research with the participation of a wider range of respondents and based on qualitative research methods in order to more deeply study the impact of artificial intelligence technologies on the educational process.

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