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POSITIVE AND NEGATIVE IMPACTS OF ARTIFICIAL INTELLIGENCE ON THE ACTIVITIES OF STUDENT YOUTH: A SYSTEMATIC-ANALYTICAL APPROACH

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Abstract

The article analyzes the positive and negative effects of artificial intelligence (AI), particularly generative language models, on the academic, research, cognitive and social activities of university students. Following the IMRAD structure, a systematic-analytical review was conducted in line with the transparency principles of PRISMA 2020. The findings reveal AI's potential to enhance learning performance, personalization, academic writing and research productivity, alongside the risks of excessive cognitive offloading, weakened critical thinking, threats to academic integrity, model hallucinations and digital inequality. The direction of impact is determined not by AI itself but by the *mode of use* (scaffolding versus substitution). A four-level framework of recommendations for the responsible use of AI in higher education institutions is proposed.

Keywords: artificial intelligence, student youth, generative AI, critical thinking, cognitive offloading, academic integrity, digital competence, higher education.

Introduction

Since the end of 2022, generative AI tools (ChatGPT, Gemini, Claude, Copilot and others) have become an integral part of students' daily activities. This has raised both great hopes and serious concerns in higher education [2; 3]. On the one hand, AI can work as an individual tutor and improve learning outcomes [11; 12; 13]; on the other hand, there is a risk that students will "hand over" core competencies such as thinking and writing to the machine and lose the essence of the learning process [4; 5;

6].

In Uzbekistan, youth policy and the digitalization of education have been defined as state priorities [21]; therefore, a scientifically grounded assessment of the impact of AI on students' activities is highly relevant. Zawacki-Richter and colleagues noted that research on AI in higher education often neglects the teacher and pedagogical theory [1]. Moreover, the evidence on its effects is contradictory: some studies show substantial gains, while others show a weakening of learning.

The research problem is that assessing the impact of AI on students simply as "good" or "bad" is scientifically insufficient; it is necessary to determine in which types of activity and under what conditions AI produces positive or negative results.

The aim of this article is to systematize the positive and negative effects of AI on the activities of student youth on the basis of empirical evidence and to develop recommendations for its responsible use.

The study addresses the following research questions:

RQ1. What positive effects does AI have on students' academic and research outcomes?

RQ2. What negative effects have been identified in the cognitive, ethical and social domains?

RQ3. Which factors determine the direction of the impact?

The theory of cognitive offloading [17] and the empirical evidence on the "Google effect" [16] show that entrusting information to an external tool changes memory and learning strategies. Generative AI extends this mechanism from recalling information to thinking and writing.

Methods

The study was designed as a systematic-analytical review, and the reporting structure follows PRISMA 2020 [14].

The search strategy covers the Scopus, Web of Science, Google Scholar, ERIC and arXiv databases and uses the following keyword combination: "artificial intelligence" OR "generative AI" OR "ChatGPT" AND "students" OR "higher education" AND ("learning outcomes" OR "critical thinking" OR "academic integrity" OR "cognitive"). *[The search date and the numbers of records identified, screened and included should be inserted from the PRISMA flow diagram.]*

The inclusion criteria were peer-reviewed articles, meta-analyses, preprints (only where the methodology is transparent) and documents of international organizations from 2011–2025; participants who were students or belonged to higher education; and outcomes covering academic, cognitive, ethical or social indicators. The exclusion criteria were works with a purely technical description, contexts unrelated to students, and materials whose data cannot be verified.

The findings were coded by "domain of impact" (academic, research, cognitive, ethical, socio-psychological) and "direction of impact" (positive, negative, mixed). Moderating factors that determine the impact (mode of use, pedagogical supervision, the student's prior knowledge) were analyzed separately.

Results

Positive impacts

Learning outcomes and personalization. Intelligent tutoring systems produce results close to the effectiveness of an individual tutor ($d \approx 0.76$) [12]; in a meta-analysis the median effect size was 0.66 [13]. A well-designed AI tutor increased practice performance by up to 127% and had no negative effect in the subsequent independent test [4].

Access to education and inclusiveness. Multilingual explanations, translation, adaptation for students with disabilities and round-the-clock support have the potential to reduce inequality where traditional resources are lacking [2; 3; 10].

Academic writing and research activity. AI saves time in idea generation, outlining, grammatical editing and summarizing literature, especially for students who face a language barrier when publishing in English [3; 24].

Professional competencies. Skills in AI literacy, prompt engineering and human–machine collaboration, which the modern labor market demands, are developed [2; 10].

Negative impacts

Cognitive offloading and weakened learning. In the experiment by Bastani and colleagues, students who used a standard GPT assistant performed well during practice, but after the assistant was removed they performed about 17% worse than the control group [4]. In the EEG study by Kosmyna and colleagues (54 participants, essay writing), reduced neural connectivity and difficulty recalling one's own text were recorded in the group using an LLM; the authors called this phenomenon "cognitive debt" [5]. This work is a preprint, and because of its small sample it should be interpreted with caution.

Decline in critical thinking. Gerlich (666 participants) found a negative correlation between frequent use of AI tools and critical thinking indicators; cognitive offloading acted as a mediating factor, and young people showed the highest dependence [6]. The systematic review by Zhai and colleagues indicates that over-reliance on AI dialogue systems may weaken decision-making, analytical thinking and creativity [7]. It should be remembered that a correlational design does not prove causation.

Academic integrity. Cotton and colleagues emphasize that the risk of plagiarism and ghost-writing has grown in the ChatGPT era and that detection tools are unreliable [8]. Liang and colleagues showed that AI detectors more often mislabel texts by non-native English writers as "written by AI" [18]; this is relevant for students in Uzbekistan as well, since many of them publish in English.

Misinformation and bias. LLMs produce "hallucinations": plausible-looking but incorrect or fabricated information, including fake references [23]; models also reproduce biases present in their training data [9]. For low-resource languages, including Uzbek, quality is generally lower.

Socio-psychological and inequality risks. Differences in access to premium tools and in internet quality may deepen the digital divide [10]; reduced interaction with teachers and peers may affect social skills [15; 24].

Factors determining the direction of impact

Factor	Condition for a positive outcome	Condition for a negative outcome	Source
Mode of use	AI as "scaffolding" (advice, questions, explanations)	AI provides a ready-made solution	[4; 22]
Pedagogical supervision	Clear rules; the process is assessed	No rules; only the final text is assessed	[3; 8; 10]
Student's prior knowledge	A foundation exists, so AI deepens understanding	No foundation, so the student cannot detect errors	[4; 24]
Independent verification	AI answers are checked against sources	Answers are accepted unquestioningly	[23; 9]
Equality of access	Infrastructure open to all	Limited or paid access	[10; 19]

Discussion

The results answer not the dichotomous question "is AI good or bad?" but the question "how and under what conditions?" The main regularity is this: when AI acts

as **scaffolding**, learning is strengthened [4; 12]; when it acts as a **substitute**, cognitive debt accumulates [5; 6]. This provides a unifying explanation of the findings: the difference between the two groups in Bastani's experiment arises precisely from this mode of use [4].

Second, cognitive offloading is not always harmful: tools such as calculators or search engines also remove load [16; 17]. What matters is which operation is being offloaded. Offloading routine operations (formatting, grammar) may be acceptable, whereas offloading the processes that are the core of the learning objective (analysis, argumentation, synthesis) defeats that objective.

Third, the problem of academic integrity cannot be solved through "detect and punish" alone. The unreliability and bias of detectors [8; 18] require redesigning assessment: oral defense, process portfolios, in-class written work and disclosure of AI use [10]. This is also relevant to the practice of assessing dissertations and research articles in Uzbekistan.

Proposed four-level system of recommendations

Level	Responsible party	Main measure
1. Student	Student	Disclose the use of AI; verify every answer against a primary source; try the task independently first
2. Teacher	Faculty member	Define AI zones (permitted / restricted / prohibited) in each assignment; include the process and oral defense in assessment
3. University	Administration	Academic integrity policy; AI literacy course; not relying solely on detectors; data privacy
4. State / policy	Ministry, regulator	National guidelines on AI in education; equal access; high-quality AI resources in Uzbek [10; 19; 21]

Future research should include surveys, interviews and quasi-experimental studies among students in Uzbekistan (for example, comparing the results of essays written with and without AI in a subsequent independent test), which would build a local evidence base.

Limitations

Longitudinal studies on generative AI are scarce, and some of the strong findings rely on small samples or on preprints that have not yet been peer-reviewed; these were interpreted with caution. The article is a review and does not report primary empirical data.

Conclusion

AI has a clear positive effect on student youth through personalization, rapid feedback, wider access to education, and the development of academic writing and professional competencies. At the same time, unsupervised use brings the risks of cognitive debt, weakened critical thinking, violations of academic integrity, acceptance of incorrect information and digital inequality.

The direction of the impact depends not on the technology itself but on the mode of use, pedagogical supervision and the student's prior preparation. A comprehensive approach covering the levels of the student, the teacher, the university and the state is necessary in higher education institutions.

References

1. Zawacki-Richter O., Marín V.I., Bond M., Gouverneur F. Systematic review of research on artificial intelligence applications in higher education – where are the educators? International Journal of Educational Technology in Higher Education. 2019. Vol. 16. Art. 39. DOI: 10.1186/s41239-019-0171-0.
2. Holmes W., Bialik M., Fadel C. Artificial Intelligence in Education: Promises and Implications for Teaching and Learning. Boston: Center for Curriculum Redesign,

2019. 228 p.

3. Kasneci E., Seßler K., Küchemann S., et al. ChatGPT for good? On opportunities and challenges of large language models for education. Learning and Individual Differences. 2023. Vol. 103. Art. 102274. DOI: 10.1016/j.lindif.2023.102274.
4. Bastani H., Bastani O., Sungu A., Ge H., Kabakcı Ö., Mariman R. Generative AI Can Harm Learning. SSRN Electronic Journal. 2024. DOI: 10.2139/ssrn.4895486.
5. Kosmyna N., Hauptmann E., Yuan Y.T., et al. Your Brain on ChatGPT: Accumulation of Cognitive Debt when Using an AI Assistant for Essay Writing Task. arXiv preprint. 2025. arXiv:2506.08872.
6. Gerlich M. AI Tools in Society: Impacts on Cognitive Offloading and the Future of Critical Thinking. Societies. 2025. Vol. 15, No. 1. Art. 6. DOI: 10.3390/soc15010006.
7. Zhai C., Wibowo S., Li L.D. The effects of over-reliance on AI dialogue systems on students' cognitive abilities: a systematic review. Smart Learning Environments. 2024. Vol. 11. Art. 28. DOI: 10.1186/s40561-024-00316-7.
8. Cotton D.R.E., Cotton P.A., Shipway J.R. Chatting and cheating: Ensuring academic integrity in the era of ChatGPT. Innovations in Education and Teaching International. 2024. Vol. 61, No. 2. P. 228–239. DOI: 10.1080/14703297.2023.2190148.
9. Bender E.M., Gebru T., McMillan-Major A., Shmitchell S. On the Dangers of Stochastic Parrots: Can Language Models Be Too Big? Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency (FAccT '21). New York: ACM, 2021. P. 610–623. DOI: 10.1145/3442188.3445922.
10. UNESCO. Guidance for generative AI in education and research. Paris: UNESCO, 2023. 46 p.
11. Murodjon o'g'li, I. S., & Kozimjon o'g, N. M. K. (2025). XIX-ASR BIRINCHI YARIMIDAN XX-ASR IKKINCHI YARIMIGACHA O'RTA OSIYODA



YUZBERGAN INGLIZ-RUS RAQOBATIDA XONLIKLARNING AHAMIYATI. IMRAS, 8(5), 138-147.

12.4. Murodjon o'g'li, I. S., & Kozimjon o'g, N. M. K. (2025). XIX-ASR BIRINCHI YARIMIDAN XX-ASR IKKINCHI YARIMIGACHA O'RTA OSIYODA YUZBERGAN INGLIZ-RUS RAQOBATIDA XONLIKLARNING AHAMIYATI. IMRAS, 8(5), 138-147.

13.5. "Katta o'yin" siyosati davrida Buyuk Britaniyaning O'rta Osiyo masalasiga doir siyosiy qarashlari manbaviy sharhi. (2026). *Jamiyat Va Innovatsiyalar* , *7*(6/S), 76-83.https://doi.org/10.47689/2181-1415-vol7-iss6/S-pp76-83