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THE RELATIONSHIP BETWEEN THE USE OF ARTIFICIAL INTELLIGENCE AND STUDENTS' CRITICAL THINKING AND ACADEMIC AUTONOMY

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Abstract

This article analyzes the relationship between the use of artificial intelligence technologies and critical thinking, independent learning, cognitive engagement, and academic autonomy among higher education students from a psychological and pedagogical perspective. The rapid integration of generative artificial intelligence tools into education is transforming the ways students search for, process, and analyze information, complete academic assignments, and make decisions. On the one hand, artificial intelligence expands opportunities for personalized learning, immediate feedback, explanations of complex information, and independent inquiry. On the other hand, excessive reliance on these tools may pose risks associated with reduced cognitive effort, dependence on ready-made answers, and diminished independent analytical activity. The article examines the interrelationships among cognitive offloading, metacognitive monitoring, self-regulated learning, and academic autonomy. Drawing on existing scientific research, it also distinguishes constructive and detrimental patterns of AI use and develops psychological and pedagogical recommendations aimed at fostering students' critical thinking.

Keywords

artificial intelligence, generative artificial intelligence, student psychology, critical thinking, academic autonomy, cognitive dependence, metacognition, independent learning, academic integrity, digital literacy.

INTRODUCTION

In the twenty-first century, the development of digital technologies has had a significant impact on both the content and organization of education. In particular, the widespread adoption of generative artificial intelligence technologies has intensified the

need to reconsider the processes of knowledge acquisition, information use, scientific inquiry, and independent thinking in higher education.

Today, students use ChatGPT and similar artificial intelligence systems to understand lecture materials, analyze texts, develop outlines, search for scholarly literature, complete written assignments, and solve problems. Although these tools have the potential to improve learning efficiency, the psychological consequences of their use are not uniform.

Within the traditional educational paradigm, students' independent thinking is regarded as one of the principal outcomes of learning. Rather than accepting information as a finished product, students should analyze it, compare it with other information, evaluate evidence, and draw their own conclusions. However, the rapid provision of ready-made answers by artificial intelligence may, in some circumstances, shorten these intellectual processes.

UNESCO's 2023 publication Guidance for Generative AI in Education and Research emphasizes that artificial intelligence should serve as a tool for developing human capabilities in education rather than replacing independent human thinking and decision-making.

From this perspective, the pressing scientific issue is not the use of artificial intelligence itself, but the purposes for which it is used, the extent of its use, and the cognitive strategies underlying that use.

The aim of the study is to provide a scientific and theoretical analysis of the relationship between artificial intelligence use and students' critical thinking and academic autonomy, and to identify the psychological and pedagogical conditions for the effective use of AI in education.

The objectives of the study are as follows:

1. To explain the psychological nature of critical thinking and academic autonomy.

2. To analyze the potential positive and negative effects of artificial intelligence use on cognitive processes.

3. To conduct a comparative examination of the findings of existing empirical studies.

4. To develop recommendations for preserving and strengthening students' academic autonomy.

RESEARCH METHODOLOGY

This article is a theoretical and analytical study employing a targeted, nonsystematic review of scholarly literature, comparative analysis, psychological and pedagogical synthesis, and conceptual modeling.

Scholarly publications concerning artificial intelligence, critical thinking, cognitive offloading, academic autonomy, and self-regulated learning were selected for analysis. Particular attention was paid to research published between 2023 and 2026 and to theoretical approaches explaining the psychological foundations of the issue.

No new empirical survey or experiment was conducted for this article. The reported statistical findings are drawn from studies published by other authors and are used to formulate general theoretical conclusions.

1. The Psychological Nature of Critical Thinking and Academic Autonomy

Critical thinking is characterized as an individual's ability to analyze information logically, evaluate evidence, compare different perspectives, and draw well-reasoned conclusions. It involves not merely remembering or reproducing information, but also examining its reliability and logical foundations.

From a psychological standpoint, critical thinking comprises several interconnected components:

- Cognitive component — analysis, synthesis, comparison, generalization, and logical inference.

- Metacognitive component — monitoring one's own thinking processes, recognizing errors, and adjusting intellectual strategies.

- Motivational component — a desire to discover the truth, intellectual curiosity, and willingness to solve problems independently.

• Reflective component — readiness to reassess one's views, consider alternative perspectives, and revise conclusions.

Academic autonomy, in turn, is expressed in students' ability to set learning goals, plan the process of acquiring knowledge, select information sources, assess learning outcomes, and assume responsibility for educational decisions.

This concept is directly connected with the theory of self-regulated learning. According to Zimmerman (2002), effective learners plan their activities in advance, monitor performance as it unfolds, and reflectively evaluate the outcomes.

The use of artificial intelligence may affect these processes in two different ways. For example, if a student uses AI to explain a complex theory, identify weaknesses in their own conclusions, or find alternative evidence, AI becomes a tool that supports independent thinking.

Conversely, if a student accepts a ready-made response without understanding the substance of the task, the visible outcome of the learning activity may be preserved while the student's internal intellectual engagement is limited.

Thus, academic autonomy does not mean refraining from using technology altogether; rather, it means maintaining intellectual control, personal responsibility, and independent decision-making while using it.

2. Cognitive Opportunities and Psychological Risks of Artificial Intelligence Use

2.1. Positive Opportunities Offered by Artificial Intelligence

Artificial intelligence can provide a number of psychological and pedagogical benefits in education.

First, it makes it possible to explain complex learning materials in ways appropriate to a student's level of preparation. Through diverse examples, simplified explanations, and step-by-step instructions, students may revisit and acquire theoretical knowledge that they previously found difficult to understand.

Second, artificial intelligence can serve as a source of immediate feedback. Students can identify logical gaps in independently prepared texts, essays, or analytical conclusions, improve their arguments, and consider alternative approaches.

Third, artificial intelligence may stimulate students' inquiry-based activities. In particular, rather than using it to obtain ready-made solutions, it is advisable to employ it to formulate new questions, discuss scientific hypotheses, and compare opposing viewpoints.

However, these positive outcomes do not arise automatically. They depend on students' prior knowledge, learning motivation, critical approach, and strategies for using artificial intelligence.

2.2. The Problem of Cognitive Offloading

One psychological mechanism associated with artificial intelligence use is cognitive offloading, that is, transferring some cognitive tasks to an external tool.

In everyday life, people use external tools to perform certain tasks related to memory, calculation, and information processing. Such a strategy may conserve mental resources and is not necessarily negative.

However, the situation becomes more complex when the purpose of a learning task is not merely to produce a finished result, but to develop a specific intellectual ability.

For example, if a student asks artificial intelligence to generate all the ideas, arguments, and conclusions for an analytical essay, the assignment may be completed. Yet the student may fail to adequately practice the skills of analysis, argumentation, and independent writing.

In a study involving 319 knowledge workers, Lee and colleagues (2025) found that greater confidence in artificial intelligence was associated with less effort devoted to critical thinking, whereas greater confidence in personal abilities was associated with more critical engagement. The study analyzed 936 instances of AI use. The authors also showed that, in certain tasks, critical thinking may shift from generating information toward checking and integrating it.

Although these findings do not directly concern university students, they provide an important scientific basis for understanding the relationship between confidence in artificial intelligence and cognitive engagement.

2.3. Cognitive Dependence and Academic Passivity

One potential risk of regular artificial intelligence use is that students may become overly reliant on external technological assistance instead of responding to intellectual challenges independently.

Such cognitive dependence may manifest as difficulty initiating independent assignments, lack of confidence in one's own conclusions, uncritical acceptance of ready-made answers, and insufficient intellectual effort when solving complex problems.

In a study of 580 Chinese university students, Tian and Zhang (2025) reported that higher levels of dependence on artificial intelligence were associated with lower critical-thinking scores, while cognitive fatigue partially mediated this relationship. The authors also indicated that information literacy may mitigate this association under certain conditions.

It is particularly important to emphasize that correlational findings do not prove that dependence on artificial intelligence directly causes a decline in critical thinking. For example, students who initially possess less developed critical-thinking skills may themselves be more likely to seek assistance from AI.

Therefore, evaluating this relationship requires longitudinal and experimental studies capable of clarifying causal connections.

3. Empirical Analysis of the Relationship Between Artificial Intelligence and Students' Critical Thinking

Recent scientific studies indicate that the relationship between artificial intelligence use and critical thinking is not unidirectional. Whereas some studies associate excessive reliance on AI with cognitive passivity, others report positive associations between AI literacy, reflective use, and indicators of critical thinking.

In particular, a study by Khalid, Sheraz, and Shah (2025), involving 384 undergraduate and graduate students, found that generative AI literacy was positively associated with a disposition toward critical thinking and negatively associated with cognitive offloading. Cognitive offloading also emerged as a mediating variable in this relationship.

This finding indicates that effective artificial intelligence use is not limited to technical proficiency. Students must also understand AI's potential for error, its limitations, and the need to verify information.

In a qualitative study involving 12 university students in Bangladesh, Roy and Jony (2026) identified patterns associated with generative AI use, including superficial engagement with academic materials, difficulties in self-regulating cognitive effort, and increasing reliance on external intellectual assistance. The participants recognized both the convenience of these technologies and the risks of relying on them excessively.

At the same time, a 2026 study based on data from 353 Chinese students showed that AI users do not constitute a psychologically homogeneous group. The researchers identified several profiles based on usage characteristics and reported that learning motivation was significantly associated with self-perceived growth in critical thinking and cognitive independence.

These findings suggest that the frequency of artificial intelligence use alone cannot fully explain a student's level of critical thinking. The tasks for which AI is used, the underlying motivation, and the degree of independent oversight may be more important.

Table 1. Comparative Analysis of Selected Empirical Studies on the Topic

Authors	**Participants**	**Main finding**
Lee et al. (2025)	319 knowledge workers	Greater confidence in AI was associated with less effort devoted to critical thinking.
Tian and Zhang (2025)	580 students	A negative association was found between AI dependence and critical thinking.
Khalid et al. (2025)	384 students	AI literacy was positively associated with a disposition toward critical thinking.
Roy and Jony (2026)	12 students	Qualitative analysis identified risks of superficial learning and cognitive dependence.
Study of Chinese universities (2026)	353 students	Cognitive outcomes varied according to usage profiles and motivation.

The results presented in the table are based on different methodologies, participant groups, and measurement instruments. It would therefore be inappropriate to combine them into a single statistical finding or to treat them as directly equivalent.

4. The Role of Metacognitive Monitoring and Learning Motivation in the Development of Academic Autonomy

Metacognition occupies a central place in explaining students' relationships with artificial intelligence from a psychological perspective.

Metacognition is the ability to recognize and regulate one's own knowledge, thinking processes, and learning strategies. A student with this ability does not accept information provided by artificial intelligence as unquestionable truth. Instead, the student checks sources, seeks alternative evidence, and compares the response with their own knowledge.

An important psychological prerequisite for academic autonomy is intrinsic learning motivation. If a student's primary goal is to acquire a deep understanding of knowledge, artificial intelligence can become a supporting tool that enriches learning. If the primary goal is merely to complete an assignment quickly or obtain a high grade, the likelihood of seeking a ready-made result from technology increases.

On this basis, two broad strategies for using artificial intelligence can be distinguished.

The first strategy is constructive use. The student first analyzes a problem independently, develops an initial hypothesis, and uses artificial intelligence only for additional explanations, alternative approaches, or critical evaluation. In this case, the human learner remains the principal agent of the thinking process.

The second strategy is substitutive use. The student delegates the main intellectual stages of the assignment to artificial intelligence and accepts the result without independent verification. Although an academic product is created, the student's personal intellectual engagement in producing it may be limited.

Distinguishing these two strategies shows that educational evaluation should consider not only the amount of technology use but also its psychological quality.

5. A Conceptual Model of Artificial Intelligence Use, Critical Thinking, and Academic Autonomy

Based on the scholarly literature reviewed, the relationship between artificial intelligence use and students' academic autonomy can be explained through the following theoretical model:

Use of Artificial Intelligence

Purpose, frequency, independent oversight, and usage strategy

Constructive Strategy

Independent inquiry, information verification, and reflection

Substitutive Strategy

Reliance on ready-made answers and unverified acceptance

Support for independent analysis and metacognitive monitoring

Reduced cognitive effort and risk of dependence

Academic autonomy may develop

Risk of declining academic autonomy

Figure 1. A theoretical model proposed by the author based on a review of the scientific literature. The model requires separate empirical testing.

According to this model, the association between artificial intelligence use and critical thinking can be explained through psychological factors such as usage strategy, learning motivation, metacognitive monitoring, and AI literacy.

A key point is that the educational outcomes of technology depend not only on its technical capabilities but also on the extent to which students can independently organize their intellectual activities.

6. DISCUSSION AND PRACTICAL RECOMMENDATIONS

The research reviewed shows that artificial intelligence use is creating new psychological and pedagogical challenges for education. It is no longer sufficient to assess only students' final academic products. It is also necessary to consider the intellectual processes through which those outcomes were achieved.

For example, a high-quality essay or scientific analysis produced with the assistance of artificial intelligence does not always fully reflect a student's independent thinking ability. Accordingly, assessment should incorporate oral defenses, independent argumentation, reflective reports, and analytical tasks completed in the classroom.

Kasneci and colleagues (2023) likewise emphasize the importance of critical thinking, fact-checking, understanding technological limitations, and maintaining human oversight when integrating large language models into education.

The following recommendations can be proposed on the basis of the theoretical analysis:

1. Introduce the principle of "Independent thinking first, artificial intelligence second." Students should initially formulate their own ideas, plans, or solutions for an assignment and only then compare them with AI-generated responses.

2. Increase opportunities for critical verification. Students should be assigned exercises requiring them to identify logical flaws, unsupported claims, and incorrect references in AI-generated answers.

3. Introduce reflective writing practices. Students can briefly explain how they used artificial intelligence, which ideas they developed independently, and which information they verified.

4. Develop metacognitive skills. Learning activities should emphasize goal setting, monitoring one's own work, analyzing the causes of errors, and independently evaluating results.

5. Clearly define academic integrity rules. Higher education institutions should transparently specify permitted and restricted uses of artificial intelligence according to the nature of each learning task.

6. Improve educators' AI literacy. Rather than limiting their approaches to either prohibiting the technology or allowing unrestricted use, teachers should design instructional tasks that encourage students to think independently.

Implementing these recommendations may also be important for higher education institutions in Uzbekistan. In particular, purposeful approaches to using AI should be developed for analytical essays, scholarly discussions, case-based problems, and independent research in pedagogy, psychology, the social sciences, and other disciplines.

Future empirical research on this topic could use correlation and regression analyses to examine the relationships among students' frequency and purpose of

artificial intelligence use, levels of critical thinking, indicators of academic autonomy, and learning motivation.

Experimental and longitudinal studies would also be appropriate to determine whether specific pedagogical approaches to artificial intelligence use actually influence the development of independent thinking.

CONCLUSION

Studying the relationship between artificial intelligence use and students' critical thinking and academic autonomy is an important area of contemporary educational psychology.

The analysis leads to the following principal conclusions.

First, artificial intelligence creates extensive opportunities for acquiring complex knowledge, analyzing information, and meeting individual learning needs. However, the effective use of these opportunities depends on students' intellectual engagement and independent oversight.

Second, excessive reliance on artificial intelligence may increase the risks of cognitive offloading and academic passivity. At the same time, further research is needed to clarify the direction and causal nature of this relationship.

Third, AI literacy, intrinsic learning motivation, and metacognitive monitoring emerge as important psychological factors in explaining the relationship between technology use and critical thinking.

Fourth, academic autonomy can be supported not by abandoning technology, but by cultivating a culture of conscious, responsible, and critical use.

Fifth, the integration of artificial intelligence tools into higher education institutions should be aligned with pedagogical methods, assessment criteria, and academic integrity principles designed to preserve students' independent intellectual activity.

Thus, artificial intelligence can support students' critical thinking and academic autonomy only when it is used in education not as a mechanism that replaces human thought, but as an intellectual tool that contributes to its development.

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