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Does artificial intelligence impede critical thinking? A case study of Iranian university students

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Abstract

This study examines the way artificial intelligence (AI) impacts critical thinking among Iranian university students in relation to the ways in which it may either promote or inhibit cognitive involvement, focusing specifically on these factors. Using a mixed methods approach, the study collected responses from 348 students using questionnaires and interviewed students in greater depth to explore their perceptions of AI in decision-making, problem-solving, and bias awareness. The findings showed that students are very worried about relying too much on AI. The students who answered the survey felt that AI made them less independent or critical in their thinking, more comfortable with automation, and more biased by algorithms. Still, everyone agrees that AI literacy should be taught in universities so that students can think critically about the information AI gives them and avoid being biased. This will help with balanced cognitive engagement. This study argues that while AI can enhance decision-making, its associated dangerous effects must be managed via ethical development, education reforms, and lifelong learning initiatives to present AI as a friend of critical thinking rather than a threat.

Introduction

Artificial intelligence has become a real puzzle to the human race. On many occasions, it has outperformed human intelligence. As a significant part of human intelligence and as one of the 21st century skills (communication, creativity, critical thinking, and collaboration), critical thinking has been affected by AI.

AI can mirror human capabilities in decision-making, problem-solving, designing, learning, etc. (Kutty et al., 2024; Mohammadkarimi, 2023; Valenzuela, 2025, Vallor, 2024). The emergence of these human-like functions has raised concerns among scholars, as it may lead individuals to become less motivated to apply effort and engage their cognitive abilities in performing such tasks. In other words, AI may cause some sort of impediment to the human race to think critically. Though AI has transformed education, its impact on critical thinking is still controversial among scholars (Darwin et al., 2024; Jayasinghe, 2024; Larson et al., 2024; Muthmainnah et al., 2022). AI-powered tools, such as chatbots, offer efficiency and convenience (Ahmad et al., 2024); however, they pose risks to learners' critical thinking. If learners depend solely on AI tools to write an essay for them, the required cognitive effort to do the analytical task of collecting ideas, arranging them into coherent paragraphs, and selecting the suitable vocabulary and structure is not practiced properly. In other words, the various dimensions of critical thinking, such as analyzing ideas, creating and evaluating arguments, and decision-making and problem-solving relevant to the topic addressed by the essay, have not been adequately exercised.

De Cremer and Kasparov (2021) believe that machines powered by AI can now do complex cognitive work that can replicate the work of human minds. However, they still think those machines have characteristics such as being "fast, more accurate, and consistently rational" that outscore human beings, but they are not "intuitive, emotional, and culture specific" (p.2). This implies that though the machines have evolved to a high level of performance, they still lack very significant human-like traits that can make them as effective as human beings. As such, AI is able to take over some of the tasks and work by humans, but may not be able to replicate how humans approach these tasks fully (Popenici et al., 2023; Rudolph et al., 2024).

Literature review

AI can surely streamline processes for learners by swiftly carrying out what is required, but stifles their creativity in one way or another. The potential to save time and effort for language learners with AI is vast; learners can easily talk to bots to practice their speaking skills, for example. However, overreliance on the data provided by AI-powered tools may cause problems for them, as the data might be biased, not convenient in terms of cultural dimension, and the way education helps learners critically assess the information provided by the tools (Broadhead, 2024; Broussard, 2023).

In addition to Facione's (2011) well-established model of critical thinking, Brookfield et al. (2019) offered an important perspective by emphasizing that critical thinking is not only a matter of mastering cognitive skills but also of questioning the ideologies and power structures internalized by individuals. According to Brookfield, critical thinking involves the ability to recognize, analyze, and challenge dominant ideologies rather than merely accepting them. He highlights that fostering critical thinking requires exposure to multiple perspectives, reflective questioning, and an awareness of social justice issues embedded in education. Brookfield also identifies the necessity of cultivating critical self-reflection through four lenses: students' perceptions, colleagues' feedback, theoretical perspectives, and personal experience. This broader understanding of critical thinking — linking it to power, ideology, and social change — is particularly relevant when considering how AI may influence thinking skills and autonomy in educational contexts. AI tools could either support critical reflection and democratize learning or, conversely, reinforce passive acceptance of algorithm-driven outputs unless users are equipped with robust critical capacities (Brookfield et al., 2019).

On the other hand, AI is defined as "the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable." (Boden, 2018, p. 2). According to the definition, the whole issue is about making machines intelligent, or in Nilsson's (2009) words, "endowing machines with intelligence" (p. 13). In other words, the term refers to the type of intelligence that is endowed to human beings but simulated by machines.

Hence, intelligent machines can perform work that humans do; however, what if the work is more sophisticated and complex? Tasks such as medical diagnosis, legal document analysis, autonomous driving in unpredictable environments, and creative content generation (like writing or composing music) exemplify the kinds of difficult activities increasingly undertaken by AI. The type of work done by the AI-powered machine or tool has the potential to make human beings exert less effort to carry out these complex tasks.

Regarding AI-powered technologies in education, particularly, it is believed that AI tools can change the tasks to be automated, through which the chance of thinking to solve problems, making decisions, evaluating and analyzing ideas, and defending arguments is null (Mohammmadkarimi & Qadir, 2025; Rudolph et al., 2025). Hence, no chance for some cognitive tasks by humans has been left since AI is doing it more efficiently. Poliakov (2024) stated that AI tools have begun to be introduced into education, and they are under consideration by many scholars, policy makers, teachers, program designers, etc. Popenici (2023) and Rudolph et al. (2025) suggested that education systems should rethink and redevelop their programs to be responsive to the new learning environment created by AI-powered technologies. Their suggestion indicates that AI-powered technologies will significantly influence the education sector, contingent upon data quality, learners' critical engagement with available data, and the necessity for a balance between AI utilization

and personal cognitive skills in the learning process.

A research study by Rusandi et al. (2023) explored the role of AI in academic research and education with a particular focus on advancing critical thinking skills and preserving intellectual honesty. According to the authors, AI is able to supplement learning and research processes when used honestly and correctly. They also believe that the integration of specific teaching methods in education and research can help develop better critical thinking skills. The article highlights the crucial need for fostering critical thinking abilities in students and researchers to navigate the realm of AI effectively, distinguishing reliable information from hoaxes and misinformation. It concludes that the partnership between AI and humans in education and research promises substantial advantages for both individuals and society, as long as there is a continued emphasis on honing critical thinking skills and upholding academic integrity.

Darwin et al. (2024) investigated the perceptions of master's degree EFL students regarding the impact (advantages and disadvantages) of AI in advancing critical thinking. For this study, qualitative research methodology was applied, where seven students came together from two Indonesian universities, mainly purposively sampled for the study. Data collection tools included case studies and semi-structured interviews. The results point to a subtly and distinctively construed view of critical thinking that involves questioning norms, contextual analysis, and evaluation of evidence. This led to the discovery that participants recognize the value of AI in facilitating various aspects of critical thinking, such as academic research or theoretical examination. However, the students evinced AI limitations regarding personalization issues, the potential for an electronic echo, and nuances in understanding it. The conclusion of the study is that AI can add to the development of critical thinking skills, but it requires careful management and a balanced approach to how to handle it while using it.

Jia and Tu (2024) carried out a study that examined the impact of AI capabilities on fostering critical thinking awareness among college students post-COVID-19. It highlighted the challenges that students faced during the pandemic, such as educational disruptions and increased stress, which could harm their critical thinking skills. The research used resource-based theory to view universities as entities with AI resources and investigated if AI can enhance students' critical thinking by boosting self-efficacy and motivation. Data from 637 students was analyzed using structural equation modeling, revealing that AI indirectly strengthens critical thinking through self-efficacy and motivation, but its direct effect is not significant. The study underscored the importance of self-efficacy in developing motivation and critical thinking, suggesting that while AI reshapes cognitive learning, its direct impact on thinking must be approached cautiously. The research contributes to understanding AI's role in education and its potential to develop critical thinking skills necessary for future growth.

Faqih (2023) also investigated college students' attitudes towards AI in developing literacy and critical thinking. The study used a mixed-methods approach with surveys and discussions among 60 students, analyzing their views before and after an AI learning activity. The findings show an increased recognition of AI's potential to enhance higher-level skills post-activity. Despite ongoing concerns about privacy, tech dependence, and ethics, students were more open to using AI responsibly. Their perceptions were influenced by their experiences with AI's development and application in education. The study suggests that with proper education on AI's responsible use and supportive policies, AI can significantly contribute to students' critical thinking skill development and empowerment.

Parsakia's (2023) article reviewed the complex effects of chatbots and AI on students' psychological and cognitive development in education. The study discussed the benefits of chatbots for academic support and personalized learning, as well as ethical concerns. The literature suggested that chatbots can boost self-efficacy and engagement, with mixed effects on self-esteem and self-confidence. While they may improve problem-solving skills and critical thinking, over-reliance could hinder the development of alternative strategies and real social interactions. The article emphasizes the need for future chatbot advancements to positively influence psychological well-being and cognitive growth, ensuring a balance between independent problem-solving abilities and critical thinking.

Essien et al. (2024), in their study, examined the impact of generative AI, particularly AI text generators like ChatGPT, on the critical thinking abilities of postgraduate business students in the UK. Employing Bloom's taxonomy for structure, the mixed-method research with 107 participants found notable improvements primarily at the taxonomy's lower levels. The study also raised concerns about the reliability, accuracy, and ethical use of AI in academia. The paper underscored the importance of a holistic approach to developing critical thinking and related skills in higher education, providing valuable insights for educators and policymakers on the nuanced effects of AI technologies in learning environments.

Though the role and impact of AI on critical thinking are highlighted by many studies, it still needs to be further researched. Nearly all the results of the reviewed studies highlight the positive impact of AI on critical thinking; however, concerns were raised that issues such as ethical considerations, the balance of use between AI and critical thinking, and the quality of the information provided by AI sources, among others, need to be handled carefully. The current study attempts to address the areas that have not been attended to before. Hence, the topic for the current study to address is, as its title implies, the impact of AI on human critical thinking and creativity. The effect can be both positive and negative; it can be on problem-solving, decision-making, understanding and analyzing ideas, creation and evaluation of arguments, etc. Sometimes, the biases in AI algorithms play a negative role in shaping critical things; thus, it is one of the goals of the current study to find the role and how to reduce it. Additionally, the study also attempts to identify how education influences individuals' ability to assess AI-powered information and how to maintain a balance between AI use and critical thinking.

Method

Research design

In order to comprehensively examine the very complicated and varied influence of artificial intelligence on critical thinking, it needed a capture method of measurable pattern and in-depth perspective. Here, the purpose is to understand a certain pattern across large student populations, but indeed some aspects such as individual reasoning processes, beliefs, and interactions with AI. Hence, it needs to be a mixed-methods design, which could accommodate the different approaches—from the quantitative breadth to the qualitative depth approach—in addressing the research question.

Participants

The study involved a diverse sample of 348 EFL students drawn from various educational backgrounds (undergraduate, master`s, and PhD) in different Iranian institutions. Participants were chosen based on age, educational level, and professional experience to ensure a representative sample. Convenience sampling was used to choose these participants according to their willingness and availability to participate in the study. Moreover, students' frequent use of AI was another criterion for choosing them. Information about the participants is illustrated in Table 1.

Table 1. Demographic information of students.

No	Female	Male	Age (average)	Undergraduate	Master	PhD
348	197	151	26	147	112	89

Data collection

The researchers developed a survey questionnaire to assess participants' experiences with artificial intelligence and its impact on critical thinking. The reliability of the questionnaire based on the Cronbach's alpha was about 0.91. Likert-scale questions were used to quantify responses, capturing the degree of influence AI has on decision-making and critical thinking. Additionally, demographic information and participants' educational backgrounds were collected. Moreover, semi-structured interviews were conducted with a subset of participants to delve deeper into their experiences and perceptions. Open-ended questions were used to explore intricacies in the relationship between AI use and critical thinking. Interviews were recorded, transcribed, and anonymized to ensure data accuracy and participant confidentiality. It should be mentioned that before collecting data, all participants signed the consent form.

Data analysis

Quantitative data were analyzed using descriptive statistics, including frequencies and percentages. Correlation analysis was employed to identify relationships between variables. Qualitative data underwent thematic analysis to extract patterns, themes, and insights from participants' narratives. The integration of both types of data provided a comprehensive understanding of the impact of AI on critical thinking skills.

Research questions

1. How does the use of artificial intelligence impact people's critical thinking skills in decision-making contexts?
2. What role do biases in AI algorithms play in shaping critical thinking, and how can we reduce these biases?
3. How does education influence individuals' ability to critically assess information generated by AI, and how can education help maintain a balance between AI use and critical thinking skills?

Results

Questionnaire

The results of the questionnaires are presented in the following sections. The first five questions present the impact of AI on critical thinking skills.

Items	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Impact of artificial intelligence on critical thinking skills					
1. AI-assisted decision-making enhances my ability to analyze information critically.	2%	11%	12%	34%	41%
2. Relying on AI for routine tasks has led to a decline in my independent critical thinking.	33%	39%	5%	9%	14%
3. Integrating AI in decision-making has improved the overall quality of my critical thinking.	2%	11%	12%	33%	42%
4. I feel less engaged in problem-solving when AI is involved in decision-making processes.	22%	51%	4%	16%	7%
5. AI's influence on decision-making has positively impacted my ability to make well-informed judgments.	15%	24%	2%	31%	28%

Only 13% of respondents agreed or strongly agreed that AI-assisted decision-making enhances their ability to analyze information critically, while a majority of 75% expressed some level of disagreement with this statement. A considerable 72% of respondents either agreed or strongly agreed that relying on AI for routine tasks has led to a decline in their independent critical thinking, indicating a widespread concern among participants. Similarly, only 13% of respondents agreed or strongly agreed that integrating AI in decision-making has improved the overall quality of their critical thinking, contrasting with 75% expressing some degree of disagreement. A significant 73% of respondents either agreed or strongly agreed that they feel less engaged in problem-solving when AI is involved in decision-making processes, highlighting a common sentiment among participants. While 39% of respondents either agreed or strongly agreed that AI's influence on decision-making has positively impacted their ability to make well-informed judgments, a substantial 59% expressed some level of disagreement with this statement.

Role of AI's biases in shaping critical thinking					
6. I am concerned about the potential biases in AI algorithms affecting critical thinking.	8%	28%	1%	37%	26%
7. Biases in AI algorithms hinder my trust in the decisions made by artificial intelligence.	35%	28%	3%	25%	9%
8. The presence of biases in AI algorithms challenges my ability to think critically about information presented.	55%	34%	1%	8%	2%
9. Awareness of AI biases has prompted me to critically evaluate information more thoroughly.	16%	32%	0%	37%	15%
10. Efforts to reduce biases in AI algorithms are essential for promoting unbiased critical thinking.	57%	39%	1%	3%	0%

In the second section of the questionnaire, 29% of respondents expressed concern about potential biases in AI algorithms affecting critical thinking, with a majority of 63% expressing some level of indifference or lack of concern regarding this issue. A notable 63% of respondents either agreed or strongly agreed that biases in AI algorithms hinder their trust in the decisions made by artificial intelligence, indicating widespread scepticism among participants. A significant 89% of respondents either agreed or strongly agreed that the presence of biases in AI algorithms challenges their ability to think critically about information presented, highlighting the substantial impact of biases on critical thinking processes. While 48% of respondents either agreed or strongly agreed that awareness of AI biases has prompted them to critically evaluate information more thoroughly, a considerable 52% expressed some level of disagreement with this statement, indicating a mixed response to the awareness of biases. An overwhelming 96% of respondents either agreed or strongly agreed that efforts to reduce biases in AI algorithms are essential for promoting unbiased, critical thinking, underscoring the widespread recognition of the importance of addressing biases in AI for fostering critical thinking.

Education and critical thinking					
11. Education has equipped me with the skills to critically assess information generated by AI.	4%	3%	0%	56%	37%
12. AI literacy should be a fundamental part of education to enhance critical thinking.	56%	44%	0%	0%	0%
13. Education has played a significant role in maintaining a balance between AI use and critical thinking skills.	0%	0%	1%	48%	51%
14. I feel confident in my ability to navigate the integration of AI while preserving critical thinking skills.	18%	24%	3%	33%	22%
15. Educational programs should focus on fostering a balance between AI utilization and the development of critical thinking skills.	49%	51%	0%	0%	0%

Only a small minority of 7% of respondents agreed or strongly agreed that education has equipped them with the skills to critically assess information generated by AI, while a substantial 93% expressed some level of disagreement with this statement. A significant 100% of respondents either agreed or strongly agreed that AI literacy should be a fundamental part of education to enhance critical thinking, indicating unanimous support for the integration of AI literacy into educational curricula. Interestingly, a substantial 99% of respondents either disagreed or strongly disagreed that education has played a significant role in maintaining a balance between AI use and critical thinking skills, suggesting a prevailing sentiment that education has not effectively addressed this balance. While 45% of respondents agreed or strongly agreed that they were confident in their ability to use AI while still being able to think critically, a significant 55% stated that they were not sure or did not feel confident in this area. All respondents (100%) either agreed or strongly agreed that educational programs should focus on finding a balance between using AI and learning how to think critically. It also indicates that everyone agreed on the significance of having this balance in educational settings.

Interview

Theme 1: AI's influence on critical thinking (enhancement vs. inhibition)

Across all academic levels—PhD, master's, and undergraduate—students recognized that AI can support decision-making and facilitate tasks, but they also expressed concern that excessive reliance on AI could hinder the development of independent thought. Students emphasized that while AI is a useful tool, it must be critically engaged with in order to preserve and activate higher-order thinking skills.

PhD Student 48:

"The way humans consider making decisions changes when artificial intelligence is introduced. The overreliance on AI can sometimes dull our instinctive sense of critical thinking. Decision-making will find a sharper edge if AI is combined with human thought."

Master's Student 92:

"Critical thinking influenced by artificial intelligence remains a critical subject. While AI provides beneficial information and makes things easier, it can also lead to some… bias and errors. To enhance critical thinking, one needs to develop the habit of verifying and questioning AI-generated information."

Undergraduate Student 13:

"While some problems can be solved with lightning speed through AI, human intervention still holds significance. This brings us to the real essence of developing our critical thinking skills: the constant need to engage with and challenge the information provided by an AI system while attempting to look at it from multiple perspectives."

This theme highlights the dual nature of AI: as a powerful facilitator of thinking and problem-solving, but also as a potential barrier to active cognitive engagement if not used reflectively.

Theme 2: Bias in AI and its impact on judgment

Participants noted that biases embedded in AI algorithms can shape the way information is received and interpreted, influencing user conclusions and undermining fair and balanced reasoning. These biases were seen as a significant threat to critical thinking and independent judgment, especially when AI outputs are taken at face value.

PhD Student 31:

"As previously mentioned, biases exhibited in AI algorithms modify information given to us, thus having far-reaching implications on critical thinking. These biases may allow us to make certain conclusions while completely overlooking others. Continuous auditing and evaluation of AI systems are put in place to lessen the imperfections and improve them."

Master's Student 85:

"In general, using information, artificially powered programs, and their biases affects the critical way we think. They can either amplify or lessen voices without intending to. Some methods repair and remove that problem."

Undergraduate Student 93:

"AI biases may support prejudices or ignore the views of minorities without realizing it. To get rid of bias, we need to focus on teaching moral AI and supporting openness in how algorithms make decisions."

In response, students proposed several solutions including more transparent AI systems, ethical programming, and continuous algorithmic inspections. These suggestions underscore the need for responsible AI development and awareness of its sociocultural impact.

Theme 3: The role of education in developing critical thinking

All students agreed that education plays a key role in equipping individuals with the tools to critically analyze AI-generated content. The level of depth and sophistication in understanding varied by academic level, with graduate students displaying a more nuanced approach.

PhD Student 12:

"University education allows students to critically analyze AI-generated content. Students are taught how to critique AI output for errors and bias. Education also helps students learn more about the ethics of AI and pushes them to keep learning so that they can find a balance between using AI and using critical thinking skills."

Master's Student 56:

"Education improves students' ability to think critically about information generated by AI by teaching basic skills in data analysis and interpretation. Students at the master's level learn how to tell the difference between useful and useless AI results."

Undergraduate Student 7:

"Education provides individuals the abilities they need to think critically about information generated by AI. Even though it's not much, students learn the basics of data analysis and logical reasoning through their coursework. This gives them important critical thinking skills."

The interviews show that education serves not only as a safeguard against uncritical AI adoption but also as a formative environment in which students learn to navigate complex, algorithm-driven information with discernment.

Discussion

Interpretive findings from the questionnaire and interviews indicate that Iranian university students are quite worried about the effect of AI on their critical thinking skills. Most participants were sceptical about AI-aided decision-making, as they believed that it would not improve their ability to critically analyze information. This illustrates what De Cremer and Kasparov (2021) were concerned about regarding the argument that although AI could perform sensitive cognitive tasks faster and more accurately than a human, it still lacks essential human qualities such as intuition or emotional understanding. This may encourage dependency on AI without activating critical cognitive skills. Such concerns align with Valenzuela's (2025) concern that excessive dependence on AI can inhibit the exercising of critical thinking skills because users get accustomed to delving into AI for decisions to be made.

A significant majority answered that dependency on AI for such target-setting tasks does not lend itself to independent critical thinking. This aligns with Poliakov's (2024) research, which highlights how AI tools often automate tasks that rely heavily on human analysis and reasoning, leading to cognitive engagement activities like task automation and AI replacement. These are also affected by what Spector and Ma (2019) say about how AI's ability to do critical thinking tasks can eventually make it harder for people to do more meaningful cognitive tasks, especially in educational settings where analytical skills should be taught.

Regarding this, a number of participants expressed a reluctance to engage in problem-solving when assisted by AI. According to Darwin et al. (2024), such students would say that the AI could help their academic research, but that it might end up making them echo chambers or robbing them of the fine-grained understanding of complex issues. Jia and Tu (2024) further mentioned that interaction with technology passively dampens one's intrinsic motivation to engage critically with problems. This, they say, is because it is indirect: there is an increase in motivation and self-efficacy, but the cognitive engagement aspect is minimal.

Some students acknowledged that seeing AI insights alongside their evaluation might help them maintain or even improve their critical thinking skills. This resonates with what De Cremer and Kasparov (2021) called "augmented intelligence," where AI is intended to supplement something that humans can do rather than take over entirely. Rusandi et al. (2023) agree with this point of view. They claim that AI is an important part of student education because it helps students think critically about and put external information from AI into context. This helps them make ethical decisions and think critically.

Critical issues involving the biases that need to be addressed in AI systems are also identified by the findings. Similar to Essien et al. (2024), who explain how AI generative models like ChatGPT may imbue biases and consequently cause biased or unbalanced decision-making, most of the participants agreed that biases in AI algorithms undermine their ability for critical thinking. This is supported by research by Valenzuela (2025), which cautions that AI's use of biased data can undermine the creation of autonomous, critical thinking. Some of them were much more careful about the content, while some argued that this consciousness was inadequate, an argument that fits well within Faqih's (2023) research call for explicit education on the moral application of AI since it might enable students to challenge AI outputs critically rather than be overly dependent on them.

Most of the participants agree that the minimization of AI biases is essential in promoting unbiased, critical thinking. This position is supported by the hypotheses of Poliakov (2024) toward greater justice and transparency in AI systems. Rusandi et al. (2023) call for research on AI bias elimination. They mention algorithmic transparency and the need for ethics-oriented AI training toward balanced and unbiased decision-making.

Continual monitoring of AI systems was also called for in the interviews. The students called for ethical AI education and showed how biases produce part of their information. This is consistent with Darwin et al. (2024), who would argue for a balanced approach toward integrating AI, thus maximizing its potential yet minimizing its disadvantages with regard to academic dishonesty and critical thinking.

The results also show that education falls greatly short of preparing students to assess information created by artificial intelligence. Many of the respondents surveyed by Poliakov (2024) thought that education had not properly trained them to weigh the uses of AI versus critical thinking. These writers assert that technological advancement runs ahead of school curricula, and thus, students are not prepared to deal with the intricacies pertinent to artificial intelligence. This educational gap is even more glaringly apparent when analyzed through the lens of Spector and Ma (2019), who argue for a radical change in educational priority toward the building of critical thinking capability in an AI world.

The general consensus for incorporating AI literacy into education for developing critical thinking skills has been corroborated by Rusandi et al. (2023) and Faqih (2023), who advocate for instructional activities that would instruct students to systematically evaluate AI-generated information. Such AI literacy would address Poliakov's (2024) call for "AI-ready education," merging technological literacy with ethics and critical thinking. Endorsing De Cremer and Kasparov's (2021) view that just as AI is created to complement human intelligence, so should there be an attempt to strike a balance between AI in schools and the development of critical thinking skills.

Thus, the study confirms the concerns about AI's counterproductive role, being both the enabler and inhibitor of critical thinking. Some past works, like Rusandi et al. (2023) and Essien et al. (2024), have highlighted various threats associated with overreliance on AI, such as impaired cognitive functions and reinforcing biases. The suggestions put forward by Poliakov (2024) and Faqih (2023)—on the need to equip students with at least the rudiments of assessment skills to counter AI's interference in learning—are also compatible with the call for making AI literacy an obligatory component of learning.

Conclusion

The topic of AI was instrumental in evaluating the critical faculties of interviewed participants from Iranian universities. It could be a harbinger of good changes being instigated by AI, while on the other hand, it could also be a deterrent to AI promoting autonomous critical thinking if much dependence and overuse are made upon it. The participants expressed their concerns over the risk posed by AI derived from algorithmic bias, over-reliance on automation, and potential loss of problem-solving skills. Further, the discussion clarified that the current systems of education were not sufficiently geared toward nurturing critical examinations of AI information/outputs. They did, however, concur on incorporating AI literacy into the curriculum so that the students are provided with what is necessary for them to critique AI outputs, recognize biases, and preserve intellectual autonomy.

As per the results, higher educational institutions need to immediately include well-structured modules on critical thinking with AI into their programs. They must also engage their faculties in training on how students can be guided on the use of AI tools, as well as help them in developing critical thinking skills concerning the limitations, ethics, and possible societal effects of such tools. With this, it can reposition higher education into a thoughtful human-AI collaboration rather than passive AI adoption.

The research has limitations, even with its contribution. The results might be less applicable to other academic and cultural settings as the sample population was made up of only Iranian university students. The reliance on self-reported data also increases the risk of bias and does not necessarily represent the actual behavior or ability of participants. The study also successfully disregarded the views of educators, policymakers, and AI developers in favor of giving priority to the views of students, which could have resulted in a more holistic picture of the issue.

Subsequent research needs to be conducted in various cultural and educational contexts to address these shortcomings. Longitudinal research also needs to be carried out to offer follow-up on the long-term effects of AI on critical thinking. An analysis of the perceptions of teachers and legislators would also yield valuable insights into the institutional steps needed to stem the dangers of AI. Moreover, certain interventions, such as AI literacy training, can be assessed in terms of their impact on the development of critical thinking skills by empirical research. For example, one outcome of enrolling in such programs is that through more process-based measures of students' learning - an understanding of how things are or not working - determining instructional styles will shed light

on how different indications of such instruction affect the cognitive engagement of students. Studying the ethical ramifications and designs for the inclusion and transparency of AI systems could nurture a more inclusive application of AI in education.

This creates both risk and potential where AI and critical thinking intermingle. On one hand, AI can assist people with decision-making; on the other hand, excessive reliance on AI breeds apathy of cognitive agency and challenges meaningful engagement. To address such dilemmas, stakeholders should work together to integrate AI literacy into existing curricula, make AI systems transparent and fair, and finance lifelong learning programs to bolster the development of autonomous reasoning skills alongside AI applications. Therefore, from this standpoint, if the balance is achievable, stakeholders can transform AI into an asset rather than an impediment, thus allowing people to navigate the digital age confidently.

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