

## Progress or Peril? The True Impact of AI on Human Thinking

Fakeha Mohammed Rehan Shaikh<sup>1</sup>, Ashish Sambhaji Uzgare<sup>1</sup>

<sup>1</sup>Department of Chemistry, Faculty of Science, Wilson College (Autonomous), Mumbai-400007, Maharashtra, India.

**Corresponding author:** Ashish Sambhaji Uzgare

**Email** – ashish.uzgare@wilsoncollege.edu

### ABSTRACT

Artificial intelligence (AI) is now an integral part of daily life, driving innovation, efficiency, and personalization across sectors such as healthcare, finance, education, and entertainment. Like two sides of a coin, AI offers remarkable benefits but also presents significant drawbacks. While it has accelerated progress and made many tasks easier, it has also fostered a growing dependency that risks diminishing human thinking and problem-solving skills, making it seem as though people are becoming overly reliant on the very technology they created. This mini review aims to explore both the positive and negative impacts of AI, emphasizing the Strategies of using it wisely to minimize its effect on cognitive abilities. We must remember that no matter how advanced or sophisticated AI becomes, it operates on a foundation of historical data and programmed patterns. It lacks consciousness, genuine empathy, and the profound ability to understand the nuanced tapestry of human experience. It cannot replicate the depth of human emotion, the spark of true creativity that births art and poetry, or the adaptable, common-sense reasoning needed to navigate life's unpredictable challenges. The ultimate goal is not to compete with AI, but to harness its computational power to elevate the uniquely human qualities of wisdom, compassion, and innovation. Our future depends not on the strength of our algorithms alone, but on the wisdom with which we choose to use them.

**Keywords** AI, Human thinking, Progress, Peril

*(Paper received – 3<sup>rd</sup> September 2025, Peer review completed – 10<sup>th</sup> October 2025, Accepted – 18<sup>th</sup> October 2025)*

### INTRODUCTION

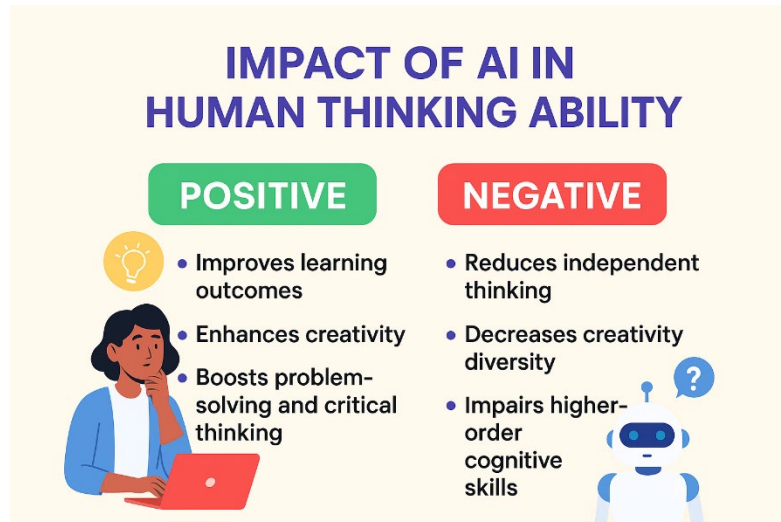
Artificial intelligence (AI) is reshaping everyday life, driving efficiency and personalization across sectors like healthcare, finance, education, and entertainment. However, its growing influence raises concerns about diminishing human critical thinking and cognitive skills [1]. Cognitive skills is the mind's capacity to store information, process and retrieve knowledge, and perform tasks involving attention, memory, logical reasoning, and adaptable thinking [2]. Critical thinking (CT) is a higher-order thinking process that integrates various skills and attitudes, using intentional, self-directed reflection to enhance the ability to form logical solutions and well-founded conclusions [3]. In both professional and everyday settings, AI tools are reshaping decision-making and problem-solving. Automated systems in areas like healthcare and finance enhance efficiency but may reduce opportunities for independent critical thinking, potentially leading to a workforce that relies more on technology than on its own analytical skills [5]. Using external aids such as notes, calculators, AI tools, or social networks to lighten mental effort and handle tasks more efficiently. Although it can enhance focus on complex thinking, overdependence, particularly on AI, may weaken deep cognitive engagement and critical thinking skills [1,4].

This mini review aims to examine artificial intelligence (AI) as both a blessing and a potential peril. While AI enhances efficiency, personalization, and innovation across various fields, it also raises concerns about reduced critical thinking, cognitive dependency, and overreliance on technology, highlighting the need to balance its benefits and risks.

### Impact of AI in Human Thinking ability Positive and Negative outcomes

In daily life, digital devices, social media, and artificial intelligence (AI) tools are seamlessly woven into our daily routines. Although they provide convenience, connectivity, and efficiency, their growing impact on brain function and cognitive abilities cannot be overlooked [6]. Figure 1 is Dual Impact of AI in Human Thinking ability.

Figure 1. Dual Impact of AI in Human Thinking Ability



Researchers highlight that students' over-reliance on AI dialogue systems, driven by a desire for quick and optimal solutions, can weaken critical thinking, analytical reasoning, and decision-making. Their PRISMA-based review of 14 studies shows that this dependency often stems from difficulty in evaluating AI reliability, despite awareness of ethical concerns [7].

Habib and others investigated how generative AI, specifically ChatGPT-3, affects students' creative thinking in a college-level creativity course. Using a mixed-methods design and an AUT test, the study assessed flexibility, fluency, elaboration, and originality in divergent thinking. Findings suggest that while AI can enhance creative thinking, it may also hinder creativity and creative confidence if not carefully integrated [8].

Promma and others found that AI literacy enhances complex problem-solving in Thai Gen Z accounting students by strengthening systematic and intuitive thinking skills. The study emphasizes integrating AI literacy into education and training to build stronger cognitive skills and better prepare students for the digital era [9]. Szmyd and Mitera examined how AI tools impact students' critical thinking and problem-solving skills in digital education environments. Using an online survey, they explored students' perceptions of AI, its benefits, limitations, and influence on independent and creative thinking. Findings show that students view AI as useful for analyzing information and building arguments but remain cautious about overreliance, with 83% concerned it may weaken independent decision-making. The study emphasizes that while AI can support critical thinking, traditional teaching methods remain essential for fostering autonomy and responsibility. These insights offer practical guidance for integrating AI into education while safeguarding students' cognitive development [10].

Lee and others explored how Generative AI (GenAI) influences critical thinking in knowledge work by surveying 319 professionals and analyzing 936 real-world examples of GenAI use. Findings show that greater confidence in GenAI often reduces critical thinking effort, while higher self-confidence encourages more active engagement. Qualitatively, GenAI shifts critical thinking toward tasks like verifying information, integrating responses, and overseeing task outcomes. The study highlights both challenges and opportunities for designing GenAI tools that better support critical thinking in professional settings [11].

Darwin explored how EFL students perceive the role of AI in developing critical thinking through case studies and semi-structured interviews with seven master's students from two Indonesian universities. The study found that while AI aids tasks like academic research and evaluating theories, it also has drawbacks,

including limited personalization, potential echo chambers, and difficulty in grasping nuanced concepts. The findings suggest that AI can enhance critical thinking when used thoughtfully, emphasizing a balanced approach that leverages its benefits while mitigating its limitations. Future research should incorporate objective measures and examine effective teaching strategies for integrating AI with critical thinking skills [12]. Du and colleagues explored how AI affects university students' higher-order thinking and complex problem-solving skills. Through qualitative case studies and semi-structured interviews, the study found that AI can support research, analysis, and theory evaluation, but also presents challenges such as limited personalization, potential echo chambers, and difficulty with nuanced understanding. The authors conclude that AI can enhance critical thinking if applied thoughtfully, emphasizing the need for balanced integration, careful oversight, and teaching strategies that maintain students' independent cognitive engagement. Future studies should investigate objective measures and best practices for effectively incorporating AI into higher-order thinking development [13].

Gonsalves explored the impact of generative AI on critical thinking, finding that overreliance may hinder cognitive development. The study proposes a revised Bloom's Taxonomy framework, highlighting skills like ethical reasoning, collaboration, and reflection, and offers 12 propositions to guide AI-integrated teaching and research [14]. Larson and others examined GenAI's role in management education, noting that while tools like ChatGPT can enhance teaching, perspectives, and access, they may also reduce engagement in critical thinking. The study highlights two dimensions, individual (logic and analysis) and social (challenging norms) and calls for research on leveraging GenAI's benefits while preserving critical thinking skills [15].

Çela, Fonkam, and Potluri examined AI-assisted learning, finding that excessive reliance on AI can impair problem-solving, though it may boost perceived academic efficiency. The study underscores the need for balanced AI use in education to support learning while preserving critical cognitive skills [16].

Guo and Lee investigated using ChatGPT to boost critical thinking in introductory chemistry courses at Georgia Gwinnett College. Through activities including orientation, essay writing, and revising AI-generated outputs, students showed increased confidence in questioning, analyzing, and understanding complex concepts. ChatGPT provided diverse perspectives and encouraged reflective thinking, though challenges included poor-quality responses and verifying sources. The study underscores the need for educator training, reliable resources, and attention to privacy, demonstrating AI's potential to support critical thinking in higher education [17].

Lamimi and his team examined the impact of generative AI (GAI) on students' critical thinking, self-efficacy, decision-making, and learning motivation. Surveying 165 students across undergraduate, master's, and doctoral levels, the study found that GAI positively affects all these factors. Additionally, self-efficacy, motivation, and decision-making mediated GAI's influence on critical thinking, indicating that AI can strengthen students' cognitive skills by enhancing and supporting human intelligence in the learning process [18].

Mohamed and others examined AI's impact on students' motivation and learning across Egypt, Saudi Arabia, Spain, and Poland with 455 participants. AI tools were found to enhance intrinsic motivation, learning experiences, autonomy, and critical thinking, with variations by nationality and major. Motivation was not affected by academic level, and students maintained a moderately positive view despite ethical concerns. The study highlights the need for research on effective and ethical AI implementation in education [19].

Wilson looks at how artificial intelligence (AI) changes the way people write, think, and process information. AI writing tools can help with feedback and idea development, but there are concerns that relying on them too much could weaken critical thinking. The essay explores how writing affects thinking and learning, and how AI can both help and hurt this process. It also emphasizes the need for AI literacy and teamwork across different areas to make sure AI supports, rather than harms, critical thinking [20].

Saeidnia and Ausloos explore how integrating artificial intelligence (AI) with design thinking can boost innovation and problem-solving. The study reviews design thinking principles and examines AI tools that can enhance ideation, prototyping, and user-centered design. It highlights how AI can be applied at each stage of the design thinking process to improve creativity, decision-making, and problem-solving through analytics, pattern recognition, and iterative learning [21].

Wang and Fan analyzed 51 studies to examine ChatGPT's effects on student learning outcomes, including performance, perception, and higher-order thinking. The findings show that ChatGPT strongly improves learning performance and moderately benefits learning perception and higher-order thinking, with outcomes influenced by course type, learning model, usage duration, and ChatGPT's role. The study suggests integrating ChatGPT into various courses and learning modes, using structured educational frameworks, and maintaining consistent use (4–8 weeks) to enhance learning. They also recommend further research to better understand its effects on perception and higher-order thinking [22].

Doshi and Hauser investigate how generative AI, including large language models, affects creativity. Their study shows that AI-assisted writers produce more creative and enjoyable stories, especially among less creative individuals, but these stories are more similar to each other. While generative AI boosts individual creativity, it may reduce collective novelty, highlighting a trade-off with implications for research, policy, and practice [23].

The integration of AI into education presents both opportunities and challenges for fostering critical thinking. While AI tools can enhance learning experiences, their overuse may hinder the development of independent cognitive skills. To mitigate this, educational strategies should emphasize structured learning frameworks, scaffolded assignments, and reflective practices that encourage students to engage deeply with content before utilizing AI assistance. Additionally, promoting AI literacy is crucial, as it equips students with the skills to use AI responsibly and effectively, ensuring that these technologies serve as tools for enhancing, rather than replacing critical thinking abilities.

### Strategies to Minimize AI Use and Promote Critical Thinking

Figure 2 shows Strategies to Minimize AI Use and Promote Critical Thinking.

**Figure 2.** Strategies to Minimize AI Use and Promote Critical Thinking



#### Structured Learning Frameworks

Implement frameworks such as Bloom's Taxonomy to guide students through stages of understanding, analysis, and evaluation, encouraging independent thinking before consulting AI tools [14,22].

#### Scaffolded Assignments

Design tasks that gradually increase in complexity, requiring students to generate ideas, analyze information, and solve problems independently before using AI [7,20].

#### AI as a Complement, not a Substitute

Encourage students to use AI for feedback or brainstorming only after attempting solutions themselves, reinforcing critical evaluation and decision-making skills [23].

#### Collaborative Problem-Solving

Promote group discussions and peer review before integrating AI inputs, fostering diverse perspectives and reducing overreliance on AI [10,15].

### Limited and Purposeful AI Integration

Set clear boundaries on when and how AI can be used, such as during specific phases of design thinking or creative tasks, to preserve independent cognitive engagement [20,22].

## CONCLUSION

Artificial intelligence (AI) offers powerful opportunities in education and professional settings, improving learning, creativity, problem-solving, and critical thinking when applied effectively. Thoughtful integration allows AI to support idea generation, provide constructive feedback, and deepen cognitive engagement. Yet overdependence on these tools can erode independent reasoning, reduce creative diversity, and weaken higher-order thinking. Approaches such as structured learning frameworks, scaffolded assignments, collaborative discussions, and purposeful AI use can help balance its benefits and risks. In the end, AI should remain a tool to enhance human potential does not replace it as true progress depends on the unique depth, creativity, and adaptability of the human mind.

## REFERENCES

1. Gerlich M. AI tools in society: Impacts on cognitive offloading and the future of critical thinking. *Societies* 2025;15(1):6.
2. Shi Y, Qu S. The effect of cognitive ability on academic achievement: The mediating role of self-discipline and the moderating role of planning. *Front Psychol* 2022;13:1014655.
3. Dwyer CP. An evaluative review of barriers to critical thinking in educational and real-world settings. *J Intell* 2023;11(6):105-12.
4. Fisher A. *Critical Thinking: An Introduction*. Cambridge, UK: Cambridge University Press; 2011.
5. Topol EJ. *Deep Medicine: How Artificial Intelligence Can Make Healthcare Human Again*. New York, NY: Basic Books; 2019.
6. Shanmugasundaram M, Tamilarasu A. The impact of digital technology, social media, and artificial intelligence on cognitive functions: A review. *Front Cogn* 2023;2:1203077.
7. Zhai C, Wibowo S, Li LD. The effects of over-reliance on AI dialogue systems on students' cognitive abilities: A systematic review. *Smart Learn Environ* 2024;11:28-34.
8. Habib S, Vogel T, Anli X, Thorne E. How does generative artificial intelligence impact student creativity? *J Creativity* 2024;34(1):100072.
9. Promma W, Imjai N, Usman B, Aujirapongpan S. The influence of AI literacy on complex problem-solving skills through systematic thinking skills and intuition thinking skills: An empirical study in Thai Gen Z accounting students. *Comput Educ Artif Intell* 2025;8:100382.
10. Szymd K, Mitera E. The impact of artificial intelligence on the development of critical thinking skills in students. *Eur Res Stud J* 2024;27(2):1022-39.
11. Lee HP, Sarkar A, Tankelevitch L, Drosos I, Rintel S, Banks R, Wilson N. The impact of generative AI on critical thinking: Self-reported reductions in cognitive effort and confidence effects from a survey of knowledge workers. In: CHI '25: Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems. 2025;1121:1-22.
12. Mukminatien N, Suryati N, Laksmi ED, Marzuki. Critical thinking in the AI era: An exploration of EFL students' perceptions, benefits, and limitations. *Cogent Educ* 2023;10(1):2290342.
13. Du X, Du M, Zhou Z, Bai Y. Facilitator or hindrance? The impact of AI on university students' higher-order thinking skills in complex problem solving. *Int J Educ Technol High Educ* 2025;22:39-45.
14. Gonsalves C. Generative AI's impact on critical thinking: Revisiting Bloom's taxonomy. *J Educ Business* 2024;9.
15. Larson BZ, Moser C, Caza A, Muehlfeld K, Colombo LA. Critical thinking in the age of generative AI. *Acad Manag Learn Educ* 2024;23(3):15-9.
16. Çela E, Fonkam MM, Potluri RM. Risks of AI-assisted learning on student critical thinking: a case study of Albania. *Int J Risk Contingency Manage* 2024;12(1):1-9.
17. Guo Y, Lee D. Leveraging ChatGPT for enhancing critical thinking skills. *J Chem Educ* 2023;100(12).
18. Lamimi IJ, El Jemli S, Zeryouh I. Enhancing critical thinking: Exploring human-AI synergy in student cognitive development. *Arab World Engl J (AWEJ)* 2025;Special Issue on Artificial Intelligence:1-19.

19. Mohamed AM, Shaaban TS, Bakry SH, Guillén-Gámez FD, Strzelecki A. Empowering the faculty of education students: Applying AI's potential for motivating and enhancing learning. *Innov High Educ* 2024;50:587–609.
20. Wilson J. Will AI undermine or support writing and critical thinking? AI, Creativity, and the Future of Learning. Newark, DE: University of Delaware; 2025:30.
21. Saeidnia HR, Ausloos M. Integrating artificial intelligence into design thinking: A comprehensive examination of the principles and potentialities of AI for design thinking framework. *Inf Syst Today* 2024.
22. Wang J, Fan W. The effect of ChatGPT on students' learning performance, learning perception, and higher-order thinking: Insights from a meta-analysis. *Humanit Soc Sci Commun* 2025;12:621.
23. Doshi AR, Hauser OP. Generative AI enhances individual creativity but reduces the collective diversity of novel content. *Sci Adv* 2024;10(28):10-3.

\*\*\*\*\*

Acknowledgements – The authors would like to acknowledge the contributions of the researchers listed in the references section, whose research publications were instrumental in the preparation of this review paper.

Conflict of Interest – Nil

Funding – Nil