
Impact Of Artificial Intelligence on Students Academic Achievement and Critical Thinking: A Theoretical Review

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Abstract

AI has been recognized by many people and is also used in various fields, one of which is the field of education. In modern education, artificial intelligence (AI) has become a significant technical advancement that affects student support, learning settings, evaluation and teaching methods. The use of artificial intelligence in educational settings is growing. Both student performance and the teaching-learning process are changing as a result of artificial intelligence in education. Intelligent tutoring systems, adaptive learning platforms, automated feedback systems, and generative AI applications are examples of AI-based educational technologies that have the ability to offer individualized learning experiences based on each student's unique needs and preferences. Students can now engage with instructional information in even more ways thanks to the growing availability of generative AI tools. AI offers fresh viewpoints, but it must be used carefully to prevent impeding critical thinking. AI has the potential to be beneficial for education and the development of students critical thinking abilities. This theoretical study investigates how AI might impact students critical thinking and academic performance. AI should not, however, be seen as a substitute for educators or as a way to permanently divide pupils into groups according to their preferred learning styles. The paper concludes that that intentional pedagogical integration, teacher direction, student's digital competency and responsible use all play a significant role in the educational benefit of AI.

Keywords: Artificial intelligence, critical thinking, academic achievement and student

Introduction

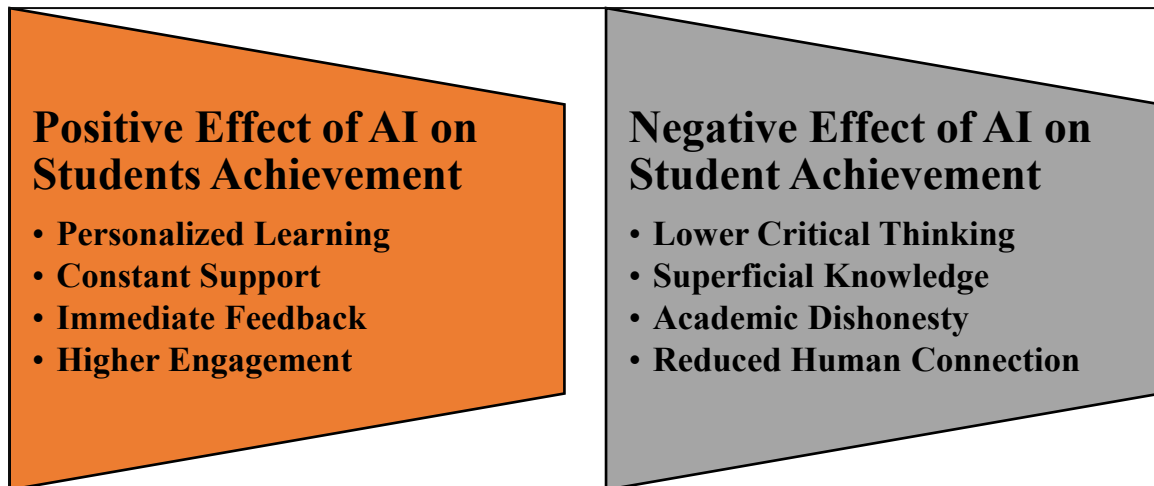
The field of education is changing at an astounding rate due to artificial intelligence (AI), which has produced a plethora of new methods and solutions that could help with teaching, learning and assessment. With the increasing use of AI technologies, such as intelligent tutoring systems, adaptive learning platforms, and generative solutions like ChatGPT, Google Gemini, Perplexity AI, and Claude, students are able to receive better academic support, personalized learning experiences and instant feedback. Innovative teaching-learning approaches that encourage students to think critically and actively have been made possible by the advancements in educational technology (Malik & Adhikary, 2025; Hossain & Adhikari, 2025). Because of the information age's technical advancements, humans are now just as essential to computers as they are to us, and as a result, computers continue to get more sophisticated (Sujith et al., 2022; Zhang et al., 2021). Technology-enabled learning has been acknowledged as a crucial way to improve educational quality and make it more inclusive and accessible under the **NEP 2020** (Jana & Adhikary, 2024; Jana & Adhikary, 2025a). By offering pupils a variety of educational resources, AI may potentially have an impact on the learning process. Explanations, summaries, questions, visual aids and interactive exercises are all available to students. This makes it possible for learning to be more individually tailored. University students' academic performance can be significantly enhanced by the use of artificial intelligence (AI) tools, especially when it comes to exam preparation and course comprehension. The significance and influence of evaluation feedback on students learning in higher education have been emphasized by numerous scholars. However, assessment has been expanded to take into account not just pupils but also curriculum design, teachers' instruction, and administrators' readiness. Assessment is used to support students learning and is crucial to their future academic success (Lan, K., 2025; Eltahir, & Ahmed, 2023).

Artificial intelligence is becoming more widely acknowledged as a worthwhile field of study and use in education, improving student outcomes and educational quality. However, in order to successfully promote a positive learning environment, educators, students and legislators must take into account the particular issues raised by the incorporation of AI tools (Holmes & Miao, 2023). AI-driven learning strategies and student motivation have been found to positively correlate, suggesting that technology might significantly engage students and improve their educational experiences. Additionally, significant gains in academic achievement after using AI-supported learning demonstrate how effective these strategies are at assisting students in understanding academic content (Pertiwi et al., 2024; Khare, 2018; Xu, 2024). A comprehensive analysis of AI in education revealed the various functions of AI in teaching, learning, assessment and administration as well as the difficulties in putting it into practice. AI that can be used to create new content as well as explore old content. By providing insights and ideas that might push their thinking and encourage creativity, these tools allow students to explore deeper into subjects.

By offering individualized learning experiences and promoting the growth of problem-solving skills, the incorporation of AI into education promises to further empower students. AI assists educators with meeting the demands of the classroom. According to Berg and Plessis (2023), AI supports educators by offering resources, concepts, and frameworks. They claimed that by using AI to teach pupils in different ways, teachers are able to develop their critical thinking skills. By making the most of these resources, educators may create an ideal learning environment in the classroom that encourages students to talk and develop their critical thinking abilities. By offering dynamic and flexible learning opportunities, AI may connect with deeper content while enhancing critical thinking. AI, for example, might present a topic or concept to students from multiple perspectives, promoting a deeper understanding. AI finds relevant resources for students to read and utilize, which aids them in their studies. AI's ability to provide students with timely, insightful feedback by analysing massive amounts of data to identify their learning preferences, weaknesses, and strengths is a significant educational advantage (Kaledio et al., 2024).

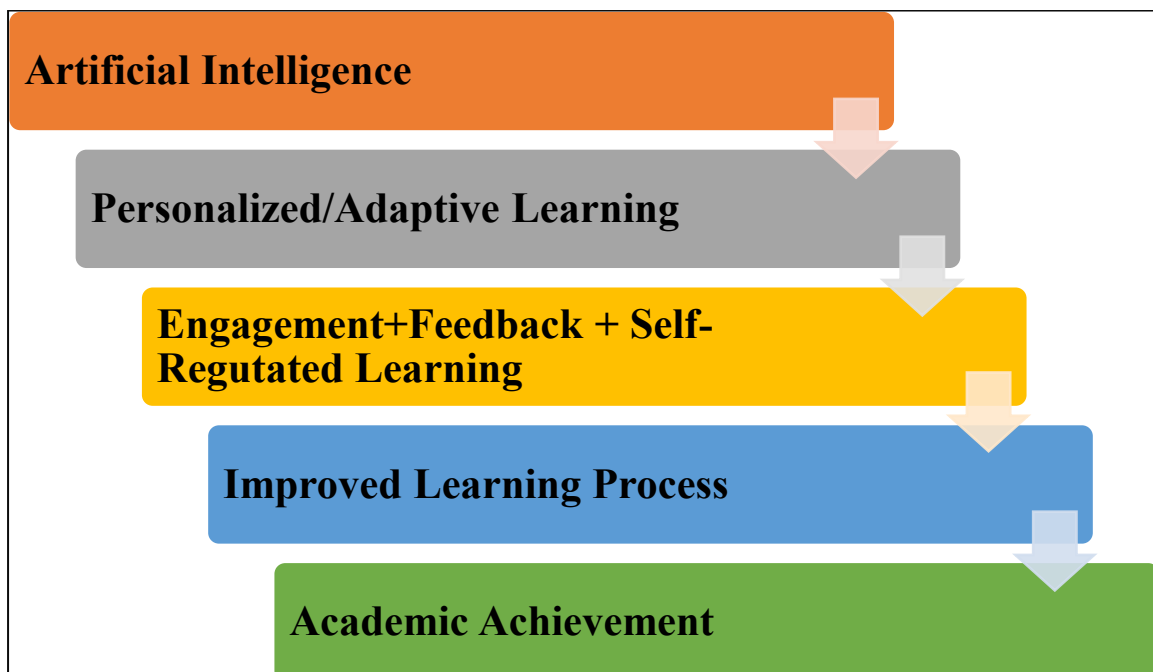
AI and Academic Achievement

Academic achievement is crucial to each person's existence in modern cultures. A student's chances of continuing their education are determined by their academic performance as determined by the GPA (grade point average) or by standardized tests like the SAT (Scholastic Assessment Test) that are used for selection. As a result, academic achievement determines a person's eligibility for higher education and depending on the degrees they get, affects their post-educational employment. Academic success is crucial for a country's wealth and prosperity in addition to its significance for a person. Studies on academic achievement, like PISA (Programme for International Student Assessment), which is run by the Organization for Economic Co-operation and Development (OECD), are conducted because there is a strong correlation between a society's level of academic achievement and positive socioeconomic development. The degree to which pupils acquire the anticipated educational knowledge, skills, competences, or performance goals is commonly referred to as academic achievement. Exams, quizzes, assignments, grades, problem-solving exercises, and standardized measurements can all be used to evaluate it. AI has the following effects on student's academic achievement, both favourable and negative:



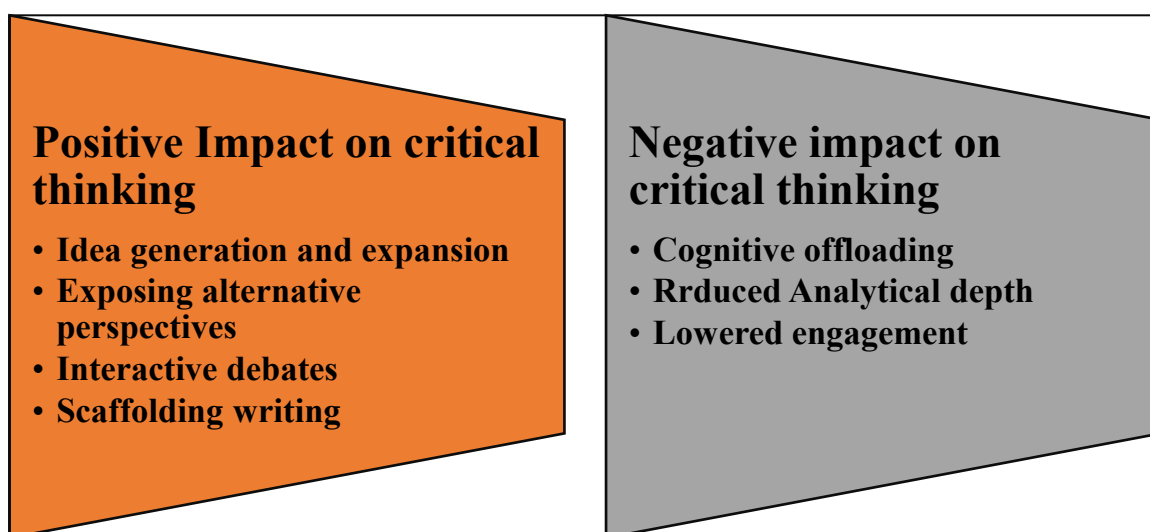
AI adjusts the pace and intensity of lessons to each student's individual ability level. Twenty-four hours a day, seven days a week, virtual tutors offer assistance and solutions. Students are inspired and ready to finish difficult courses thanks to interactive platforms. Instead of waiting for a graded test, students learn from their errors immediately. Students lose out on crucial problem-solving skills when they rely on AI to compose essays or solve arithmetic issues. Quick responses from AI tools can improve short-term results while impairing long-term memory and recall, according to research. Easy availability to automated generators increases the likelihood of cheating and makes it challenging for professors to grade assignments accurately. Social skills and emotional support in the classroom can be negatively impacted by less in-person engagement with teachers.

Positive impacts are generally possible, according to recent study. Although there was significant heterogeneity across contexts, a 2025 systematic review and meta-analysis of 68 experimental trials revealed a moderately good overall effect of generative AI on learning outcomes. In a similar vein, a 2026 meta-analysis of university students discovered that generative AI improved a number of learning outcomes, like as academic performance and higher-order thinking, however the impact on metacognition was not statistically significant.



AI and Critical Thinking

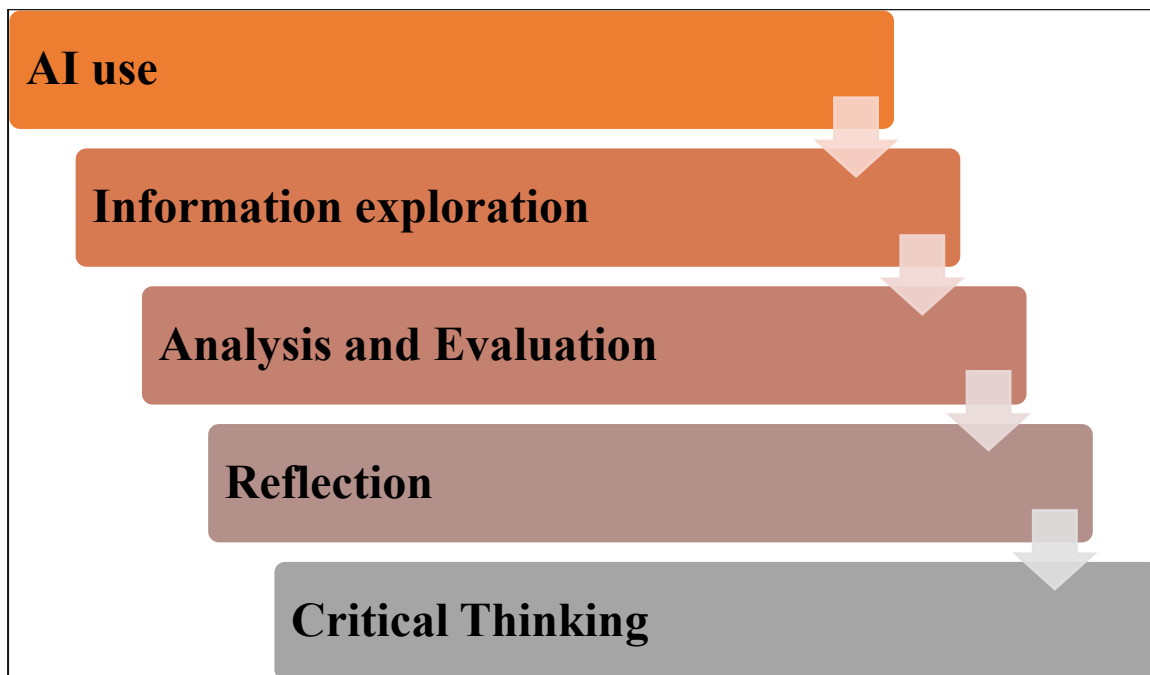
Critical thinking is a way of thinking about any topic, issue or substance in which the thinker enhances the quality of his or her thinking by deftly controlling the structures that come with thinking and applying intellectual standards to them. The capacity to comprehend, assess, and analyse the facts and information at hand in order to make a decision or determine whether something is right or wrong is known as critical thinking. It is essentially a methodical strategy to critically assessing data and arguments. When taken as a whole, critical thinking entails challenging, evaluating, and integrating data in order to arrive at a well-reasoned conclusion or solution. When AI is utilized as a tool for inquiry, analysis, assessment, and reflection rather than just for getting pre-made answers, it can enhance students' critical thinking. AI can support evidence-based reasoning by assisting students in identifying the advantages and disadvantages of an argument. AI can offer several perspectives so that students can compare concepts. Students can discuss their response with AI and consider how they arrived at their decision. It can offer other solutions that they can analyse and assess. Students' critical thinking is impacted by AI in both beneficial and negative ways. These effects include:



For literary analysis and essays, AI assists students in coming up with ideas, structural blueprints or rebuttals. Tools can produce a variety of interpretations of a text, poem, or novel, encouraging pupils to consider many points of view. Students can hone their argumentation abilities by using AI to role-play characters from English literature or simulate discussions. AI frees up cognitive capacity for higher-order synthesis and evaluation by automating simple grammatical checks and vocabulary recommendations. Students who rely too much on AI to compose essays or summarize texts are engaging in "cognitive outsourcing," which avoids the mental strain of attentive reading and independent textual interpretation. Regular users might take literary criticisms produced by AI at face value without checking the underlying reasoning, which would erode their ability to make their own decisions. Pupils who rely solely on AI to complete their English assignments frequently exhibit less comprehension, inventiveness, and engagement in class discussions.

According to a 2024 study published in the European Research Studies Journal, 64% of students thought AI enhanced their capacity to critically assess complicated concepts by giving them instant access to a variety of viewpoints. This is consistent with Purdue professors' findings that AI helps students organize their workloads and study subjects, allowing them to think more deeply (Purdue University, 2024). ScienceDirect's 2024 study on Italian students revealed that when students used ChatGPT to question their presumptions, it promoted deeper involvement and enhanced their ability to make arguments. AI encourages students to challenge and improve their concepts—essential elements of critical thinking—

by producing alternate perspectives or evidence. When carefully incorporated, AI can improve critical thinking.



Conclusions

AI has the potential to be a useful tool for improving children's critical thinking and academic performance in order to help them succeed in school. AI can guarantee the quality and applicability of material while assisting pupils in expanding their concepts and developing deeper insights. It is crucial that people ask specific questions, evaluate AI answers critically, and reword content produced by AI to make it more understandable. To optimize AI's advantages, it is crucial to apply it carefully and critically. It is advised that authors or readers look into articles about certain AI tools used in education, including chatbots or platforms for adaptive learning. We can use AI to help students develop and become critical thinkers by being aware of its advantages and disadvantages. Theoretically, enhanced feedback, personalization, engagement, self-regulation, and access to a variety of learning tools could all have an impact on academic attainment. As a result, the usefulness of AI in education depends not only on its accessibility but also on how it is incorporated into pedagogy, how instructors direct its application, and how actively students participate in the learning process.

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