



IMPACT OF AI USAGE ON CRITICAL THINKING SKILLS AMONG UNIVERSITY STUDENTS IN ALMORA DISTRICT OF UTTRAKHAND

¹DEVANSH VERMA ²DR. ANJU VERMA

¹ Bachelor Student, ²Professor

¹Department of Mathematics and Scientific Computing, IIT Kanpur

² Department Teacher Education, Nagaland University, Kohima, India

Abstract: Artificial intelligence (AI) is now a crucial component of higher education, changing how students' study, carry out research, and finish assignments. Instant access to knowledge and individualized learning experiences are made possible by AI-powered technologies including intelligent tutoring systems, virtual assistants, automated writing programs, and generative AI platforms. Although there are many educational advantages to these tools, questions have been raised about how they affect students' capacity for critical thought. A key component of a university education is critical thinking, which empowers students to assess evidence, analyze data, solve challenging issues, and reach well-informed conclusions. In the Present study 50 University students were selected as sample, simple random sampling technique was used to select the sample. Then the Percentage were calculated to find out the level of AI Usage and CTS and also to find out the Impact of AI Usage in Critical Thinking Skill. The finding revealed that the cumulative percentage indicates that over 94 % of the sample falls within the average to high categories in the usage if AI and the cumulative percentage indicates that over 96 % of the sample falls within the average to high categories in CTS, It was also found that out of five streams Engineering students demonstrated the highest levels of both AI usage (81.8%) and critical thinking skills (75.1%). This article explores the Impact of AI Usage on Critical Thinking Skills. Further it gives the implications of the study and suggestive measures to develop critical thinking skills among university students.

Keywords: Artificial intelligence, Critical Thinking Skill, intelligent tutoring, virtual assistants, automated writing programs, generative AI platforms.

INTRODUCTION

Artificial intelligence's quick development has had a big impact on a number of industries, including business, healthcare, education, and transportation. AI-driven technologies are being employed more and more in universities across the globe to support research, teaching, learning, and assessment. These days, students have access to technologies that can generate essays, solve mathematical puzzles,

summarize research articles, translate languages, and provide complex answers in a matter of seconds. Artificial intelligence is increasingly being integrated into higher education to support teaching, learning, and research (Luckin, Rose et al., 2016).

There is excitement about AI's potential to enhance educational results due to its widespread deployment. But it has also raised questions about whether an over-reliance on AI could impair critical thinking and other crucial cognitive abilities. Understanding how AI affects critical thinking has become a crucial subject of academic research since critical thinking is one of the main goals of higher education. Generative AI tools such as ChatGPT have transformed how students' access and process information (Kasneci, Enkelejda et al., 2023). This article addresses the idea of critical thinking, looks at how AI influences students' thought processes, and offers suggestions for striking a balance between intellectual growth and technological progress.

Understanding Critical Thinking

The ability to objectively analyze, understand, assess, and synthesize data in order to make well-reasoned decisions is known as critical thinking. Before drawing conclusions, it entails challenging presumptions, evaluating the data, spotting logical fallacies, and taking into account a variety of viewpoints. Critical thinking involves analysis, evaluation, inference, and self-regulation (Facione, Peter A., 1990). Universities consider critical thinking a fundamental graduate attribute (Paul, Richard & Elder, Linda, 2019). The ability to think creatively and independently is highly valued by universities because it equips students to solve problems in the real world, pursue lifelong learning, and make valuable contributions to society. Critical thinking is becoming more and more crucial in today's information-rich environment to separate accurate information from false information and to make well-informed decisions.

Educational theorists claim that critical thinking includes a number of essential competencies.

- Information and argument analysis
- Assessment of sources and evidence
- The application of logic
- Solving problems
- Self-evaluation and introspection
- Making decisions

AI's Expanding Significance in Higher Education

Educational systems now heavily include artificial intelligence. Students at universities frequently utilize the following AI applications:

- Learning Platforms Driven by AI

Adaptive learning systems evaluate student performance and offer tailored instructional materials according to each student's unique learning requirements.

- Systems for Intelligent Tutoring

Students can learn difficult ideas at their own pace with the help of these tools, which provide personalized instruction, explanations, and feedback.

- Tools for Generative AI

Students can access material faster and finish projects more rapidly with applications that can generate text, code, graphics, and study summaries.

- Automated Evaluation Systems

AI systems are able to assess assignments, give immediate feedback, and pinpoint areas that need work.

Positive Impact of AI on Critical Thinking Skills

- **Improved Information Access**

The ability of AI to instantly acquire enormous amounts of information is one of its biggest benefits. On a variety of subjects, students can easily get background information, examples, and explanations. Instead of hunting for material, learners can spend more time examining and evaluating it because to its accessibility. AI technologies provide rapid access to information and can support deeper exploration of academic topics (Holmes, Wayne et al., 2019). When applied appropriately, AI can facilitate more in-depth research by exposing students to a variety of viewpoints and promoting investigation outside of conventional educational materials.

- **Tailored Education**

Learning materials can be customized by AI-powered educational systems based on the strengths and shortcomings of the pupils. Personalized training fosters deeper comprehension and critical thinking by enabling students to interact with difficult subjects more successfully. Adaptive learning systems can enhance student engagement and individualized instruction (Luckin, Rose et al., 2016). Students who receive focused assistance may improve their ability to critically assess material and resolve challenging issues.

- **Enhanced Ability to Solve Problems**

Students can experiment with various ideas and see results in real time through AI-based simulations, virtual laboratories, and interactive learning environments. These encounters promote hypothesis testing and analytical reasoning. AI-supported simulations create opportunities for analytical reasoning and problem-solving practice (Zawacki-Richter, Olaf et al., 2019). For instance, medical students can examine virtual patient cases to hone their diagnostic abilities, while engineering students can use AI simulations to assess various design options.

- **Quick Reaction and Introspection**

Assignments and tests may not always receive prompt feedback in traditional learning environments. AI systems are able to quickly spot mistakes, provide suggestions for enhancements, and point out areas where pupils' thinking is lacking. Timely AI-generated feedback can promote reflection and self-regulated learning (Nicol, David J. & Macfarlane-Dick, Debra, 2006). This quick feedback promotes introspection and self-correction, two crucial aspects of critical thinking.

- **Encouragement of Independent Learning**

By enabling students to investigate subjects on their own, AI systems can promote self-directed learning. Outside of class, students can research ideas, raise questions, and seek clarifications. When

students actively assess and challenge the information they are given, this kind of autonomy can promote curiosity and intellectual engagement.

- **Exposure to Various Viewpoints**

Numerous AI systems are capable of presenting several points of view on contentious or difficult topics. Students are encouraged to compare arguments, evaluate the facts, and draw well-rounded conclusions when they are exposed to a variety of viewpoints. This procedure fosters intellectual openness and improves critical assessment abilities.

- **AI's detrimental effects on critical thinking abilities**

AI has advantages, but it also has drawbacks that could impair pupils' capacity for critical thought.

- **Dependency on Cognition**

The emergence of cognitive reliance is one of the biggest issues. Without doing their own research, students can grow accustomed to depending on AI systems for answers, justifications, and solutions. Excessive reliance on AI tools may reduce students' independent reasoning and cognitive effort (Kasneci, Enkelejda et al., 2023). This reliance can eventually weaken critical thinking abilities by lowering the mental effort needed for problem-solving and decision-making.

- **Diminished Intellectual Involvement**

Active interaction with challenging issues fosters the development of critical thinking. Students may avoid crucial learning processes when AI completes duties like summarizing articles, writing essays, or solving problems automatically. Automation of academic tasks may decrease opportunities for active learning and critical analysis (Selwyn, Neil, 2019). Opportunities for analysis, interpretation, and evaluation may consequently be reduced.

- **Decline in Research Skills**

Finding sources, assessing reliability, contrasting evidence, and synthesizing data are all part of traditional research. These activities can be made easier by AI-generated summaries, but relying too much on them could keep students from learning critical research skills. Overreliance on AI-generated summaries may weaken students' information literacy skills (Bender, Emily M. et al., 2021). Pupils may lose their ability to recognize trustworthy sources and evaluate information on their own.

- **Acceptance of AI Results Without Confirmation**

AI programs aren't always precise. They may provide false references, biased content, factual inaccuracies, or misleading information. If students don't check AI-generated responses, they can take false information at face value. Generative AI systems can produce inaccurate or fabricated information, requiring careful verification by users (OpenAI, 2023). This inclination can have a detrimental impact on academic performance and impair critical evaluation.

- **Reduced Originality and Creativity**

Creativity and critical thinking are closely related. Students may become discouraged from coming up with fresh ideas, creating distinctive arguments, and investigating novel solutions if they rely too much on AI-generated information. Students' ability to think independently may progressively deteriorate if they mostly rely on AI recommendations.

- **Issues with Academic Integrity and Ethics**

Academic integrity and intellectual property are called into doubt by the usage of AI-generated assignments. Students may not acquire the analytical abilities required in higher education if they turn in AI-generated work without significant participation. These methods can undermine the development of critical thinking and jeopardize learning results.

- **Factors Influencing AI's Impact on Critical Thinking**

AI's impact on critical thinking varies. Whether AI has a beneficial or negative impact depends on a number of factors:

- **Digital Knowledge**

Students who are proficient in digital literacy are more likely to critically assess AI results and identify their limitations.

- **Context of Education**

Critical interaction with AI-generated content is encouraged via courses that prioritize conversation, analysis, and problem-solving.

- **Why AI Is Used**

There is a big difference between utilizing AI to replace thought and using it as a learning tool. Students' use of AI tools has a significant impact on educational outcomes.

- **Instructor Advice**

THEORETICAL FRAMEWORK

Theory of Technology Acceptance (TAM): Fred Davis (1989) created the Technology Acceptance Model (TAM), which describes how people accept and use new technologies. TAM states that a person's intention to utilize technology is influenced by perceived utility and perceived ease of use. Because AI tools are practical, effective, and helpful for academic duties, university students are likely to adopt them. How students use these tools will determine how much AI influences critical thinking. AI can improve analytical thinking when it is employed as a learning and inquiry support system. On the other hand, critical thinking skills may deteriorate when students rely on AI to replace independent reasoning.

OBJECTIVES OF THE STUDY

1. To find out the level of usage of ai among university students in Almora District Uttarakhand.
2. To find out the level of critical thinking skills among university students in Almora District Uttarakhand
3. To analyze the impact of AI usage on Critical Thinking Skills (CTS) among different academic streams among university students in Almora District Uttarakhand

METHODOLOGY

The present study adopts a **quantitative research approach**. The quantitative approach is suitable for the present investigation because the study seeks to assess measurable dimensions to find out the level of AI Usage and Critical thinking Skills and also to find out the impact of AI usage on Critical Thinking Skills (CTS) among different academic streams among university students.

The study employs a **descriptive survey research design**. Descriptive research aims to describe the existing conditions, behaviours, and relationships among variables without manipulating them (Kothari, 2013).

The population of the present study consists of all the University students in Almora District of Uttarakhand during the academic session 2025–2026. For the purpose of the study, the researcher used **random sampling technique** to select participants from the target population. A total of 50 university students were selected from 5 Streams, 10 from each stream from SSJ University Almora. After data collection, responses were coded and entered into a statistical software program such as SPSS or Microsoft Excel for analysis. Appropriate statistical techniques were used to interpret the objectives.

OBJECTIVE WISE DATA INTERPRETATION

Objective 1: To find out the level of usage of ai among university students in Almora District Uttarakhand.

Table 1. Frequency and Percentage Distribution of Participants by Different Levels.

Different Levels	Score Range	Frequency	Percentage %
High	27-38	27	54%
Average	16–26	20	40%
Low	0–15	3	6%
Total		50	100%

The primary objective was to assess the levels of usage of ai among university students in Almora District Uttarakhand. As demonstrated in Table 1, the descriptive analysis reveals a predominant trend towards the higher spectrum. Specifically, a significant majority of the respondents (54 %) demonstrated a high level of AI Usage followed by average (40 %) and low (6 %) levels. The cumulative percentage indicates that over 94 % of the sample falls within the average to high categories.

Objective 2: To find out the level of critical thinking skills among university students in Almora District Uttarakhand.

Table 2. Frequency and Percentage Distribution of Participants by Different Levels.

Different Levels	Score Range	Frequency	Percentage %
High	51–72	28	56%
Average	29–50	20	40%
Low	0–28	2	4%
Total		50	100%

The primary objective was to assess the levels of critical thinking skills among university students in Almora District Uttarakhand. As demonstrated in Table 2, the descriptive analysis reveals a predominant trend towards the higher spectrum. Specifically, a significant majority of the respondents (56 %) demonstrated a high level of critical thinking skills followed by average (40 %) and low (4 %) levels. The cumulative percentage indicates that over 96 % of the sample falls within the average to high categories.

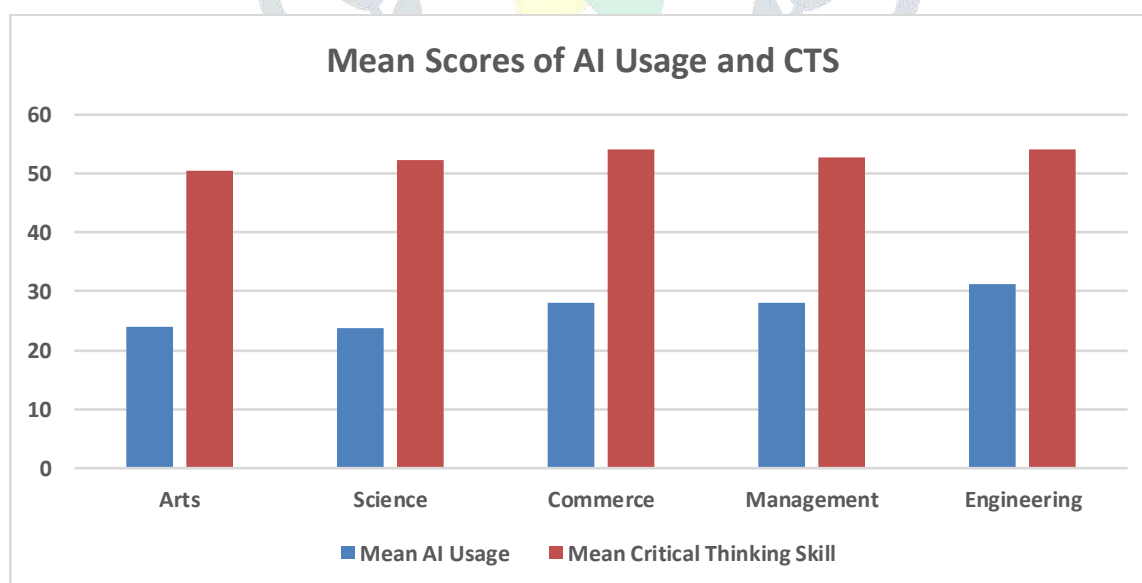
Objective 3: To analyze the impact of AI usage on Critical Thinking Skills (CTS) among different academic streams among university students in Almora District Uttarakhand.

The average AI usage score and average CTS score for each stream was calculated to find out the impact.

Table 3: Stream-wise Mean Scores of AI Usage and Critical Thinking Skills

Stream	Mean AI Usage	Mean Critical Thinking Skill
Arts	23.9	50.5
Science	23.7	52.2
Commerce	28.0	54.0
Management	28.0	52.6
Engineering	31.1	54.1

Figure 1. Shows the Stream Wise Mean scores of AI Usage and Critical Thinking Skills



To show the impact of AI usage on Critical Thinking Skills (CTS), Percentage Comparison was done (Based on Maximum Scores) Maximum AI score = 38 and maximum CTS score = 72 is shown in table 4:

Table 4. Frequency and Percentage Distribution of Participants by Levels in different streams

Stream	AI Usage %	Level Wise Classification of AI Usage	CTS %	Level Wise Classification of CTS
Arts	62.9%	Average	70.1%	High
Science	62.4%	Average	72.5%	High
Commerce	73.3%	High	75.0%	High
Management	73.7%	High	73.1%	High
Engineering	81.8%	High	75.1%	High

Interpretation of Table 4:

1. The highest AI usage (81.8%) and critical thinking score (75.1%) were recorded by engineering students, indicating that higher AI engagement is linked to better critical thinking abilities.
2. Students studying commerce and management demonstrated high levels of AI usage (73.7%) and critical thinking (75.0% and 73.1%), suggesting a favorable correlation between the two.
3. Students in the arts and sciences maintained good critical thinking scores (70.1% and 72.5%), but they used AI somewhat less frequently (around 63%). This implies that critical thinking in these fields may be greatly influenced by elements other than the use of AI.
4. Overall, the findings show that using AI improves critical thinking abilities across all streams, with streams with increased AI usage typically showing better critical thinking performance.

FINDINGS OF THE STUDY

More than half of the respondents (54%) demonstrate a high level of AI usage skills, while only 6% fall into the low category. Similarly, 56% of respondents exhibit a high level of critical thinking skills, with only 4% showing a low level. The findings suggest that the majority of participants possess strong AI usage and critical thinking abilities, while about 40% are at an average level in both domains and may benefit from further skill development.

Additionally, it was discovered that across students from various academic streams, the use of AI is favorably connected with critical thinking abilities. The highest percentages of AI utilization (81.8%) and critical thinking abilities (75.1%) were shown by engineering students, followed by management and commerce students. Students in the arts and sciences had strong critical thinking skills while reporting less use of AI. These results imply that the use of AI technologies could improve critical thinking abilities, especially in fields with a professional focus. However, beyond the use of AI alone, other academic and pedagogical aspects seem to have an impact on the development of critical thinking.

STRATEGIES FOR PROMOTING CRITICAL THINKING IN THE AGE OF AI:

Universities can take a number of steps to guarantee that AI fosters rather than impedes the growth of critical thinking.

- **Including AI Literacy in Courses**

The operation of AI systems, its constraints, and techniques for assessing information produced by AI should all be taught to students.

- **Creating Activities for Higher-Order Learning:** Instead, than only retrieving material, assignments should focus on analysis, assessment, reflection, and problem-solving.
- **Promoting the Verification of Sources:** It should be mandatory for students to use reliable academic sources to validate material supplied by AI.
- **Encouraging Introspective Education:** Deeper intellectual engagement can be promoted through case studies, discussions, reflective diaries, and project-based learning.
- **Teaching the Use of Ethical AI:** Clear rules around appropriate AI use and academic integrity should be established by universities.
- **Building Collaboration Skills Between Humans and AI:** Instead of seeing AI as a replacement for autonomous thought, students should learn to see technology as a helpful tool.

FUTURE IMPLICATIONS

AI technologies will probably have a greater impact on education as they develop further. Graduates with excellent analytical and decision-making skills who can work well with AI systems will be in high demand in the workplace of the future. Preparing students for an AI-driven society without sacrificing the development of critical cognitive abilities will be a challenge for higher education institutions. In order to maintain the intellectual rigor that supports academic performance, universities must find a balance between utilizing technological innovation. AI literacy is becoming essential for effective participation in higher education and future workplaces (UNESCO, 2023).

CONCLUSION

Artificial Intelligence has transformed higher education by providing unprecedented access to information, personalized learning opportunities, and powerful academic support tools. When used appropriately, AI can enhance learning experiences, improve problem-solving abilities, and encourage intellectual exploration. However, excessive reliance on AI may weaken critical thinking skills by fostering cognitive dependency, reducing intellectual engagement, and discouraging independent analysis.

The ultimate impact of AI on critical thinking depends on how students, educators, and institutions integrate these technologies into the learning process. By promoting AI literacy, encouraging critical evaluation, and designing learning activities that require independent reasoning, universities can ensure that AI serves as a valuable educational partner rather than a replacement for human thought. In the evolving digital age, the goal should not be to resist AI but to harness its potential while preserving and strengthening the critical thinking abilities that remain essential for academic success, professional competence, and responsible citizenship.

REFERENCES

- [1] Bender, E. M., Gebru, T., McMillan-Major, A., & Shmitchell, S. (2021). On the dangers of stochastic parrots: Can language models be too big? Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency, 610–623. <https://doi.org/10.1145/3442188.3445922>
- [2] Facione, P. A. (1990). Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction. The Delphi Report. American Philosophical Association.
- [3] Holmes, W., Bialik, M., & Fadel, C. (2019). Artificial intelligence in education: Promises and implications for teaching and learning. Center for Curriculum Redesign.
- [4] Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günnemann, S., Hüllermeier, E., Krusche, S., Kutyniok, G., Michaeli, T., Nerdel, C., Pfeiffer, F., Poquet, O., Sailer, M., Schmidt, A., Seidel, T., Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences*, 103, 102274. <https://doi.org/10.1016/j.lindif.2023.102274>
- [5] Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). *Intelligence unleashed: An argument for AI in education*. Pearson Education.
- [6] Nicol, D. J., & Macfarlane-Dick, D. (2006). Formative assessment and self-regulated learning: A model and seven principles of good feedback practice. *Studies in Higher Education*, 31(2), 199–218. <https://doi.org/10.1080/03075070600572090>
- [7] Paul, R., & Elder, L. (2019). *The miniature guide to critical thinking concepts and tools* (8th ed.). Foundation for Critical Thinking.
- [8] Selwyn, N. (2019). *Should robots replace teachers? AI and the future of education*. Polity Press.
- [9] UNESCO. (2023). *Guidance for generative AI in education and research*. UNESCO Publishing.
- [10] Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education. *International Journal of Educational Technology in Higher Education*, 16(39), 1–27. <https://doi.org/10.1186/s41239-019-0171-0>