A Study on Evaluating the Impact of AI Tools on the Critical Thinking Ability of Students in Jerusalem College of Engineering

ZAARA KHAN G, MBA, Jerusalem College of Engineering, Chennai, Tamil Nadu, India

AKILA S, Assistant Professor of MBA, Jerusalem College of Engineering, Chennai.

Abstract

The study titled, "A Study on Evaluating the Impact of AI Tools on the Critical Thinking Ability of Students in Jerusalem College of Engineering," examines how the use of Artificial Intelligence tools influences student's academic learning and critical thinking ability. Using a descriptive research design, data were collected from 155 respondents through structured questionnaires and analyzed using percentage analysis, correlation analysis, ANOVA and chi-square tests. The study mainly focuses on how students use AI tools for academic tasks such as understanding concepts, completing assignments, preparing for exams and verifying information.

The findings show that most students actively use AI tools for learning support, especially for understanding difficult concepts and completing academic tasks faster. While AI tools improve productivity and make learning easier, the study also indicates that excessive dependence on AI may affect student's independent thinking ability. Many students still believe that AI tools should be used as a support tool rather than replacing traditional learning methods. Overall, the study highlights the importance of balancing AI usage with critical thinking to ensure effective learning and academic development.

Keywords: Artificial Intelligence (AI) Tools, Critical Thinking, Student Learning Behavior, Academic Performance, Technology in Education, AI in Higher Education.

Introduction:

Artificial Intelligence (AI) tools have become a part of student's everyday academic life. With the growth of technology many students now use AI-based tools to complete assignments, prepare reports, generate ideas and understand difficult concepts more easily. These tools provide quick explanations and easy access to information, which helps students save time and improve their learning experience. Today, the education sector itself is changing with the use of digital technologies like online learning platforms, smart classrooms and AI tools making learning more flexible and accessible for students.

At the same time, the increasing use of AI tools has raised concerns about how they affect student's critical thinking abilities. Critical thinking is an important academic skill that helps students analyze information, evaluate different viewpoints and make decisions on their own. It allows students to think independently, solve problems effectively and develop a deeper understanding of what they study.

Even though AI tools make learning easier and more efficient, there is a possibility that depending too much on them may reduce student's ability to think on their own. When students rely heavily on AI-generated answers, they may not try to understand the subject deeply or solve problems independently. Over time, this can affect their analytical and reasoning skills. In institutions like Jerusalem College of Engineering (JCE), where students actively use modern technologies for learning, it becomes important to study how AI tools influence student's learning behavior and thinking patterns.

Therefore, this study aims to understand the impact of AI tools on student's critical thinking ability. The main purpose is to find out whether AI tools help students improve their analytical and problem-solving skills or whether they make students more dependent on technology. By studying how students use AI tools and how it affects their learning, this research tries to give a clear idea of how AI influences student's thinking and academic development.

Objectives:

Primary Objectives:

To evaluate the impact of AI tools on the critical thinking ability of students in JCE.

Secondary Objectives:

➢ To analyze the frequency and purpose of AI tools usage among students for academic activities.

➢ To assess whether students are able to independently complete academic task without the assistance of AI tools.

➢ To examine whether students verify and critically analyze AI generated content before using it.

Review of Literature:

Artificial Intelligence (AI) has rapidly become a part of higher education, especially in supporting students with writing, research and problem-solving tasks. Tools such as ChatGPT, Grammarly and other AI-based platforms are now commonly used by students to improve their academic work. While these tools offer convenience and efficiency, many researchers have raised important questions about their influence on student's critical thinking and independent learning abilities. The present study builds on this growing body of research to understand how AI usage affects student's intellectual development.

Waqar Mahmood Khan (2024) examined the impact of AI tools on BS English students in Pakistani universities. His study compared students from pre-AI and post-AI academic sessions and found that although AI improved writing accuracy and grammar, students who relied heavily on AI showed reduced originality and weaker analytical depth. Teachers also expressed concerns about academic honesty and the difficulty of identifying AI-generated content. This study highlights an important issue; while AI makes academic tasks easier, overdependence may weaken independent thinking.

At the same time, other studies show that student's attitudes toward AI play an important role in how they use these tools. Ninghardjanti et al. (2025) explored AI adoption among university students in Indonesia and found that students are more likely to use AI where they believe it is useful and easy to use. However, the study also emphasized that critical thinking acts as a key factor in ensuring responsible AI use. In other words, students with stronger critical thinking skills are better able to use AI as a support tool rather than becoming dependent on it.

Similarly, Szmyd and Mitera (2024) studied university students in Poland and found that most students believe AI helps them understand difficult topics and solve academic problems more efficiently. However, many students were also worried that too much reliance on AI could reduce their ability to think independently. Their findings suggest that AI has both positive and negative effects depending on how it is used.

Research by Pervaiz et al. (2025) further supports this balanced perspective. Their study showed that AI tools significantly improve writing skills such as grammar, clarity and structure. However, the improvement in deeper critical thinking skills was not as strong. This indicates that AI may be more effective in enhancing surface level academic performance rather than developing higher order thinking abilities. Institutional differences were also found to influence how students experience AI suggesting that guidance and access to resources matter.

Focusing on graduate level writing, Mustafa et al. (2025) found that AI tools help students organize their arguments and improve clarity in academic writing. However, the development of strong argumentation and deep critical analysis still required human feedback and guidance. Students acknowledged that AI is helpful, but not sufficient on its own for developing advanced thinking skills.

Taking a broader view, Syahputra et al. (2024) conducted a literature review and public sentiment analysis to understand how AI influences critical thinking in education. Their findings show that AI can enhance learning through personalized feedback and problem-based approaches. However, concerns such as technological dependence, reduced social

interaction, misinformation and data privacy were repeatedly highlighted. The study emphasized the need for careful and balanced integration of AI into education.

Overall, the existing literature shows that AI is neither completely beneficial nor entirely harmful. It can improve efficiency, support learning and enhance writing skills. but excessive dependence may reduce intellectual independence and deep analytical thinking. Most studies agree that AI should be used as a supportive tool rather than a replacement for human effort and reasoning. While previous research has explored AI adoption and its general effects, there is still a need to better understand how AI directly influences student's critical thinking skills in specific academic contexts. The present study aims to address this gap by examining the relationship between AI usage and critical thinking development in higher education.

Research Methodology:

Research Design

The study titled "A study on evaluating the impact of AI tools on critical thinking ability of students in JCE" employs a descriptive research design to examine how Artificial Intelligence tools influence student's critical thinking ability in academic learning. The main objective of this research is to identify how students use AI tools for different academic tasks such as understanding concepts, completing assignments, preparing for examinations and solving academic problems. The study also aims to analyze how the use of AI tools affects student's independent thinking, verification of information and their overall approach to problem solving. By using a descriptive approach, the study attempts to provide a clear understanding of student's learning behavior and their reliance on AI tools without manipulating any variables.

Sample Design

A total of 155 respondents were selected through a random sampling technique to ensure a diverse representation of students from different departments, academic years and age groups of Jerusalem College of Engineering. This method helped capture a realistic picture of how students from various academic backgrounds interact with AI tools for learning and academic activities. The sample included students who regularly use AI tools for purposes such as completing assignments, understanding concepts and preparing for examinations.

Primary data was collected using a structured questionnaire distributed to students of Jerusalem College of Engineering. The questionnaire consisted of closed-ended questions and Likert scale items designed to understand how frequently students use AI tools, for what academic purposes they use them and how confident they feel in solving academic problems without AI support. The questionnaire also included questions related to student's practices of verifying the accuracy of AI-generated information. The questions were carefully designed to ensure clarity, simplicity and relevance, thereby reducing the chances of misunderstanding and improving the quality of the data collected.

Secondary data was collected from reputable journals, research articles, books and credible online sources related to Artificial Intelligence, critical thinking skills and the role of technology in education. This helped in building the theoretical foundation of the study, understanding previous research findings and supporting the analysis of the primary data collected.

For data analysis, the study utilized a combination of Percentage Analysis, Correlation Analysis, ANOVA and Chi-Square tests. Percentage analysis was used to summarize demographic details and identify general trends related to AI usage among students. Correlation analysis helped in identifying the relationship between the usage of AI tools and student's critical thinking behavior. ANOVA was applied to examine differences in responses among different groups of students, while the Chi-Square test was used to determine the association between categorical variables used in the study such as accuracy of information generated by AI and its comparison with text books and online sources.

Through this methodology, the study aims to provide a clear understanding of how AI tools influence student's learning habits, their confidence in solving academic problems independently and their ability to verify AI-generated information. The findings are expected to provide useful insights for educators and academic institutions in promoting responsible use of AI tools while encouraging the development of students critical thinking skills.

Data Analysis

Percentage Analysis: Percentage analysis is used to understand the basic details of the respondents such as their age and the different academic purposes for which they use AI tools. It also helps to see how their opinions differ about the use of Artificial Intelligence tools in their studies. This method shows what percentage of students use AI tools for understanding concepts, completing assignments, preparing for exams and other academic activities. It also helps identify how students feel about using AI tools, their confidence in solving academic problems without AI support and how often they check the accuracy of AI-generated information.

**Percentage Analysis for Age of the Respondents**
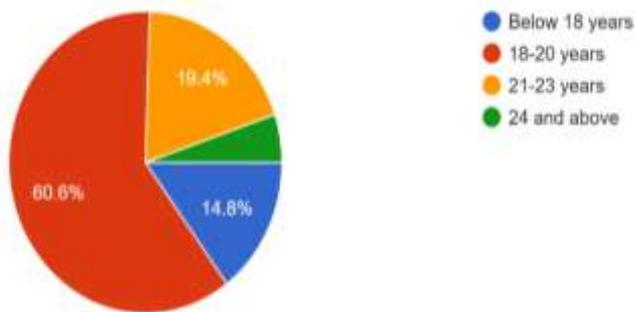
Inference: The table shows that 14.8% of respondents are below 18 years, 60.6% are between 18–20 years, 19.4% are between 21–23 years and only 5.2% are 24 years and above. This clearly shows that most of the respondents are in the 18–20 age group. It means the study mainly represents young college students and they are the ones who are most likely to use AI tools in their academic activities.

**Percentage Analysis for Academic tasks for which AI tools are mostly used**
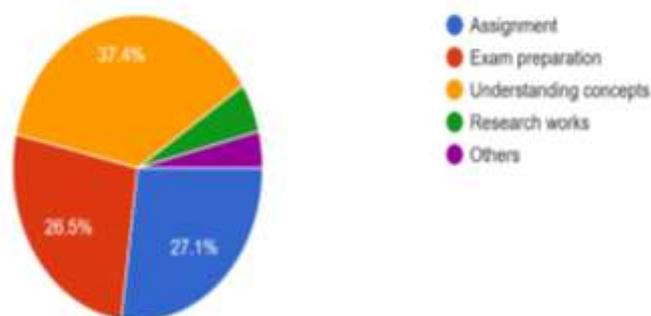
Inference: The table shows that 37.4% of students use AI tools mainly to understand concepts, 27.1% use them for assignments and 26.5% use them for exam preparation. Only a small number of students use AI for research (5.2%) and other purposes (3.9%). This clearly shows that most students use AI tools to help them learn and understand their subjects better, rather than using them for advanced tasks like research.

Percentage Analysis for Level of confidence in solving academic problems without AI support
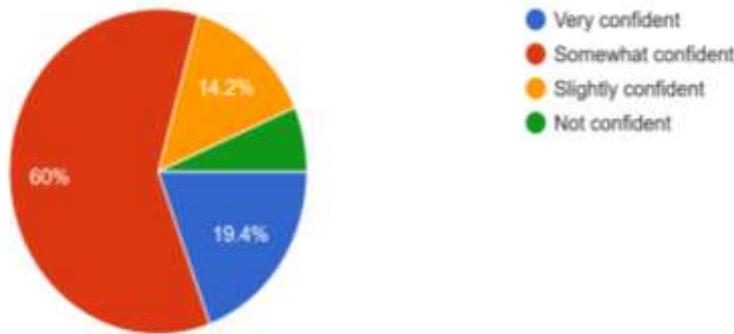
Inference: The table shows that 20% of students are very confident and 60% are somewhat confident in solving academic problems without AI support. On the other hand, 14.2% are slightly confident and 5.8% are not confident. This clearly shows that most students feel at least somewhat confident in solving problems on their own even without using AI tools.

Percentage Analysis for Frequency of checking the accuracy of AI generated information
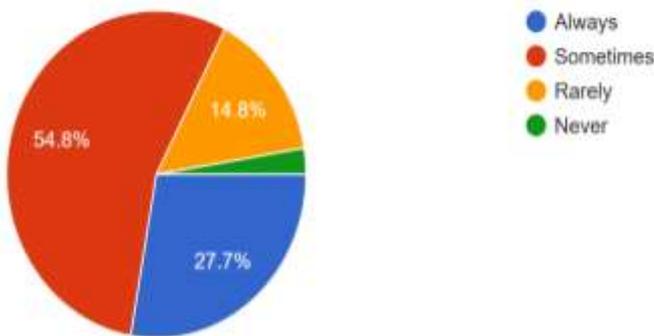
Inference: The table shows that 25.8% of students always check the accuracy of AI-generated information while 51.6% sometimes check it. Around 20% rarely check it and only 2.6% never check it. This clearly shows that most students do try to verify the information at least sometimes, which means they are somewhat careful when using AI. However, a small number of students still do not check the accuracy regularly, which could affect the quality of their academic work.

ANOVA Analysis

ANOVA analysis helps to understand whether there is a difference between groups and whether one factor influences another. In this study, it is used to see whether the time students spend using AI tools is related to the academic tasks they use them for. The aim is to understand if the amount of time students spend on AI tools affects whether they use them for assignments, exam preparation, understanding concepts, research work or other academic activities.

HYPOTHESIS

H_0 **(Null Hypothesis):** There is no significant difference between the academic tasks and the time spent on using AI tools.

H_1 **(Alternative Hypothesis):** There is a significant difference between the academic tasks and the time spent on using AI tools.

ANOVA

		Sum of Squares-	df	Mean Square	F	Sig.
ACADEMIC TASK FOR WHICH AI TOOLS ARE MOSTLY USED	Between Groups	2.69	3	.90	.81	.489
	Within Groups	167.18	151	1.11		
	Total	169.87	154			

Interpretation: Since the p-value (0.489) is greater than 0.05, the null hypothesis is accepted. Therefore, there is no significant difference in the academic tasks for which AI tools are used based on the time spent daily using AI tools. This means that the amount of time students spend using AI tools does not significantly affect whether they use it for assignments, exam preparation, understanding concepts, research work or other tasks.

Correlation Analysis

Correlation analysis helps to find out how closely two things are related and whether one affects the other. In this study, it is used to see whether the year of study of students is connected to their level of confidence in solving academic problems without AI support. The aim is to understand if students in higher years feel more confident in solving problems on their own compared to students in lower years or if the confidence level remains similar across all years.

HYPOTHESIS

H_0 **(Null Hypothesis):** There is no significant relationship between year of study and level of confidence in solving academic problems without AI support.

H_1 **(Alternative Hypothesis):** There is a significant relationship between year of study and level of confidence in solving academic problems without AI support.

Correlations

		LEVEL OF CONFIDENCE IN SOLVING ACADEMIC PROBLEMS WITHOUT AI SUPPORT-	YEAR OF STUDY OF THE RESPONDENT
LEVEL OF CONFIDENCE IN SOLVING ACADEMIC PROBLEMS WITHOUT AI SUPPORT	Pearson Correlation	1.000	.036
	Sig. (2-tailed)		.653
	N	155	155
YEAR OF STUDY OF THE REPONDENTS	Pearson Correlation	.036	1.000
	Sig. (2-tailed)	.653	
	N	155	155

Interpretation: Since the p-value (0.653) is greater than 0.05, the null hypothesis is accepted. Therefore, there is no significant relationship between the year of study and the level of confidence in solving academic problems without AI support. This means student's confidence without AI is not dependent on their year of study. Confidence level is almost same for all years.

Chi-Square Analysis

Chi-square analysis helps to find out whether there is a relationship between two categorical variables and whether one behavior is associated with another. In this study, it is used to see whether students who check the accuracy of AI-generated information are also likely to compare that information with textbooks or other online sources before using it. The aim is to understand if students who verify AI information tend to cross-check it with reliable sources or if these practices occur independently.

HYPOTHESIS

H_0 **(Null Hypothesis):** There is no significant association between checking the accuracy of AI-generated information and comparing it with textbooks or online sources before use.

H_1 **(Alternative Hypothesis):** There is a significant association between checking the accuracy of AI-generated information and comparing it with textbooks or online sources before use.

Chi-Square Tests

	Value	df	Asymptotic Sig. (2-tailed)
Pearson Chi-Square	9.38	6	.153
Likelihood Ratio	10.25	6	.114
Linear-by-Linear Association	4.70	1	.030
N of Valid Cases	155		

Interpretation: Since the p-value (0.153) is greater than 0.05, the null hypothesis is accepted. Therefore, there is no significant association between checking the accuracy of AI-generated information and comparing it with textbooks or online sources before using it. This indicates that respondent's habit of checking AI accuracy is not significantly related to whether they compare the information with textbooks or online sources.

Findings

The study showed that AI tools play an important role in student's academic activities and learning process. Most of the respondents were young undergraduate students, mainly between the ages of 18–20 and a slightly higher number of female students participated in the study. A large number of students reported that they use AI tools for academic

purposes, especially to understand difficult concepts and complete assignments. Many students also agreed that AI tools help them finish their academic tasks faster and understand topics more clearly, which shows that AI is widely used as a learning support tool.

At the same time, the study also found that students are aware of the importance of using AI responsibly. Many respondents said they sometimes check the accuracy of AI-generated information and compare it with textbooks or other online sources before using it. However, some students also believe that excessive use of AI tools may reduce independent thinking ability. Because of this, most respondents feel that AI tools should be used as a support tool along with traditional learning methods rather than completely replacing independent thinking and problem-solving skills.

Suggestion

To make the use of AI tools more effective in education, the colleges and institutions should guide students on how to use the AI tools responsibly for academic learning. Students should be encouraged to use AI tools mainly as a support for understanding concepts, completing assignments and improving their learning rather than depending on them completely. At the same time teachers should emphasize the importance of critical thinking so that students learn to analyze and solve problems independently instead of relying only on AI-generated answers.

Educational institutions should also encourage students to verify the accuracy of AI-generated information by comparing it with textbooks, research articles or reliable online sources. Colleges can also conduct workshops or awareness programs to help students understand both the benefits and limitations of AI tools. This will help students use AI in a balanced way while still improving their independent thinking and learning abilities.

Bibliography

1.Khan, W. M. (2024). Analyzing the AI Tools' Impact on Critical Thinking in BS English Students at Pakistani Universities. Journal of Applied Linguistics and TESOL.

2.Ninghardjanti, P., Umam, M. C., Subarno, A., Winarno, W., Langgi, N. R., & Widodo, J. (2025). Evaluating the Impact of AI on the Critical Thinking Skills among Higher Education Students by Combining the TAM Model and Critical Thinking Theory. Frontiers in Education.

3.Szmyd, K., & Mitera, E. (2024). The Impact of Artificial Intelligence on the Development of Critical Thinking Skills in Students. European Research Studies Journal.

4.Pervaiz, H., Ali, K., Razzaq, S., & Tariq, M. (2025). The Impact of AI on Critical Thinking and Writing Skills in Higher Education. The Critical Review of Social Sciences Studies.

5.Mustafa, G., Khoso, A. R., & Raza, M. A. (2025). Evaluating the Role of AI Tools in Enhancing Critical Thinking and Argumentation in High-Stakes Writing among Graduate Students at MUET Hyderabad. Journal of Applied Linguistics and TESOL.

6.Syahputra, F., Sabrina, E., Simbolon, A. B., Nasution, A. R., Hutagalung, N. R., Amanda, N., Siboro, S. A., & Sirait, S. (2024). The Impact of Using Artificial Intelligence in Learning on Students' Critical Thinking Skills: A Literature and Public Sentiment Analysis Study. Journal Corner of Education, Linguistics, and Literature.

7.Selwyn, N. (2019). Should Robots Replace Teachers? AI and the Future of Education. Cambridge: Polity Press.

8.Holmes, W., Bialik, M., & Fadel, C. (2019). Artificial Intelligence in Education: Promises and Implications for Teaching and Learning. Boston: Center for Curriculum Redesign.

9.Zawacki-Richter, O., Marín, V., Bond, M., & Gouverneur, F. (2019). Systematic Review of Research on Artificial Intelligence Applications in Higher Education. International Journal of Educational Technology in Higher Education.

10.Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. (2016). Intelligence Unleashed: An Argument for AI in Education. London: Pearson Education.