- *AI TOOLS AND THE RISK TO CRITICAL THINKING SKILLS IN UNDERGRADUATE COURSES*

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- Purpose: Investigate AI reliance in student writing

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- Method: Surveys of 203 students & 60 instructors

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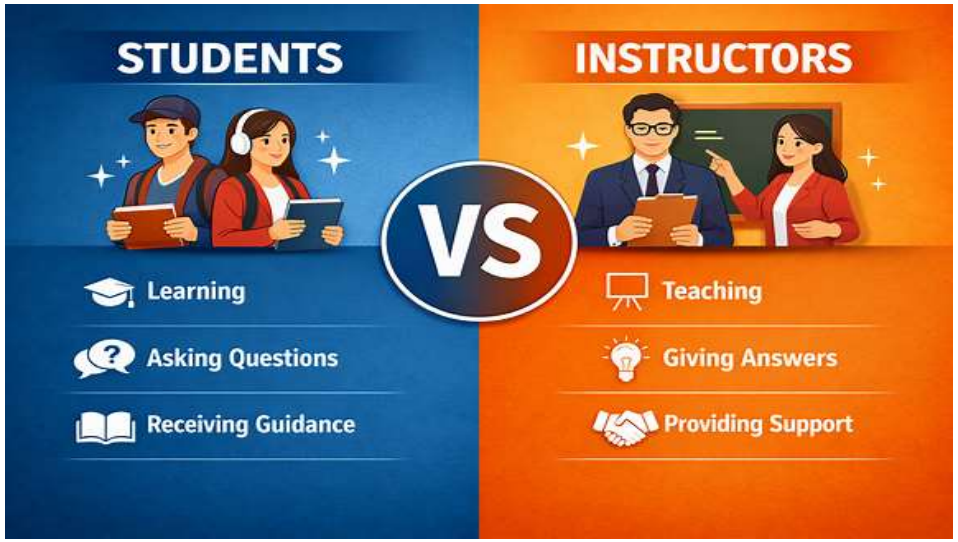

- Goal: Assess impact on originality & critical thinking
- Students vs Instructors

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Introduction

AI tools have rapidly entered higher education. While they save time and improve writing mechanics, they risk shifting students from active reasoning to passive dependence. Critical thinking—defined as the ability to analyze, evaluate, and synthesize information—remains a cornerstone of undergraduate education. The question is: are we strengthening or weakening this skill?

-This research investigates how undergraduate students' reliance on AI tools—such as grammar checkers, paraphrasing engines, and generative text platforms—affects their originality and critical thinking. This study surveyed **203 students** and **60 instructors**, combining quantitative analysis with qualitative insights. The central concern is: does frequent AI use enhance performance while eroding independent reasoning?

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– Literature Review

Scholars such as Brookfield and Banning emphasize that critical thinking requires purposeful, self-regulatory judgment. Yet, studies show students often rely on algorithmic recommendations rather than their own analysis. This tension between efficiency and intellectual autonomy frames the debate.

Jonathan Michael Spector & Shanshan Ma (2019) stated that: *"Critical thinking is one of four keys 21st century skills– communication, collaboration, critical thinking, and creativity. Though most people are aware of the value of critical thinking, it lacks emphasis in curricula."* By highlighting, "While much funding and support go to the development of artificial intelligence, this should not happen at the expense of human intelligence."

The majority of educational institutions have found themselves unprepared for the patterns of AI tools, particularly in terms of affordability and the time required to implement and properly integrate these tools into the teaching process (Welham, D., 2008).

Whether such a pattern was ever tested and its effects ever been comprehended, this is something that only time will show; adding its responsibility to the role of governments and educational institutions to be the central guarantees of AI's successes and adaptabilities in the teaching and learning processes that simultaneously boost critical thinking behaviors starting from students to every other party involved (Chaparro-Banegasa, N., Mas-Turb, A., & Roig-Tierno, N. 2024).

Research Questions & Hypotheses

- **RQ1:** To what extent do undergraduates rely on AI tools?
- **RQ2:** How does AI use affect originality and independent analysis?
- **RQ3:** What are students' and instructors' perceptions of AI's role?

Hypotheses:

- H1: Frequent AI use reduces critical thinking.
- H2: Heavy reliance lowers originality.
- H3: Instructors perceive AI as a threat to reasoning.

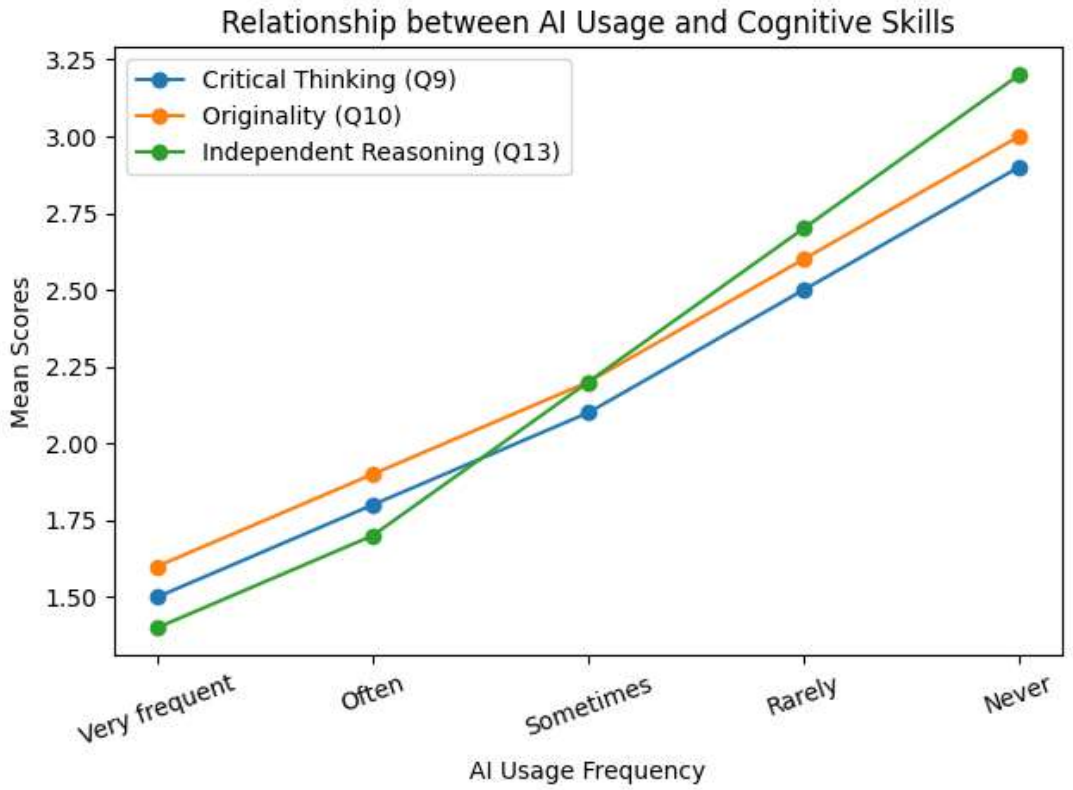
Methodology

This study was conducted as a two-phase survey:

- **Phase 1:** 203 undergraduates, October 2024–February 2025.
- **Phase 2:** 60 instructors. Analysis used **SPSS**: Kruskal–Wallis tests, Spearman correlations, and regression models. Reliability was confirmed with Cronbach's Alpha ($\alpha = 0.800$)."

Results

Relationship between frequency of AI use and cognitive skills.
-Results reveal a paradox: an **AI Paradox**
Students who use AI frequently report improvements in writing quality and confidence. Yet statistical tests show frequent use correlates with **lower levels of critical thinking, originality, and independent reasoning**.



Results

Table 1 (Kruskal–Wallis test results). Significant differences emerged in perceptions of AI benefits: idea organization, time saving, grammar correction, research skills, and writing style. Heavy users expressed skepticism, while light users viewed AI more positively.

The results from the first phase, Students' Table 1.

Test Statistics

	11. AI tools help me organize my thoughts and ideas better. (1 = Strongly Disagree, 5 = Strongly Agree)	12. Using AI tools saves me time when writing assignments. (1 = Strongly Disagree, 5 = Strongly Agree)	13. I rely on AI tools to catch grammatical errors in my writing. (1 = Strongly Disagree, 5 = Strongly Agree)	14. AI tools have helped me improve my research skills. (1 = Strongly Disagree, 5 = Strongly Agree)	15. AI tools assist me in maintaining a consistent writing style. (1 = Strongly Disagree, 5 = Strongly Agree)
Kruskal-Wallis H	24.091	30.004	13.424	17.151	20.264
df	4	4	4	4	4
Asymp. Sig.	.000	.000	.009	.002	.000

a. Kruskal-Wallis Test

b. Grouping Variable: 6. How often do you use AI tools for writing assignments/coursework?

Results: Regression & Correlation Analysis

Show Regression Coefficients (Tables 4 & 5). "Regression models confirmed that AI use significantly impacts performance indicators. For example:

- Critical thinking (β = 0.435, p = 0.001)
- Originality (β = 0.357, p = 0.005)
- Independent reasoning (β = 0.518, p < 0.001) These gains, however, may reflect surface-level improvements rather than genuine cognitive growth."

			6. How often do you use AI tools for writing assignments /coursework ?	11. AI tools help me to better organize my thoughts and ideas. (1 = Strongly Disagree, 5 = Strongly Agree)	12. Using AI tools saves me time when writing assignments. (1 = Strongly Disagree, 5 = Strongly Agree)	13. I rely on AI tools to catch grammatical errors in my writing. (1 = Strongly Disagree, 5 = Strongly Agree)	14. AI tools have helped me improve my research skills. (1 = Strongly Disagree, 5 = Strongly Agree)	15. AI tools assist me i maintainin a consister writing sty (1 = Strong Disagree, 5 Strongly Agree)
Spearman's rho	6. How often do you use AI tools for writing assignments/coursework?	Correlation Coefficient	1.000	-.322**	-.374**	-.147*	-.248**	-.265**
		Sig. (2-tailed)	.	.000	.000	.037	.000	.000
		N	202	202	202	202	202	202
	11. AI tools help me to better organize my thoughts and ideas. (1 = Strongly Disagree, 5 = Strongly Agree)	Correlation Coefficient	-.322**	1.000	.575**	.254**	.613**	.491**
		Sig. (2-tailed)	.000	.	.000	.000	.000	.000
		N	202	203	203	203	203	203

Ranks

	6. How often do you use AI tools for writing assignments/coursework ?	N	Mean Rank
9. AI tools have significantly improved the quality of my scientific writing	- A. Always	21	142.95
	- B. Often	65	111.36
	- C. Sometimes	105	89.96
	- D. Never	10	78.90
	Almost Never	1	27.50
	Total	202	
10. I feel more confident in my writing abilities when using AI tools. (1 = Strongly Disagree, 5 = Strongly Agree)	- A. Always	21	137.88
	- B. Often	65	113.97
	- C. Sometimes	105	88.75
	- D. Never	10	84.60
	Almost Never	1	34.50
	Total	202	

Discussion/Conclusion

-The findings highlight a paradox: AI improves measurable outcomes but risks fostering dependence and standardization. Instructors worry that students may lose their intellectual autonomy.

-To balance efficiency with intellectual growth, educators should:

- Encourage AI as a supportive tool, not a replacement.
- Design assignments that foster deeper analysis.
- Provide training on ethical and effective AI use.
- Establish clear institutional guidelines.

Ultimately, technology must enhance—not erode—critical thinking


THANK YOU FOR YOUR ATTENTION.

I WELCOME YOUR QUESTIONS AND DISCUSSION ON HOW WE CAN INTEGRATE AI RESPONSIBLY INTO HIGHER EDUCATION.