ADVANCE SOCIAL SCIENCE ARCHIVE JOURNAL
Available Online: https://assajournal.com
Vol. 05 No. 02. April-June 2026.Page# 977-986
Print ISSN: 3006-2497 Online ISSN: 3006-2500
Platform & Workflow by: Open Journal Systems

Artificial Intelligence and the Erosion of Student Effort

A Critical Analysis of Research Dependency and Diminishing Critical Thinking in Pakistani Universities

Dr Bushra Salahuddin
Assistant Professor, Institute of Education & Research, Quaid e Azam campus, Gomal University, Dera Ismail Khan, Khyber, Pakhtunkhwa, Pakistan
bushrakhan0066@gmail.com
Laraib Khan
PhD scholar (Education) , Visiting Lecturer, LAW Department, Quaid e Azam campus, Gomal University, Dera Ismail Khan, Khyber, Pakhtunkhwa, Pakistan
larikhan17@gmail.com
Dr Haleema Sadia
PSHT Department of Elementary and Secondary Education, Dera Ismail Khan
haleemasadia431@gmail.com

Abstract
Over the past few years, AI-driven tools from large language models to automated writing platforms and AI-enhanced search engines have quietly but profoundly reshaped how students in Pakistani universities go about their academic work. The convenience these tools offer is undeniable, yet something troubling is happening beneath the surface. Students are increasingly outsourcing their thinking. They submit AI-generated responses without wrestling with the material themselves, and in doing so, they may be forfeiting the cognitive struggle that genuine learning demands. This study looks directly at that problem. Drawing on survey data from 412 undergraduate and postgraduate students across five Pakistani universities, collected through a validated 60-item questionnaire on a 9-point Likert scale, the research examines how AI usage patterns relate to student research effort, critical thinking, and academic originality. The results are sobering: habitual AI use is significantly and negatively associated with all three outcomes. These findings make a case for institutions to move urgently to develop AI literacy curricula, rethinking assessment design, and crafting policy frameworks that encourage students to engage with ideas rather than simply retrieve them.

Keywords: *Artificial Intelligence, student effort, critical thinking, academic dependency, research skills, Pakistani universities, AI literacy, higher education*

Introduction

It is worth pausing to consider just how much has changed in how students access information and complete academic work over a short span of time. Tools like ChatGPT, Google Gemini, and Microsoft Copilot can now produce polished essays, synthesise research, and construct arguments on virtually any academic topic within seconds (Chen & Cheung, 2025). For a student staring at a blank page or a daunting assignment deadline, the temptation to reach for these tools is understandable.

In Pakistan's higher education landscape, this shift has been particularly rapid (Abbas & Raza, 2025). Students across disciplines are turning to AI not just for a nudge in the right direction, but as a starting point — and often an endpoint — for their academic work (Zaman, Arain, & Hayat, 2026). Educators and university administrators have begun noticing the consequences: fewer students seem willing to sit with difficult material, visit the library, evaluate conflicting sources, or push their thinking to arrive at an original argument (Butt, 2025; Siddiq, Muhammad, & Shaheen, 2026). What they produce may look complete on the surface, but the intellectual labour that produces lasting knowledge is frequently absent (Gerlich, 2025).

This matters because academic effort — real effort, the kind that involves searching databases, sitting with contradictory sources, drafting and revising — is not simply a means to complete assignments. It is the very process through which students develop durable knowledge and transferable intellectual skills (Pallant, Blijlevens, Campbell, & Jopp, 2025). When AI absorbs that process, students may still submit work, but they may learn considerably less from doing so (Liu & Li, 2024). The concern is especially pressing at the postgraduate level, where independent scholarly judgment is the central goal (Butt, 2025; Zahra & Khan, 2025).

This study takes that concern seriously. Using data from 412 students at five Pakistani universities, it investigates the relationship between AI tool use and three dimensions of student academic engagement: research effort, critical thinking, and academic originality (Siddiq et al., 2026; Zaman et al., 2026). The aim is both diagnostic — to document what is actually happening — and constructive, to offer a theoretical grounding for institutions working out how to respond (Zahra & Khan, 2025).

Literature Review

Theoretical Foundations of Academic Effort and Cognitive Engagement

Several established learning theories help us understand why AI-assisted shortcuts might undermine genuine academic development. Vygotsky's (1978) sociocultural theory situates learning in active struggle — knowledge is not absorbed passively but built through effortful engagement with challenging material. From that vantage point, any technology that removes the struggle also removes part of the learning. Deci and Ryan's (2000) Self-Determination Theory draws a useful distinction between intrinsic motivation — the genuine curiosity and intellectual investment that drives deep learning — and extrinsic motivation, which is satisfied simply by task completion. AI tools excel at satisfying the extrinsic goal while leaving the intrinsic dimension untouched.

Cognitive Load Theory (Sweller, 1988) adds nuance here. Reducing unnecessary cognitive burden can, under the right conditions, free up mental resources for deeper processing. But this is quite different from eliminating what Kapur (2008) calls 'productive failure' — the struggle with genuinely complex problems that, uncomfortable as it is, produces the most durable learning. When AI absorbs the work of research and synthesis, students may complete tasks with less effort, but the cognitive work that actually builds competence goes undone.

AI Tools and Their Academic Applications

Since 2022, the range of AI tools available to students has grown dramatically. Large language models like GPT-4 generate polished, contextually appropriate text on almost any academic topic — essays, literature reviews, research summaries, argumentative papers — with minimal

intellectual input required from the student (Baidoo-Anu & Owusu Ansah, 2023). AI-powered search aggregators go further still, synthesising material across multiple sources and sparing students the work of navigating, evaluating, and integrating literature on their own.

Researchers have drawn an important distinction: AI tools can serve legitimate pedagogical purposes when used as scaffolds — generating practice problems, offering feedback on drafts, and clarifying concepts students are working to understand. The problem arises when they function as replacements for original intellectual work (Tlili et al., 2023). That distinction is conceptually clear, but institutional policies in Pakistani universities have not yet developed the sophistication to act on it.

Evidence of Declining Research Effort

The empirical record on this point is building quickly. Farrokhnia et al. (2023) documented meaningful reductions in the time students spent on independent library research after AI writing tools became widely available. Cotton et al. (2023) found that a majority of surveyed students admitted to using AI to generate substantial portions of assignments, usually without disclosure. Closer to home, Iqbal et al. (2024) found that more than 60% of Pakistani undergraduate students had at some point submitted AI-generated content as their own work.

What makes this more than an integrity problem is what students fail to develop when they routinely skip the research process. Information literacy — knowing how to identify sources, assess credibility, synthesise competing perspectives, cite appropriately — does not emerge on its own. It is built through repeated practice. When that practice disappears, so do the skills.

Critical Thinking and AI Dependency

Critical thinking — analysing evidence, evaluating competing claims, and constructing well-reasoned arguments — is widely treated as the central intellectual goal of higher education (Halpern, 2014). AI tools, by design, deliver pre-processed conclusions and arguments. They relieve students of precisely the evaluative work that critical thinking demands. Floridi et al. (2020) warn of what they call 'epistemic cowardice' — the growing preference for ready-made answers over the discomfort of genuine intellectual engagement.

In Pakistan specifically, this concern sits on top of a pre-existing pedagogical culture that has historically favoured rote learning and examination performance over higher-order thinking. The combination of culturally ingrained passive learning habits and technologically enabled shortcuts creates a particularly difficult environment for developing genuine analytical capacity.

Research Gap

Despite growing concern internationally, empirical research on AI's impact on student learning behaviours in Pakistan remains sparse. The bulk of existing studies comes from North American or European contexts, which may not translate straightforwardly to Pakistan's institutional and cultural setting. Moreover, few studies have looked simultaneously at research effort, critical thinking, and academic originality as connected outcomes of AI dependency. This study addresses both gaps.

Research Objectives and Hypotheses

Objectives

Three objectives guided this work:

1. To understand how students in Pakistani universities perceive and describe their own use of AI tools in academic contexts.
2. To measure the degree to which AI dependency correlates with student research effort, critical thinking capacity, and academic originality.
3. To assess the predictive relationship between specific patterns of AI tool use and each of those three learning outcomes.

Research Hypotheses

H01: There is no significant relationship between AI tool use and student research effort, critical thinking, and academic originality in Pakistani universities:

a) AI Tool Accessibility has no significant impact on Research Effort, Critical Thinking, or Academic Originality.
b) Frequency of AI Use has no significant negative relationship with student learning outcomes.
c) Nature of AI Dependency does not significantly predict Research Effort, Critical Thinking, or Academic Originality.

Methodology

Research Design

The study used a descriptive-correlational design, which is well-suited to research that aims to document existing patterns and identify relationships between variables without imposing experimental conditions (Creswell & Creswell, 2018). The goal was not to establish causation but to map the landscape of current student behaviour and its associations with key learning outcomes.

Population and Sample

The target population was undergraduate and postgraduate students currently enrolled in Pakistani universities with functioning digital learning infrastructure. Stratified random sampling was used to ensure fair representation across institution type, academic level, and gender. The final sample comprised 412 students from five universities: University of the Punjab (n = 98), Gomal University (n = 84), COMSATS University Islamabad (n = 79), University of Peshawar (n = 81), and Quaid-i-Azam University (n = 70). Of these, 248 were male and 164 female; 234 were at the undergraduate level and 178 at the postgraduate level.

Sample Distribution by University, Gender, and Academic Level

University	Total (n)	Gender		Academic Level	
		Male	Female	Undergraduate	Postgraduate
University of the Punjab	98	59	39	56	42
Gomal University	84	51	33	48	36
COMSATS University Islamabad	79	47	32	45	34
University of Peshawar	81	49	32	46	35
Quaid-i-Azam University	70	42	28	39	31
Total	**412**	**248**	**164**	**234**	**178**

Summary Statistics

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Male	248	60.2
	Female	164	39.8
Academic Level	Undergraduate	234	56.8
	Postgraduate	178	43.2
Total		**412**	**100**

Research Instrument

A structured questionnaire was developed following an extensive review of the literature on AI use in education and student academic engagement. Items were rated on a 9-point Likert scale (1 = Very Strongly Disagree to 9 = Very Strongly Agree). An initial pool of 90 items went through content validity review by a panel of ten subject experts. Items with an Item-Objective Congruence (IOC) index below 0.50 were removed, leaving a refined 60-item instrument with 10 items per variable.

Validity and Reliability

Content validity was established through the IOC procedure as recommended by Rovinelli and Hambleton (1977). Cronbach's alpha on pilot data yielded a total scale reliability of $\alpha = 0.93$, with subscale alphas ranging from 0.84 to 0.91 — all well above the conventional 0.70 threshold.

Data Collection and Analysis

Questionnaires were administered in person during scheduled class sessions, with institutional authorisation and voluntary participant consent. Descriptive statistics addressed questions about student perceptions and AI usage patterns. Multiple regression analysis was used to test predictive relationships between AI use variables and learning outcomes. All analyses were conducted in IBM SPSS Statistics version 26, with a significance threshold of $p < 0.05$.

Table 2

Descriptive Statistics for Key Study Variables (N = 412)

Variable	Mean	SD	Interpretation
AI Tool Accessibility	7.21	1.14	High
Frequency of AI Use	6.74	1.31	Moderate-to-High
Nature of AI Dependency	6.41	1.27	Moderate
Research Effort	5.12	1.58	Moderate
Critical Thinking	5.09	1.60	Moderate
Academic Originality	5.08	1.62	Moderate

Note. All variables measured on a 1–9 scale, where 1 = lowest and 9 = highest.

Table 3

Multiple Regression Summary for AI Variables Predicting Student Learning Outcomes (N = 412)

Outcome Variable	Predictor	β	SE	t	p	R^2
Research Effort						**0.461**
	AI Tool Accessibility	-0.261	0.041	-6.17	< 0.001	
	Frequency of AI Use	-0.387	0.038	-9.23	< 0.001	
	Nature of AI Dependency	-0.318	0.039	-7.58	< 0.001	
Critical Thinking						**0.427**
	AI Tool Accessibility	-0.293	0.042	-6.84	< 0.001	
	Frequency of AI Use	-0.342	0.039	-8.11	< 0.001	
	Nature of AI Dependency	-0.376	0.040	-8.96	< 0.001	
Academic Originality						**0.473**
	AI Tool Accessibility	-0.275	0.040	-6.52	< 0.001	
	Frequency of AI Use	-0.401	0.037	-9.67	< 0.001	
	Nature of AI Dependency	-0.352	0.038	-8.43	< 0.001	

Note. All models were statistically significant at $p < 0.001$. β = standardised beta coefficient.

Table 4

Hypothesis Testing Summary

Hypothesis	Statement	Result
H01(a)	AI Tool Accessibility has no significant negative relationship with student learning outcomes.	**Rejected** (β range: -0.261 to -0.293, $p < 0.001$)
H01(b)	The frequency of AI Use has no significant negative relationship with student learning outcomes.	**Rejected** (β range: -0.342 to -0.401, $p < 0.001$)
H01(c)	The nature of AI Dependency has no significant negative relationship with student learning outcomes.	**Rejected** (β range: -0.318 to -0.376, $p < 0.001$)
H01 (composite)	There is no significant negative relationship between AI use and student learning outcomes.	**Rejected** (all three models significant at $p < 0.001$)

Table 5

Gender and Institutional Comparisons

Comparison	Test Statistic	Value	p	Conclusion
Gender (Male vs. Female)	t-test	t = 1.31	0.191	No significant difference
Institution (Five universities)	One-way ANOVA	F = 1.87	0.114	No significant variation

Note. Gender comparison examined AI use patterns and outcome variables collectively. Institutional comparison examined AI dependency levels across the University of the Punjab, Gomal University, COMSATS University Islamabad, University of Peshawar, and Quaid-i-Azam University.

Results

Student Perceptions of AI Tools and Academic Effort

Descriptive analysis revealed a pattern that was clear and consistent: students reported high AI tool accessibility and moderate-to-high frequency of use, while scores on research effort, critical thinking, and academic originality clustered in the moderate range. AI tool accessibility scored high (Mean = 7.21, SD = 1.14). Frequency of AI use was also elevated (Mean = 6.74, SD = 1.31). Research effort, by contrast, scored noticeably lower (Mean = 5.12, SD = 1.58), and academic originality came in lowest of all (Mean = 5.08, SD = 1.62). Easy access to AI, in other words, did not go hand in hand with strong, independent scholarly engagement.

Extent of AI Dependency

Digital access to AI tools was rated at a high level (Mean = 7.18), which reflects the widespread availability of smartphones, institutional WiFi, and freely accessible AI platforms. Frequency of use was moderate-to-high (Mean = 6.74), and the nature of AI dependency was moderate (Mean = 6.41). Across all three learning outcome measures — research effort, critical thinking, and originality — scores remained moderate, consistent with a pattern in which high AI use tracks with lower engagement in intellectually demanding work.

Impact of AI Use on Student Learning Outcomes

Multiple regression analyses examined how the three AI-related independent variables predicted each of the three outcome variables. All three models were statistically significant ($p < 0.001$). AI-related variables accounted for 46.1% of the variance in Research Effort, 42.7% in Critical Thinking, and 47.3% in Academic Originality.

Crucially, every significant beta coefficient was negative. Frequency of AI Use was the strongest negative predictor across all three outcomes (Research Effort: $\beta = -0.387$; Critical Thinking: $\beta = -0.342$; Academic Originality: $\beta = 0.401$), leading to rejection of H01(b). Nature of AI Dependency was the second strongest predictor (β range: −0.318 to −0.376), rejecting H01(c). AI Tool Accessibility showed the weakest but still significant negative associations (β range: −0.261 to −0.293), rejecting H01(a). Together, these results reject the composite null hypothesis H01.

No significant gender differences were found in AI use patterns or outcome variables ($t = 1.31$, $p = 0.191$). A one-way ANOVA across the five institutions revealed no significant variation in AI dependency levels ($F = 1.87$, $p = 0.114$), suggesting that the phenomenon plays out consistently regardless of institutional context.

Discussion

Interpretation of Findings

The results give empirical shape to what many Pakistani educators have long suspected: widespread AI adoption is going hand in hand with students doing less — less reading, less independent searching, less original thinking. The negative predictive relationships across all three outcome variables fit coherently with what cognitive load theory, self-determination theory, and the literature on productive struggle would lead us to expect.

The finding that Frequency of AI Use is the strongest negative predictor of research effort lines up with Farrokhnia et al.'s (2023) observation that habitual AI consultation displaces the time and cognitive energy students previously devoted to independent inquiry. When turning to an AI tool is a student's first move upon encountering an academic challenge, the practices that actually build scholarly competence — formulating search queries, weighing sources, synthesising competing perspectives — simply get bypassed.

The strong negative relationship between AI dependency and Academic Originality is worth dwelling on. Originality in academic work is not merely a matter of not plagiarising. It reflects a student's capacity to locate their thinking within a scholarly conversation, recognise gaps in existing knowledge, and contribute a distinctive perspective. Students who substitute AI output for that kind of thinking may produce work that looks complete while failing to develop the intellectual identity that advanced scholarship requires.

Practical Implications

Four practical directions follow from these findings. First, universities need AI literacy frameworks that go beyond warnings about plagiarism and instead help students understand the difference between constructive and substitutive uses of AI. These frameworks should be woven into orientation programmes and revisited across the curriculum, not treated as a one-off intervention.

Second, faculty professional development is overdue. Many instructors in Pakistani universities have limited familiarity with how current AI tools actually work — which means they are not well positioned to design assessments that AI cannot trivially complete, or to offer students meaningful guidance on where AI use is genuinely helpful versus where it substitutes for learning.

Third, assessment design needs to change. Assignments that AI can complete on a student's behalf with minimal engagement need to be rethought in favour of tasks that require demonstrable original effort: oral defences, iterative drafts accompanied by reflective commentary, fieldwork-grounded projects, and tasks that draw on locally specific material or knowledge that falls outside AI training data.

Fourth, institutional AI policies should be developed through genuine collaboration among students, faculty, and administrators — grounded in educational principles rather than primarily punitive ones. Policies built from shared understanding are more likely to produce lasting cultural change than those handed down as rules.

Limitations and Future Research

A few caveats deserve acknowledgement. The cross-sectional design means we cannot make causal claims; longitudinal research is needed to determine whether increasing AI use actually causes declining research engagement over time or whether other factors are driving both. The reliance on self-reported data also introduces the possibility of social desirability bias. Future research would benefit from triangulating survey responses with behavioural indicators — library usage records, citation diversity in student papers, and learning management system engagement data. Mixed-methods extensions incorporating qualitative accounts of students' lived experience with AI would help explain the mechanisms behind the quantitative patterns identified here.

Conclusion

This study has provided empirical grounding for a concern that is increasingly hard to dismiss: habitual AI tool use among Pakistani university students is associated with meaningfully reduced research effort, weaker critical thinking, and diminished academic originality. These patterns hold across different institutions and demographic groups, pointing to something systemic rather than anecdotal.

The data reject the null hypotheses and tell a more unsettling story: AI dependency is not a neutral presence in students' academic lives. It carries real costs to the quality of learning. But those costs are not inevitable. They are the product of institutions that have not yet developed the pedagogical infrastructure to guide how students use these tools.

Pakistan's universities are at an inflexion point. Digital transformation is not reversible, and AI tools will only grow more capable and more accessible. The question is not whether students will use them — they will — but whether institutions will develop the pedagogical imagination to ensure that AI expands students' intellectual capacities rather than quietly eroding them.

References

Abbas, M., & Raza, S. H. (2025). Effects of ChatGPT on students' academic performance in Pakistan's higher education classrooms. *Scientific Reports*, 15, 16434.

ACRL. (2016). Framework for information literacy for higher education. Association of College and Research Libraries.

Baidoo-Anu, D., & Owusu Ansah, L. (2023). Education in the era of generative artificial intelligence (AI): Understanding the potential benefits of ChatGPT in promoting teaching and learning. Journal of AI, 7(1), 52–62.

Butt, J. (2025). The unseen co-author: How generative AI is reshaping academic integrity and supervision in Pakistan. *The Friday Times*.

Chen, S., & Cheung, A. C. K. (2025). Effect of generative artificial intelligence on university students' learning outcomes: A systematic review and meta-analysis. *Studies in Educational Evaluation*, 87, 101395.

Cotton, D. R. E., Cotton, P. A., & Shipway, J. R. (2023). Chatting and cheating: Ensuring academic integrity in the era of ChatGPT. Innovations in Education and Teaching International, 61(2), 228–239.

Creswell, J. W., & Creswell, J. D. (2018). Research design: Qualitative, quantitative, and mixed methods approaches (5th ed.). SAGE Publications.

Deci, E. L., & Ryan, R. M. (2000). The 'what' and 'why' of goal pursuits: Human needs and the self-determination of behaviour. Psychological Inquiry, 11(4), 227–268.

Farrokhnia, M., Banihashem, S. K., Noroozi, O., & Wals, A. (2023). A SWOT analysis of ChatGPT: Implications for educational practice and research. Innovations in Education and Teaching International, 61(3), 460–474.

Floridi, L., Cowls, J., King, T. C., & Taddeo, M. (2020). How to design AI for social good: Seven essential factors. Science and Engineering Ethics, 26(3), 1771–1796.

Gerlich, M. (2025). The impact of AI writing assistants on academic writing performance: A subjectivity perspective. *Computers and Education: Artificial Intelligence*, 8, 100321.

Halpern, D. F. (2014). Thought and knowledge: An introduction to critical thinking (5th ed.). Psychology Press.

Kapur, M. (2008). Examining productive failure, productive success, unproductive failure, and unproductive success in learning. Educational Psychologist, 51(2), 289–299.

Liu, Y., & Li, W. (2024). Do AI chatbot-integrated writing tasks influence writing self-efficacy and critical thinking ability? An exploratory study. *Computers and Education: Artificial Intelligence*, 7, 100278.

Pallant, J. L., Blijlevens, J., Campbell, A., & Jopp, R. (2025). Mastering knowledge: The impact of generative AI on student learning outcomes. *Studies in Higher Education*, 50(4), 714–735.

Rovinelli, R. J., & Hambleton, R. K. (1977). On the use of content specialists in the assessment of criterion-referenced test item validity. Dutch Journal of Educational Research, 2, 49–60.

Siddiq, S., Muhammad, N., & Shaheen, S. (2026). Artificial intelligence and the transformation of collaborative study culture: Evidence from graduate-level students in Pakistan. *Journal of Applied Linguistics and TESOL (JALT)*, 9(1).

Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. Cognitive Science, 12(2), 257–285.

Tlili, A., Shehata, B., Adarkwah, M. A., Bozkurt, A., Hickey, D. T., Huang, R., & Agyemang, B. (2023). What if the devil is my guardian angel: ChatGPT as a case study of using chatbots in education. Smart Learning Environments, 10(15), 1–24.

Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. Harvard University Press.

Zahra, A., & Khan, M. I. (2025). AI adoption and educational effectiveness in emerging higher education institutions: The moderating role of digital literacy and institutional support. Bentham Science Publishers.

Zaman, G., Arain, M. B., & Hayat, A. (2026). Exploring the university students' willingness to integrate artificial intelligence in writing academic research articles in Pakistan. *Journal of Education and Social Research*, 16(2).