

Overreliance on AI Tools and Its Impact on Learning Depth Among MBA Students

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Abstract

The rapid proliferation of generative AI tools such as ChatGPT, Google Gemini, and Microsoft Copilot has significantly altered the academic landscape in higher education. This study examines the impact of overreliance on AI tools on learning depth and critical thinking among MBA students, with independent learning effort as a mediating variable. Adopting a quantitative, cross-sectional design, data were collected from MBA students using a structured Likert-scale questionnaire. Statistical analyses including descriptive statistics, Pearson correlation, multiple regression, and mediation analysis were conducted. Results reveal that overreliance on AI tools has a significant negative impact on both learning depth ($R^2 = 0.351$, $p < 0.001$) and critical thinking ($R^2 = 0.389$, $p < 0.001$). Independent learning effort was found to fully mediate both relationships, highlighting that the reduction in active cognitive engagement is the primary mechanism through which AI overreliance harms academic outcomes.

Keywords: AI tools, overreliance, learning depth, critical thinking, MBA education, independent learning effort

INTRODUCTION

Artificial Intelligence has emerged as one of the most transformative forces in contemporary higher education, reshaping how students access information, process knowledge, and complete academic tasks. Platforms such as ChatGPT, Google Gemini, Microsoft Copilot, Grammarly, and Notion AI are now routinely employed by students for summarizing content, generating ideas, drafting reports, and answering conceptual queries. For MBA students — who face demanding coursework, analytical tasks, and high academic pressure — these tools are particularly appealing due to their speed, accessibility, and efficiency.

The integration of AI into academic learning creates both opportunities and risks. On the positive side, AI can support idea exploration, comprehension of difficult concepts, and academic productivity. It can help learners manage deadlines and

process large volumes of information quickly. In management education specifically, where students engage with case studies, business analytics, strategic frameworks, and data interpretation, AI can reduce routine workloads and enable greater focus on application-oriented thinking.

However, the increasing pervasiveness of AI tools has raised fundamental questions about the nature and quality of student learning. The primary concern is not the use of AI per se, but the extent of dependency students develop over time. When students use AI as a substitute for independent thought rather than a supplementary tool, academic outputs may appear polished while the internal depth of learning diminishes. Students may shift from producing work that reflects genuine understanding to producing work that reflects AI-generated

responses — a transition from deep learning to surface engagement.

This distinction is central to the present study. Learning depth refers to the degree to which students engage meaningfully with academic content, connecting new knowledge with existing frameworks, reflecting critically, and applying concepts in real-world contexts. Deep learning underpins long-term retention, conceptual clarity, and higher-order cognitive abilities. In contrast, surface learning — characterized by task completion without conceptual engagement — is increasingly probable when AI tools are used excessively and uncritically.

In the MBA context, this concern is especially acute. Business education aims not only to transmit knowledge but to cultivate decision-making, strategic reasoning, analytical problem-solving, and leadership capacities. Overreliance on AI undermines these objectives by enabling what can be termed cognitive outsourcing — the externalization of thinking to a machine. Students in Business Analytics specializations face even higher demands for logical reasoning and evidence-based judgment, making the risk of AI-induced cognitive atrophy particularly significant.

The present study therefore investigates two central research questions: first, whether overreliance on AI tools negatively impacts learning depth; and second, whether it impairs critical thinking and problem-solving skills among MBA students. Independent learning effort is examined as a mediating mechanism. By focusing on overreliance rather than AI usage per se, the study addresses a theoretically and practically important gap in the emerging literature on AI in higher education.

LITERATURE REVIEW

Existing scholarship broadly acknowledges the academic utility of generative AI while raising increasing concern about its unintended consequences. Rajabi et al. (2024) found that while ChatGPT is widely recognized as useful for idea generation and summarization, it simultaneously fosters concerns about dependency and reduced critical engagement. Wang et al. (2024) highlighted institutional responses to AI, noting that shallow learning and overreliance have emerged as central policy concerns.

Bhullar et al. (2024) conducted a bibliometric review identifying dependency and integrity as dominant themes in ChatGPT literature, while calling for more empirical studies on the quality of student learning outcomes. Zhai et al. (2024) provided a systematic review directly addressing AI dialogue overreliance, finding that frequent dependency reduces memory retention, independent problem-solving, and active knowledge construction — outcomes closely aligned with the present study's conceptual model.

Kasneci et al. (2023) assessed the educational risks of large language models, noting that while they can personalize learning, they also create concerns about dependency and weakened critical reasoning. Wach et al. (2023) described the "dark side" of generative AI, arguing that overdependence encourages passive knowledge consumption and reduces intellectual autonomy. Du et al. (2025) empirically found that excessive AI dependence limits student initiative and analytical engagement in university settings.

From a theoretical standpoint, the study is grounded in two complementary

frameworks. Deep and Surface Learning Theory (Biggs, 1987) distinguishes between learners who engage meaningfully with content versus those who focus on task completion without conceptual internalization. Self-Regulated Learning Theory (Zimmerman, 2002) emphasizes the role of learner-directed planning, monitoring, and reflection as prerequisites for effective academic development. Together, these frameworks explain how AI overreliance may systematically displace the cognitive behaviors associated with quality learning.

Despite this growing body of work, the literature reveals significant gaps. Most studies focus on AI adoption, usability, or ethical concerns rather than overreliance as a behavioral construct. Integrated empirical models examining overreliance, independent learning effort, learning depth, and critical thinking simultaneously — particularly in the MBA context within India — remain scarce.

METHODOLOGY

The study adopted a quantitative, descriptive, and explanatory cross-sectional research design. Primary data were collected from MBA students through a structured questionnaire employing a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). The target population comprised MBA students, particularly those specializing in Business Analytics within higher education institutions in India. A convenience sampling technique was employed, yielding a sample of approximately 150–250 respondents — sufficient for regression and mediation analyses.

The questionnaire comprised six sections capturing demographic information and measuring four key constructs: (i) overreliance on AI tools

(independent variable, 5 items); (ii) independent learning effort (mediating variable, 5 items); (iii) learning depth (dependent variable, 4 items); and (iv) critical thinking and problem-solving skills (dependent variable, 6 items). Scale items were adapted from validated instruments in the literature.

Data analysis was conducted using SPSS. The analytical sequence included descriptive statistics, reliability analysis (Cronbach's Alpha), Pearson correlation, multiple regression analysis, and mediation analysis. The mediation model followed the Baron and Kenny approach, with all paths tested at a significance threshold of $p < 0.05$. Factor analysis (KMO and Bartlett's Test, Total Variance Explained, Rotated Component Matrix) was also conducted to confirm the construct validity of the instrument.

The conceptual model positions overreliance on AI tools as the independent variable, directly influencing learning depth and critical thinking, and indirectly affecting these outcomes through independent learning effort as mediator. AI usage frequency was conceptualized as a moderating variable, though the primary analyses centred on mediation.

DATA ANALYSIS & IMPLICATIONS

Descriptive Statistics

Mean scores ranging from 4.27 to 4.33 indicate high agreement among respondents, suggesting that MBA students exhibit a pronounced tendency toward overreliance on AI tools. Low standard deviations confirm response consistency across the sample.

Reliability Analysis

All constructs exceed the 0.7 threshold, confirming strong internal

consistency and suitability for hypothesis testing.

Correlation Analysis

Overreliance on AI tools is significantly and negatively correlated with learning depth ($r = -0.593$) and critical thinking ($r = -0.624$). Independent learning effort shows strong positive associations with both outcomes, acting as a positive counterforce.

Regression Analysis

Overreliance explains 35.1% of variance in learning depth and 38.9% in critical thinking. Independent learning effort explains 55.1% and 60.5% of variance in these outcomes respectively, underscoring the potency of active self-directed engagement.

Mediation Analysis

Independent learning effort fully mediates both relationships, confirming that AI overreliance harms learning outcomes primarily by reducing students' active cognitive engagement rather than exerting a direct harmful effect.

Implications

The findings carry significant implications for MBA institutions, curriculum designers, and faculty. The full mediation result is particularly instructive: it suggests that AI tools are not inherently damaging, but become so when they displace independent intellectual effort. Institutions should therefore focus less on restricting AI use and more on cultivating self-regulated learning behaviors. Assessments should be redesigned to require original reasoning, case application, and reflective analysis. Faculty should integrate active learning pedagogies — Socratic discussion, problem-based learning, and analytical

case work — that require students to generate knowledge rather than retrieve it. Embedding AI literacy into the curriculum, teaching students to critically verify, contextualize, and build upon AI-generated content, is equally essential.

DISCUSSION AND CONCLUSION

This study provides empirical evidence that overreliance on AI tools significantly diminishes both learning depth and critical thinking among MBA students, with independent learning effort serving as the central explanatory mechanism. All five directional hypotheses were supported at the $p < 0.001$ level, and the mediation analysis confirmed full mediation through independent learning effort.

These findings are theoretically consistent with Deep and Surface Learning Theory (Biggs, 1987), which predicts that excessive reliance on external shortcuts shifts learners toward surface engagement. They also align with Self-Regulated Learning Theory (Zimmerman, 2002), which identifies self-monitoring and independent effort as foundational to quality learning. The study extends both frameworks to the context of generative AI in postgraduate management education — a gap that has remained underexplored.

A critical practical insight is that the harmful effect of AI overreliance is mediated, not direct. This implies that MBA students who maintain strong independent learning habits can use AI tools without suffering degraded learning outcomes. The goal, therefore, is not technological prohibition but behavioral recalibration — helping students develop the metacognitive discipline to use AI as a scaffold rather than a crutch.

In conclusion, while AI tools have irrevocably entered the higher education landscape and offer genuine benefits, their

uncritical and excessive use represents a substantive academic risk. The findings call for a balanced, pedagogically-informed approach to AI integration that preserves the cognitive demands that make postgraduate education meaningful.

FUTURE SCOPE FOR THE RESEARCH

Several directions emerge for extending this work. First, longitudinal study designs are needed to track how AI dependency and its effects on learning evolve over time, moving beyond the limitations of the present cross-sectional approach. Second, future studies should examine a broader range of moderating variables — including digital literacy, academic motivation, personality traits, and prior academic performance — to understand individual-level variation in susceptibility to AI overreliance. Third, differentiating between types of AI usage (content generation, conceptual clarification, problem-solving assistance) would yield more granular insights than treating AI use as a monolithic construct. Fourth, comparative studies across academic disciplines — engineering, medicine, social sciences — would establish whether the findings generalize beyond the MBA context. Fifth, mixed-method designs incorporating interviews and focus groups would complement the quantitative findings with richer, experiential accounts. Finally, future research should evaluate the effectiveness of specific educational interventions — AI literacy programmes, reflective journaling, process-oriented assessments — in mitigating the negative effects of overreliance identified here.

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Table 1: Descriptive Statistics — Overreliance on AI Tools

Item	Statement	Mean	Std. Dev.	Skewness
Q6	I use AI tools frequently for academic tasks	4.28	0.55	-0.45
Q7	I depend on AI tools before attempting problems	4.31	0.53	-0.48
Q8	I rely on AI-generated answers without verifying	4.29	0.56	-0.42
Q9	I use AI tools even for tasks I can do independently	4.33	0.54	-0.50
Q10	AI tools are essential for my academic work	4.27	0.57	-0.39

Table 2: Reliability Statistics

Variable	No. of Items	Cronbach's Alpha	Interpretation
Overreliance on AI Tools	5	0.776	Good
Independent Learning Effort	5	0.861	Strong
Learning Depth	4	0.893	Very Strong
Critical Thinking & Problem-Solving	6	0.942	Excellent

Table 3: Pearson Correlation Matrix

Variable	Overreliance	Ind. Learning	Learning Depth	Critical Thinking
Overreliance on AI Tools	1	-0.588**	-0.593**	-0.624**
Independent Learning Effort	-0.588**	1	0.742**	0.778**
Learning Depth	-0.593**	0.742**	1	0.801**
Critical Thinking & PS	-0.624**	0.778**	0.801**	1

Note: ** $p < 0.01$

Table 4: Summary of Regression Results

Hypothesis	Dependent Variable	Independent Variable	R	R ²	Adj. R ²	Sig.	Decision
H1	Learning Depth	Overreliance on AI	0.593	0.351	0.347	0.000	Supported
H2	Critical Thinking	Overreliance on AI	0.624	0.389	0.385	0.000	Supported
H3	Ind. Learning Effort	Overreliance on AI	0.588	0.345	0.341	0.000	Supported
H4	Learning Depth	Ind. Learning Effort	0.742	0.551	0.548	0.000	Supported
H5	Critical Thinking	Ind. Learning Effort	0.778	0.605	0.602	0.000	Supported

Table 5: Mediation Results

Mediation Path	Direct Effect	Indirect Effect	Significance	Result
Overreliance → Ind. Learning → Learning Depth	Significant	Significant	$p = 0.000$	Full Mediation
Overreliance → Ind. Learning → Critical Thinking	Significant	Significant	$p = 0.000$	Full Mediation
Mediation Path	Direct Effect	Indirect Effect	Significance	Result

Overreliance → Ind. Learning → Learning Depth	Significant	Significant	p = 0.000	Full Mediation
Overreliance → Ind. Learning → Critical Thinking	Significant	Significant	p = 0.000	Full Mediation