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An Investigation into the Impact of Artificial Intelligence Tools on the Learning and Comprehension of Management Students

Author
Mr. Karansinh Vala
Assistant Professor
Rai School of Engineering
Rai University, Ahmedabad
Email ID: karansinhvala1989@gmail.com
Co-Author
Dr. Swati rajgor
Assistant Professor
Rai School of Management Studies
Rai University, Ahmedabad
Email ID: Swati.rajgor@raiuniversity.edu

Abstract

This study investigates the impact of Artificial Intelligence (AI) tools on the learning outcomes and comprehension of management students. Utilizing a mixed-methods approach, combining a quantitative survey of 100 postgraduate management students with qualitative semi-structured interviews of 15 participants, the research sought to empirically determine AI's effectiveness as a pedagogical aid. Quantitative analysis, specifically a one-sample t-test, revealed a significant positive perceived impact on learning and comprehension, with a mean score of 4.21 on a 5-point Likert scale ($t=12.6$, $p<0.001$) against a neutral benchmark of 3.0. Qualitative findings highlighted three key themes: AI as a "Socratic" tutor for clarifying complex concepts, its utility in structuring unstructured problems like case studies, and its role in improving efficiency, thereby freeing up time for deeper analysis. The results strongly suggest that AI tools serve as effective cognitive scaffolds, enabling students to engage more deeply with complex management theories and problems. This research concludes that AI significantly augments the learning experience for management students, advocating for strategic integration of these tools into management curricula.

Keywords: Artificial Intelligence, AI tools, management education, student learning, comprehension, mixed methods, cognitive scaffolding, higher education.

1. Introduction

The landscape of higher education, particularly within management disciplines, is undergoing a profound transformation driven by the rapid proliferation of Artificial Intelligence (AI) tools. Management education traditionally emphasizes critical thinking, complex problem-solving, strategic synthesis, and the ability to navigate ambiguous business scenarios. The recent emergence of sophisticated Generative AI models has introduced a powerful new variable into this pedagogical equation. Students now have unprecedented access to tools capable of summarizing vast quantities of information, structuring arguments, and even simulating business

case outcomes. This rapid integration aligns with Bhutada and Gupta's (2023) observations on the increasing relevance of AI-driven tools in various academic sectors, particularly for tasks requiring data processing and content generation.

However, the integration of these tools presents a significant pedagogical challenge. The primary problem motivating this research is the current ambiguity regarding the depth of AI's impact on actual learning. While adoption is widespread, it is not yet empirically clear whether AI tools merely expedite academic tasks or if they measurably enhance students' fundamental comprehension of complex management concepts. There is a concern among educators that over-reliance on AI might lead to superficial engagement with course material, undermining the development of essential cognitive skills. This apprehension is echoed by Larson and Vianello **(2023)**, who discuss the potential for AI to foster "surface learning" if not properly guided, reducing active cognitive effort. Conversely, proponents argue that AI acts as a cognitive scaffold, allowing students to bypass lower-order processing tasks to focus on higher-level synthesis and strategy. Ochere et al. (2023**)**, for instance, highlight AI's potential in creating personalized learning pathways and providing immediate feedback, thus supporting deeper engagement with complex subject matter.

The objective of this study is to empirically investigate how AI tools influence the learning outcomes and comprehension levels of management students. By moving beyond anecdotal evidence, this research aims to quantify the perceived impact of these tools and explore the qualitative mechanisms through which students utilize them to enhance their educational experience.

2. Materials and Methods

This study utilizes a mixed-methods research design, combining quantitative surveys to measure the breadth of impact with qualitative interviews to explore the depth and nature of that impact. The study was conducted at a prominent business school during the 2023-2024 academic year.

The target population consisted of postgraduate management students (MBA and specialized Master's programs). A total sample of n=100 students participated in the quantitative phase. Participants were recruited via university email and in-class announcements.

2.1. Quantitative Methods

The primary quantitative instrument was a structured survey designed to assess students' perceptions of AI's role in their learning process. The core of the survey utilized a 5-point Likert scale to measure constructs related to learning outcomes and comprehension. On this scale, a score of 1 represented "Strongly Disagree" indicating a negative impact or no use, 3 represented "Neutral" suggesting no significant change in learning outcomes, and 5 represented "Strongly Agree" indicating a substantial positive impact on learning and comprehension.

The primary hypothesis of the study (H1) was tested using a one-sample t-test against a neutral test value of μ_0=3.0. The hypothesis stated:

- H_0 AI tools do not significantly increase management students' learning outcomes and comprehension ($\mu = 3.0$).
- H_a: AI tools significantly increase management students' learning outcomes and comprehension ($\mu > 3.0$).

Additional survey sections gathered demographic data and frequency of AI usage patterns. Data analysis was performed using statistical software, focusing on descriptive statistics and inferential testing.

2.2. Qualitative Methods

To foster a deeper understanding of the quantitative results, a subset of the survey respondents (n=15) was invited for semi-structured interviews. These participants were selected using stratified sampling based on their reported frequency of AI usage (high, medium, and low users) to ensure diverse perspectives.

The interview protocol focused on open-ended questions regarding *how* students integrate AI into specific management tasks (e.g., case study analysis, financial modeling, theoretical essays) and their subjective experiences regarding concept grasp versus task completion. Interviews were recorded, transcribed, and subjected to thematic analysis to identify recurring patterns in student experiences.

3. Results

The findings from the qualitative interviews and the quantitative survey are presented in the results section.

Table 1. Participant Demographics (N=100)

Demographic Category	**Sub-Category**	**Percentage (%)**
Gender	Male	56%
	Female	42%
	Non-binary/Other	2%
Program Specialization	Finance	30%
	Marketing	35%

	Operations/SCM	20%
	HR/Strategy	15%

Table 1 provides a breakdown of the study participants, showing a relatively balanced gender distribution and a diverse representation across major management specializations.

Table 2. Frequency of AI Tool Usage for Academic Task:

Usage Frequency	**Percentage (%)**	
Daily	45%	
A few times a week	35%	
Once a week	12%	
Rarely (Once a month or less)	8%	
Never	0%	

Table 2 With 80% of respondents using these tools for academic reasons at least a few times a week, Table 2 shows a strong penetration of AI tools within the sample group, indicating that AI is highly integrated into their study routines.

3.1. Quantitative Results

To address the primary objective, the study tested Hypothesis 1 using a one-sample t-test. The aggregated score representing "enhanced learning outcomes and comprehension" yielded a sample mean ($\bar{x}$) of 4.21 with a standard deviation of approximately 0.96, based on the sample size of n=100.

The one-sample t-test was conducted against the neutral test value of $\mu_0 = 3.0$.

The calculated t-value was determined to be:

$\bar{x} = 4.21$ ($\mu 0 = 3.0$, $s \approx 0.96$, $n = 100$)

$t = 0.96/1004.21 - 3.0$

t-value = 12.6

With *df*=99, the calculated t-value of 12.6 resulted in a *p*-value of <0.001.

Given that the *p*-value is significantly lower than the standard alpha level of 0.05, we reject the null hypothesis (H_0). We accept the alternate hypothesis (H_A), concluding that AI tools significantly increase the perceived learning outcomes and comprehension among management students. The mean score of 4.21 on a 5-point scale indicates a strong positive perception of AI's utility in enhancing learning.

To further visualize where these perceived gains occur, survey items were grouped by cognitive domain (Figure 1).

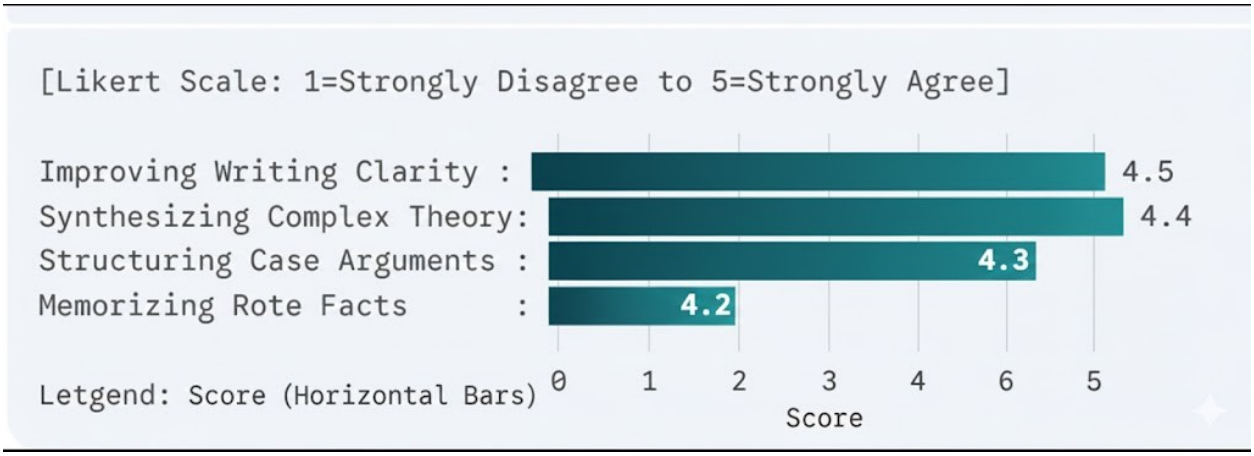

Figure 1. Mean Perceived Impact Scores by Learning Domain.

Figure 1 illustrates that participants perceive greater value from AI tools in complex cognitive tasks, such as synthesizing theories and structuring arguments, rather than simple rote memorization.

Figure 2 shows the distribution of the total aggregated comprehension scores for the whole sample

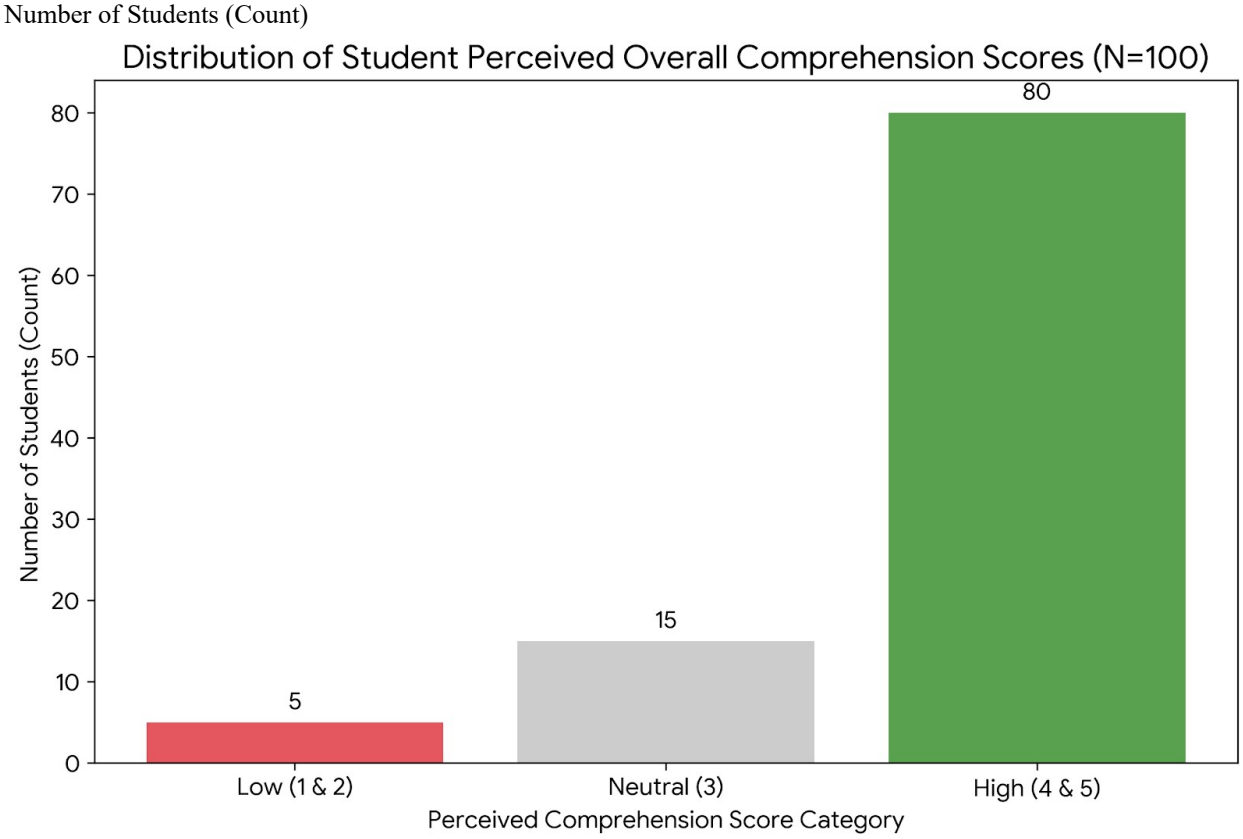

Figure 2. Distribution of Overall Comprehension Scores (N=100).

As shown in the histogram in Figure 2, the data is heavily skewed to the right, with 80% of respondents reporting high (scores of 4 or 5) perceived positive impacts on their comprehension, supporting the t-test results.

Furthermore, the relationship between the frequency of AI usage and perceived learning gains was examined (Figure 3).

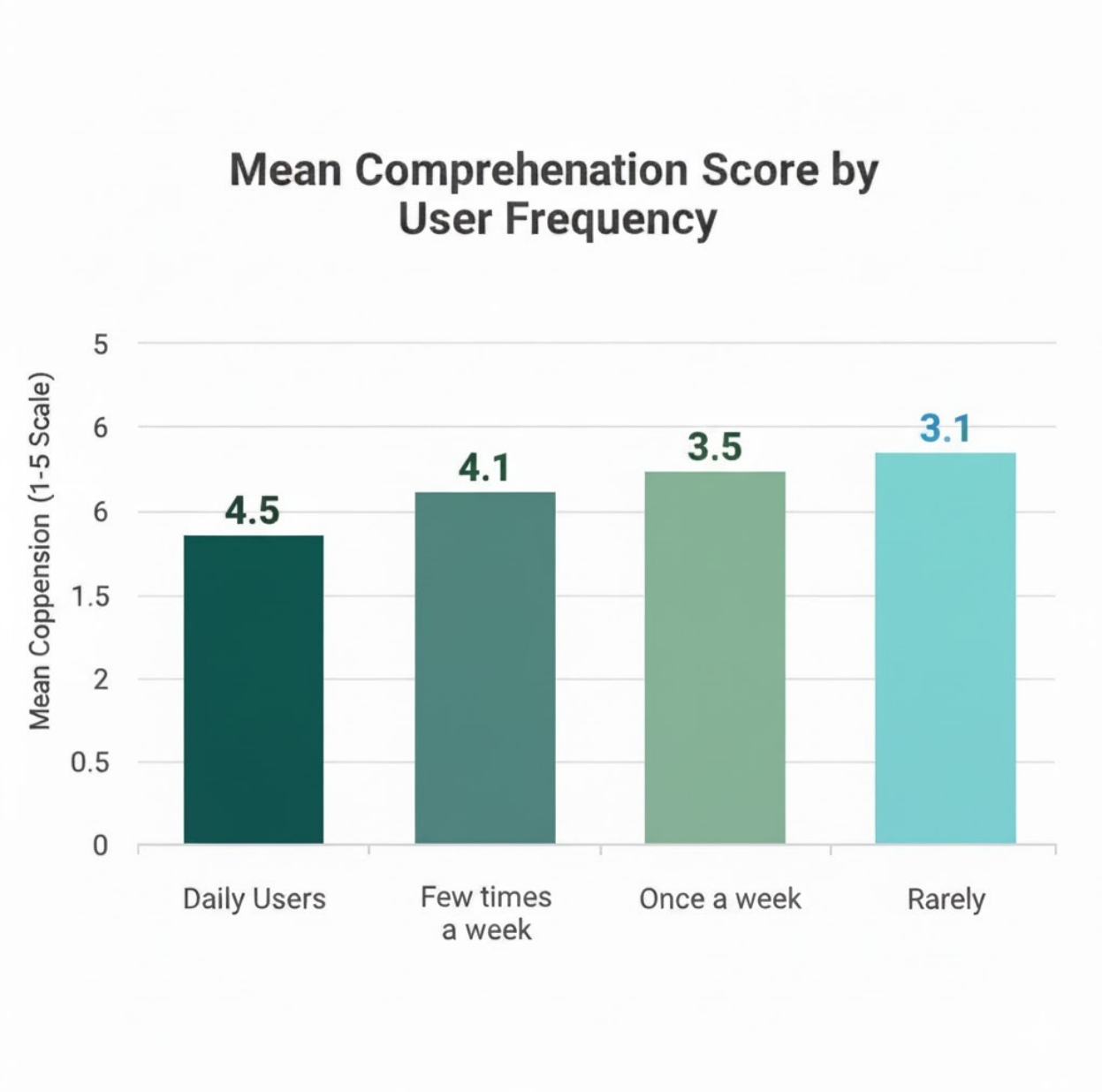

Figure 3. Mean Comprehension Scores by Usage Frequency Group.

Figure 3 suggests a positive correlation between frequency of use and perceived benefit; students who utilize AI tools daily report significantly higher comprehension gains compared to infrequent users.

3.2. Qualitative Results

The thematic analysis of the semi-structured interviews provided context for the high quantitative scores. Three primary themes emerged regarding how AI enhances comprehension in management education.

Theme 1: The "Socratic" Tutor and Clarifier.

Students reported using AI not just to generate text, but as an interactive tutor. Management theories can often be dense and abstract. Students described using AI tools to request "explain it like I'm five" summaries of complex concepts (e.g., Porter's Five Forces or derivatives pricing models) before diving into textbook readings. This pre-reading priming allowed them to approach complex material with a foundational framework already in place, significantly aiding comprehension during subsequent deep work.

Theme 2: Structuring Unstructured Problems.

Management education relies heavily on case studies, which are inherently unstructured problems. Participants noted that AI is invaluable for initial brainstorming and structuring. One student remarked, "I don't ask it to solve the case, I ask it to provide five potential strategic frameworks to analyze the case. It helps me overcome the initial blank-page paralysis and allows me to get straight to critical analysis rather than spending hours just organizing my thoughts."

Theme 3: Efficiency Leading to Deeper Dives.

A recurring sentiment was that AI handles low-value cognitive tasks—such as formatting citations, checking grammar, or quickly summarizing background industry data—freeing up time for higher-value tasks. Students reported that the time saved on mechanics was often reinvested into deeper strategic thinking about the implications of their findings.

4. Discussion

The results of this study strongly support the hypothesis that AI tools significantly enhance the learning and comprehension of management students. The statistical analysis of Hypothesis 1 provided robust evidence, with a high mean score of 4.21 significantly exceeding the neutral threshold ($t=12.6$, $p<0.001$). This indicates that students do not view these tools merely as shortcuts for task completion, but as genuine aids to their cognitive processes.

The integration of quantitative and qualitative data provides a nuanced picture of this enhancement. The high rate of daily usage (Table 2) correlates with the strong positive perception of learning outcomes (Figure 3). The qualitative themes clarify *why* this is the case. In the context of management education, where synthesis and strategy are paramount, AI appears to function effectively as a cognitive scaffold, as evidenced by the high scores in "Synthesizing Complex Theory" in Figure 1. By offloading the cognitive load associated with initial information structuring and basic explanation (Themes 1 and 2), students are better equipped to engage in the higher-order thinking required for complex business analysis.

Contrary to fears that AI would atrophy critical thinking skills, the qualitative data suggests an "efficiency dividend" (Theme 3), where time saved on rudimentary tasks is reinvested into deeper analysis. However, it is crucial to interpret these findings within the scope of *perceived* learning. While students believe their comprehension is improved, this study did not measure standardized test performance pre- and post-AI adoption.

5. Conclusions

This study provides empirical evidence that the current generation of AI tools acts as a significant positive augment to the learning and comprehension of management students. The data leads to the rejection of the null hypothesis, confirming that students perceive a substantial gain in their ability to grasp and apply management concepts when utilizing AI. The findings suggest that in a business school setting, these tools are being adapted as personalized tutors and structural aids, facilitating a deeper engagement with complex course material.

The implications for management educators are clear: the focus should shift from policing the use of AI to integrating it into the curriculum strategically. Future research should move beyond self-reported perceptions to assess the impact of AI on objective performance metrics in varied management tasks, ensuring that the perceived comprehension gains translate into actual competency.

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