

"To Study the Impact of AI-Integrated Learning Tools on Academic Engagement Among Gen-Z "

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Abstract

Purpose

The study examines the impact of AI-integrated learning tools on academic engagement among Gen Z students in Mumbai. It examines how AI-based educational technologies influence usage patterns, learning outcomes, and engagement levels.

Design/methodology/approach

A descriptive and analytical research design was adopted. Primary data were collected from 400 Gen-Z respondents using a structured questionnaire. Statistical tools such as correlation and regression were used to analyse the relationship between AI tool usage, learning outcomes, and academic engagement.

Findings

Results show a significant positive relationship between AI tool usage and academic performance. Usage patterns strongly predict academic engagement ($R^2 = 0.997$), and students using AI tools demonstrate higher motivation, improved understanding, and better performance.

Practical Implications

The study highlights the growing importance of AI-integrated learning tools in enhancing academic engagement among Gen-Z students. Educational institutions can use these insights to design AI-supported curricula, improve personalised learning pathways, and create more interactive academic environments. Faculty can integrate AI-driven platforms to support assessments, feedback, and doubt clarification. The findings also guide policymakers in strengthening digital literacy initiatives and framing ethical AI usage guidelines to promote responsible adoption in higher education.

Originality

This research contributes original empirical evidence on how AI-integrated learning tools influence academic engagement among Gen-Z learners in the Indian context. Unlike existing studies focused on AI literacy or ethical concerns, this study directly measures the correlation and predictive power of AI usage patterns on academic involvement, offering a novel perspective on technology-driven education.

Keywords: AI-integrated learning tools, Academic engagement, Gen-Z students, Learning outcomes, Usage patterns

Introduction

Artificial Intelligence is rapidly transforming the landscape of higher education, especially for Gen-Z learners who are digital natives and deeply immersed in technology-driven environments. AI-integrated learning tools such as ChatGPT, Gemini, Perplexity, and Meta AI have redefined how students interact with academic content, complete assignments,

seek clarification, and engage with learning materials. These tools offer personalised learning support, instant feedback, and enhanced access to information, contributing to a more dynamic educational experience.

Despite the growing adoption of AI tools in academic settings, the extent to which they influence academic engagement among Gen-Z remains insufficiently explored. Academic engagement—which includes attention, motivation, participation, and active involvement—is a critical predictor of learning outcomes and overall academic success. As educational institutions increasingly incorporate AI-driven technologies, it becomes essential to understand how these tools influence student behaviour, learning performance, and long-term academic involvement.

This study bridges this gap by analysing the relationship between AI tool usage patterns, learning outcomes, and academic engagement among Gen-Z students in Mumbai. It provides empirical insights supported by statistical evidence, offering a deeper understanding of how AI tools contribute to academic performance and the evolving dynamics of modern education.

Background of the Study

AI-integrated learning tools are transforming how Gen-Z students engage with academic content. As digital natives, they interact extensively with technology, creating new patterns of learning behaviour. Understanding how AI tools influence motivation, participation, and academic involvement is essential for improving learning outcomes and designing future-ready education systems.

Problem Statement

Although AI-based learning tools are widely adopted, the extent to which they enhance or reduce academic engagement among Gen-Z remains unclear. Limited empirical evidence exists regarding their impact on attention, motivation, collaboration, and learning satisfaction. This study identifies gaps in understanding how AI tools shape student engagement in higher education.

Objective of the Study

1. To assess the level of academic engagement among Gen-Z students using AI-integrated learning tools.
2. To analyse the relationship between AI tool usage and students' learning outcomes.
3. To examine the relationship between the usage pattern of AI-integrated learning tools and academic engagement among Gen-Z students.

Significance of the Study

This study provides valuable insights for educators, institutions, and policymakers to understand the role of AI in enhancing academic engagement. It highlights how AI tools can improve motivation and learning performance while identifying user challenges. The findings will guide the development of more effective AI-driven educational strategies for Gen-Z learners.

Limitations of the Study

- The study is limited to respondents from Mumbai, restricting generalisability to other regions.
- Only self-reported data were used, which may include biases such as overestimation or underreporting.
- The research focuses only on Gen-Z students and excludes other generational groups.
- The study considers only selected AI-integrated tools, not the full range of available technologies.
- The cross-sectional design prevents analysis of long-term behavioural changes.

Literature Review

Generative AI is reshaping education and creativity for Gen Z by enhancing learning, engagement, and creative output. While offering major opportunities, it also raises concerns about overreliance, reduced critical thinking, data privacy, and algorithmic bias. The study emphasizes balancing AI use with human creativity, ethics, and responsible integration (Ali et al., 2024). (Singh et al., 2024) found that AI literacy significantly enhances AI usage, learning outcomes and academic

performance among Gen Z students. Using SEM, the study showed that higher AI literacy improves engagement, problem-solving and critical thinking. It recommends integrating AI education, supporting educators and ensuring equitable access to AI technologies. (LLANES et al., 2025) found that Gen Z students perceive AI tools as helpful for academic success but requiring responsibility, discipline, and ethical use. Despite risks and uncertainties, the study stresses the need for institutions to strengthen ethical guidelines and digital literacy programs to uphold academic integrity as AI continues to advance. (Jesus et al., 2025) found that AI adoption in higher education varies across generations due to differences in trust, digital literacy and ethical concerns. Through qualitative interviews, four themes emerged—innovation, peer influence, institutional support and generational attitudes—leading to the Generationally Mediated AI Adoption Theory explaining generational differences in AI integration. (Hill, 2025) found that AI-enabled performance-tracking systems moderately influence Gen Z employees' engagement, motivation and management styles, shifting workplaces toward data-driven oversight. While Gen Z appreciates efficiency gains, they express concerns about privacy and job security, highlighting the need for supportive policies and alignment of AI adoption with evolving workforce expectations. (Chiara, 2025) shows that AI is transforming higher education, offering innovation and personalised learning but raising concerns about bias, ethics, dependency and inequality. Through international focus groups, researchers emphasised the need for transparent AI policies, critical AI literacy and culturally responsive strategies, framing AI integration as a broad cultural shift in academia. (Cho & Ofosu-Anim, 2025) found that international students are generally willing to adopt GenAI, though usage varies by gender and age—male and younger students show higher adoption. Despite these differences, overall interest remains strong. The study recommends reforms in South Korea's education system to integrate ethical, student-centred GenAI practices. (Thakur et al., 2025) found that digital transformation in higher education is driven by factors such as innovativeness, self-efficacy, facilitating conditions and AI value creation, influencing AI adoption and inclusive education. Using SEM, the study highlights that AI-enabled DT supports quality education and advances SDG-related goals in higher education.

Methodology

i. Research design:

The research conducted was descriptive and analytical, so a Survey method was used. A Survey was conducted through a structured questionnaire, tested for reliability and data were collected throughout Mumbai.

ii. Primary data:

Primary data was collected randomly through the structured questionnaire in Mumbai, by using simple random sampling.

iii. Sample size:

The study was limited to participants who voluntarily completed the instruments in their entirety. There was a total of 400 respondents of Gen-Z.

The sample to which the questionnaire was administered was based on random sampling techniques. The sample distribution was given in Table 1. Socio-Demographic profile

Parameters	Classification	Sample (N)	Percentage (%)
Gender	Male	175	43.80
	Female	225	56.30
	Total	400	100
Age (in years)	18-20 years	349	87.30
	21-25 years	33	8.30
	25 and above	18	4.50
	Total	400	100

Educational Qualification	Under graduate	53	13.30
	Graduate	323	80.80
	Others	24	6.00
	Total	400	100
Do you regularly use AI-based learning tools?	Yes	370	92.50
	No	19	4.80
	May be	11	2.80
	Total	400	100
Which AI-integrated tools do you use most?	ChatGPT	273	68.3
	Google Gemini	53	13.3
	Meta AI	44	11.00
	Perplexity	25	6.30
	Others	5	1.30
	Total	400	100

Table 1. Source: Primary data

iv. Sample design:

When conducting the study, the researcher followed the rules and used a straightforward random sample strategy. The respondents who did not express a desire to participate in the study were not included in the analysis, as was advised during the study.

v. Area of research:

Mumbai

vi. Secondary data:

The secondary information or data was collected from newspapers, research articles, magazine, and websites.

vii. Research instruments

A summated closed-ended questionnaire was used with different viewpoints of respondents. In this questionnaire, all the questions were positively framed to study the impact of independent variables like age, gender and qualification on the dependent variable.

viii. Statistical analysis

Efficient and effective data analysis is the result of effective data preparation. This was found to be very crucial between the completion of the field work and the statistical processing of the collected data. Based on the data sheet, tables and graphs were prepared for the analysis.

Hypothesis

1. H_0 : There is no significant impact of AI-integrated learning tools on academic engagement among Gen-Z students.
 H_a : There is a significant impact of AI-integrated learning tools on academic engagement among Gen-Z students.
2. H_0 : There is no positive relationship between AI tool usage and students' learning outcomes.
 H_a : There is a positive relationship between AI tool usage and students' learning outcomes.
3. H_0 : There is no significant relationship between the usage pattern of AI-integrated learning tools and academic engagement among Gen-Z students.

H_a: There is a significant positive relationship between the usage pattern of AI-integrated learning tools and academic engagement among Gen-Z students.

Analysis

1. H₀: There is no significant impact of AI-integrated learning tools on academic engagement among Gen-Z students.

Correlations			
		Which AI-integrated tools do you use most?	Academic_Performance
Which AI-integrated tools do you use most?	Pearson Correlation	1	.226**
	Sig. (1-tailed)		.000
	N	400	400
Academic_Performance	Pearson Correlation	.226**	1
	Sig. (1-tailed)	.000	
	N	400	400

** . Correlation is significant at the 0.01 level (1-tailed).

Table 2. Source: Primary data – Correlation

Conclusion on Hypothesis:

Since the correlation is significant at the 0.01 level ($p = 0.000 < 0.01$), the null hypothesis (H₀) is rejected. This means AI-integrated learning tools have a significant impact on academic engagement/performance among Gen-Z students.

Interpretation

The Pearson correlation coefficient $r = 0.226$ shows a positive and statistically significant relationship between the use of AI-integrated learning tools and academic performance among Gen-Z students. The significance value $p = 0.000$ (1-tailed), which is below the 0.01 threshold, confirms that this relationship is not due to chance. Therefore, the null hypothesis is rejected. Although the correlation is modest, it indicates that students who frequently use AI learning tools tend to demonstrate higher levels of academic engagement and better performance. This suggests that AI tools contribute meaningfully to improving learning effectiveness.

2. H₀: There is no positive relationship between AI tool usage and students’ learning outcomes.

Correlations			
		Usage_Patterns	Learning_Outcomes
Usage_Patterns	Pearson Correlation	1	.942**
	Sig. (1-tailed)		.000
	N	400	400
Learning_Outcomes	Pearson Correlation	.942**	1
	Sig. (1-tailed)	.000	
	N	400	400

** . Correlation is significant at the 0.01 level (1-tailed).

Table 3. Source: Primary data - Correlations

Conclusion on Hypothesis:

Since the correlation is significant at the 0.01 level ($p = 0.000 < 0.01$).

H_0 : There is no positive relationship between AI tool usage and students’ learning outcomes is rejected. This means a strong positive relationship exists.

Interpretation

The Pearson correlation value of $r = 0.942$ indicates a very strong and highly positive relationship between AI tool usage patterns and students’ learning outcomes. This exceptionally high correlation suggests that as students use AI tools more frequently or effectively, their learning outcomes improve significantly. The significance value $p = 0.000$ (1-tailed) confirms that this relationship is statistically meaningful and not due to random chance. Therefore, the null hypothesis is rejected. These results clearly show that AI-based learning tools play a major role in enhancing students’ understanding, performance, and overall academic success.

- H_0 : There is no significant relationship between the usage pattern of AI-integrated learning tools and academic engagement among Gen-Z students.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.998 ^a	.997	.997	.04231
a. Predictors: (Constant), Usage_Patterns				

Table 4. Source: Primary data – Model Summary

ANOVA ^a						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	220.591	1	220.591	123207.337	.000 ^b
	Residual	.713	398	.002		
	Total	221.303	399			
a. Dependent Variable: Academic_Performance						
b. Predictors: (Constant), Usage_Patterns						

Table 5. Source: Primary data - Anova

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.013	.005		-2.499	.013
	Usage_Patterns	1.008	.003	.998	351.009	.000
a. Dependent Variable: Academic_Performance						

Table 6. Source: Primary data - Coefficients

Conclusion on Hypothesis:

Based on the regression results ($p = 0.000 < 0.01$),

H_0 : There is no significant relationship between the usage pattern of AI-integrated learning tools and academic engagement is rejected.

This means a statistically significant relationship exists.

Interpretation

The regression model shows an extremely strong relationship between usage patterns of AI-integrated learning tools and academic engagement among Gen-Z students. The model explains 99.7% of the variance ($R^2 = 0.997$) in academic performance, indicating exceptional predictive power. The ANOVA results ($F = 123207.337$, $p = 0.000$) confirm that the model is highly significant. The coefficient for usage patterns ($B = 1.008$, $p = 0.000$) demonstrates that increased use of AI tools leads to a strong rise in academic engagement. Therefore, the null hypothesis is rejected, proving AI usage is a powerful predictor of academic performance.

Discussion

The findings of this study reveal a significant and positive impact of AI-integrated learning tools on academic engagement among Gen-Z students. As highly tech-savvy learners, Gen-Z actively incorporates AI platforms such as ChatGPT, Gemini, and Meta AI into their academic routines. The data demonstrates that increased usage of AI tools correlates strongly with enhanced learning outcomes, motivation, understanding, and academic performance. Regression results further confirm that usage patterns are powerful predictors of academic engagement, explaining nearly all the variance in performance scores.

These outcomes suggest that AI tools act as catalysts for personalised, flexible, and interactive learning experiences. Students benefit from instant support, improved comprehension, and efficient problem-solving resources. However, the findings also emphasise the need for structured and ethical integration of AI, as excessive reliance may hinder critical thinking and academic integrity if not properly regulated.

The discussion highlights that while AI holds transformative potential, institutional readiness, digital literacy, and faculty involvement are essential for effective implementation. The study contributes valuable insights into evolving educational practices, urging stakeholders to adopt balanced and student-centred AI strategies to optimise learning experiences for the Gen-Z generation.

Recommendation/Suggestion

1. Integrate AI Literacy into Curriculum: Institutions should develop formal training modules to improve students' responsible and effective use of AI tools.
2. Promote Ethical AI Usage: Clear guidelines should be established to ensure academic integrity and prevent misuse.
3. Strengthen Digital Infrastructure: Colleges should invest in robust technological systems that support scalable AI-based learning environments.
4. Provide Faculty Training: Educators must be trained to incorporate AI tools into teaching strategies and evaluation processes.
5. Encourage Blended Learning Models: Combine AI-driven tools with traditional teaching to maintain a balance between automation and human interaction.

Conclusion

The study provides strong empirical evidence that AI-integrated learning tools play a significant role in enhancing academic engagement and performance among Gen-Z students. As digital natives, this generation is highly adaptive to technology, and their learning preferences align closely with the personalised, interactive, and instant-feedback nature of AI-driven educational platforms. The results clearly demonstrate that increased usage of AI tools corresponds with improved learning outcomes, higher motivation levels, and deeper academic involvement.

The correlation and regression analyses reveal a powerful relationship between usage patterns and academic performance, with AI usage explaining a significant portion of the variance in engagement among students. This

underscores the growing value of AI tools in shaping effective learning behaviours, fostering independent study habits, and supporting students in goal-oriented learning. However, despite the overwhelming benefits, responsible usage remains critical. The rapid expansion of AI poses challenges related to ethical considerations, overdependence, data privacy, and the reduction of critical thinking skills if not used judiciously.

Educational institutions must recognise the transformative potential of AI while ensuring a balanced approach that combines technological innovation with human guidance. AI tools should serve as complementary aids rather than replacements for traditional learning processes. Faculty readiness, ethical guidelines, and structured curriculum integration are essential to maximise the benefits of AI-assisted learning.

In conclusion, AI-integrated learning tools are emerging as essential components of modern education, particularly for Gen-Z students. Their ability to enhance academic engagement and performance highlights the need for institutions to embrace AI strategically and responsibly. With proper implementation, AI can significantly improve the quality of learning, promote student success, and reshape the future of education in meaningful ways.

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