



Generative AI in Higher Education: Exploring Its Influence on Students' Academic Engagement, Creativity and Self-Regulated Learning

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Abstract

Generative Artificial Intelligence (GenAI) has emerged as an important technological development in higher education, providing students with opportunities for personalised assistance, brainstorming, information support, feedback, and academic task completion. The present study examines the relationship between Generative AI use and three important dimensions of student learning: academic engagement, creativity, and self-regulated learning. The study adopted a quantitative research approach. An illustrative sample of 500 higher education students was considered for the statistical model. Data were analysed using descriptive statistics, reliability analysis, Pearson's correlation, and multiple regression analysis. The illustrative findings indicated significant positive relationships between Generative AI use and academic engagement, creativity, and self-regulated learning. Academic engagement and creativity were also significantly associated with self-regulated learning. The regression model indicated that Generative AI use, academic engagement, and creativity jointly explained a substantial proportion of variance in self-regulated learning. The findings suggest that Generative AI can become a useful educational resource when it is used as a support for active learning rather than as a replacement for independent thinking.

Keywords: Generative AI, Higher Education, Academic Engagement, Creativity, Self-Regulated Learning, Artificial Intelligence, Student Learning

1. Introduction

The rapid development of Artificial Intelligence has significantly influenced the contemporary higher education environment. In particular, Generative Artificial Intelligence has introduced new ways of creating, accessing, explaining, and interacting with academic information. Unlike traditional digital learning resources, generative AI applications can produce new text, explanations, examples, questions, summaries, ideas, and other forms of content in response to students' instructions. The increasing availability of tools such as ChatGPT has changed the way students approach several academic activities. Students may use GenAI to understand difficult concepts, generate ideas, prepare outlines, obtain explanations, improve written work, develop practice questions, and receive immediate feedback. These possibilities have created opportunities for more flexible and personalised learning.

However, the increasing use of GenAI has also created important educational concerns. Excessive dependence on AI-generated information may reduce students' independent thinking and may encourage them to complete academic tasks without sufficient cognitive involvement. Similarly, if students accept AI-generated information without verification, they may develop misconceptions or reproduce inaccurate information. Academic engagement is particularly important in this context. Students need to remain actively involved in reading, analysing, questioning, discussing, and applying knowledge. GenAI may support



engagement by providing immediate assistance, but its actual educational value depends on whether students use it actively and critically.

Creativity is another important dimension. GenAI can generate alternative ideas, perspectives and examples that may stimulate students' creative thinking. At the same time, students may become dependent on AI-generated ideas and reduce their own originality if they use AI passively. Self-regulated learning is equally important because students must be able to set goals, plan their learning, monitor progress and evaluate outcomes. GenAI can assist these processes, but students should retain responsibility for making academic decisions. Therefore, the present study examines the relationship between Generative AI use, academic engagement, creativity and self-regulated learning among higher education students.

2. Conceptual Framework

The conceptual framework of the study assumes that Generative AI use may influence students' academic behaviour and learning processes. Productive use of GenAI may provide students with additional learning support, which may encourage academic engagement and creative exploration. These processes may subsequently contribute to stronger self-regulated learning.

The study therefore considers:

Generative AI Use → Academic Engagement

Generative AI Use → Creativity

Generative AI Use → Self-Regulated Learning

Academic Engagement → Self-Regulated Learning

Creativity → Self-Regulated Learning

The framework does not assume that AI automatically improves learning. Rather, it proposes that the educational effects of GenAI depend on the manner in which students interact with the technology.

3. Academic Engagement

Academic engagement refers to the extent to which students actively participate in and invest effort in the learning process. It includes students' behavioural participation, emotional involvement and cognitive investment in academic activities. Behavioural engagement includes attendance, participation, completion of assignments and persistence. Emotional engagement includes students' interest, enthusiasm, sense of belonging and positive attitude towards learning. Cognitive engagement refers to the mental effort students invest in understanding, analysing and applying knowledge. Generative AI may support academic engagement by providing immediate explanations, examples, feedback and personalised learning assistance. Students can use AI to clarify difficult concepts and explore alternative explanations. Such interaction may increase their involvement in learning activities. However, passive dependence on AI may have the opposite effect. If students simply copy AI-generated responses, their actual cognitive engagement may decrease. Therefore, the present study examines academic engagement as an important variable associated with the productive use of Generative AI.



4. Creativity

Creativity refers to the ability to generate ideas or solutions that are both original and appropriate to a particular context. In higher education, creativity is important for research, problem solving, innovation, academic projects and application of knowledge. Generative AI can support creativity by helping students brainstorm, generate alternative ideas, explore different perspectives and develop initial concepts. AI can therefore function as a stimulus for creative thinking. However, AI-generated ideas should not replace students' independent creativity. Students need to evaluate, modify and develop AI-generated suggestions according to their own understanding. Excessive dependence on AI may result in reduced originality and intellectual independence. Thus, the present study examines whether GenAI use is positively associated with students' creativity.

5. Self-Regulated Learning

Self-regulated learning refers to students' ability to actively manage their own learning. It involves goal setting, planning, selection of learning strategies, self-monitoring, time management, self-evaluation and reflection. In AI-supported learning environments, self-regulation becomes particularly important. Students may use GenAI to prepare study schedules, generate practice questions, obtain feedback and identify areas of difficulty. Such activities may support different stages of the self-regulated learning process. Nevertheless, effective self-regulated learning requires students to remain responsible for evaluating information and making learning decisions. Therefore, AI should function as a supportive resource rather than replacing students' planning, monitoring and reflection.

6. Need and Significance of the Study

The increasing use of Generative AI among higher education students creates a need to understand its educational consequences. Although GenAI can provide rapid and personalised academic assistance, its influence on students' learning behaviour may depend on how the technology is used. The study is significant because it examines three important outcomes—academic engagement, creativity and self-regulated learning—within a single framework. Understanding academic engagement is important because technology should encourage students to participate actively in learning rather than simply complete academic tasks more quickly. Creativity is important because higher education aims not only to transmit information but also to develop innovation, originality and problem-solving abilities. Self-regulated learning is important because students increasingly have access to technologies that can perform several learning-related tasks. Students therefore need the ability to determine when and how AI should be used. The study may provide useful implications for teachers, curriculum planners and higher education institutions in developing responsible and pedagogically meaningful approaches to Generative AI.

7. Objectives of the Study

1. To examine the level of Generative AI use among higher education students.
2. To examine the level of academic engagement among higher education students.
3. To examine the level of creativity among higher education students.
4. To examine the level of self-regulated learning among higher education students.



5. To determine the relationship between Generative AI use, academic engagement, creativity and self-regulated learning.
6. To determine whether Generative AI use, academic engagement and creativity significantly predict self-regulated learning.

8. Hypotheses of the Study

H₀₁: There is no significant relationship between Generative AI use and academic engagement among higher education students.

H₀₂: There is no significant relationship between Generative AI use and creativity among higher education students.

H₀₃: There is no significant relationship between Generative AI use and self-regulated learning among higher education students.

H₀₄: There is no significant relationship between academic engagement and self-regulated learning among higher education students.

H₀₅: There is no significant relationship between creativity and self-regulated learning among higher education students.

H₀₆: Generative AI use, academic engagement and creativity do not significantly predict self-regulated learning.

9. Research Methodology

9.1 Research Design

A quantitative descriptive-correlational research design was used. This design was considered appropriate because the study aimed to determine the relationships among Generative AI use, academic engagement, creativity and self-regulated learning.

9.2 Sample

For the illustrative statistical analysis, a sample of **500 higher education students** was considered.

Table 1

Demographic Profile of the Respondents

Variable	Category	N	Percentage
Gender	Male	238	47.6
	Female	262	52.4
Academic Level	Undergraduate	325	65.0

Variable	Category	N	Percentage
	Postgraduate	175	35.0
AI Experience	Less than 1 year	105	21.0
	1–2 years	185	37.0
	More than 2 years	135	27.0
	No regular use	75	15.0

The sample consisted of 500 students, including 238 male and 262 female respondents. Undergraduate students constituted 65% of the sample, while postgraduate students represented 35%. In terms of AI experience, the largest group had 1–2 years of experience (37%), followed by students with more than two years of experience (27%). A smaller proportion reported less than one year of experience (21%), while 15% reported no regular use of AI. Thus, the sample included students with different levels of exposure to Generative AI.

12. Reliability Analysis

Table 2

Reliability of the Major Variables

Variable	No. of Items	Cronbach's Alpha
Generative AI Use	18	.912
Academic Engagement	20	.904
Creativity	16	.887
Self-Regulated Learning	24	.925

The reliability coefficients ranged from .887 to .925, indicating strong internal consistency among the items. The highest reliability was observed for Self-Regulated Learning ($\alpha = .925$), while Creativity showed an alpha coefficient of .887. Overall, the scales demonstrated satisfactory reliability for the proposed analysis.

Descriptive Statistics

Table 3

Mean and Standard Deviation

Variable	N	Mean	SD
Generative AI Use	500	3.68	0.64
Academic Engagement	500	3.72	0.58
Creativity	500	3.61	0.60
Self-Regulated Learning	500	3.75	0.56

The results indicate moderately high levels across all four variables. Self-Regulated Learning obtained the highest mean score ($M = 3.75$), followed by Academic Engagement ($M = 3.72$), Generative AI Use ($M = 3.68$), and Creativity ($M = 3.61$). The findings suggest that the students generally reported positive engagement with AI-supported learning and relatively favourable learning and creative behaviours.

Correlation Analysis

Table 4

Pearson Correlation Matrix

Variables	GAI Use	Academic Engagement	Creativity	SRL
GAI Use	1	.56**	.49**	.52**
Academic Engagement	.56**	1	.58**	.67**
Creativity	.49**	.58**	1	.58**
Self-Regulated Learning	.52**	.67**	.58**	1

The correlation analysis revealed significant positive relationships among all four variables. Generative AI use was positively associated with academic engagement ($r = .56$), creativity ($r = .49$), and self-regulated learning ($r = .52$). Academic engagement showed the strongest relationship with self-regulated learning ($r = .67$). Creativity was also significantly related to self-regulated learning ($r = .58$).

Therefore, H_{01} , H_{02} , H_{03} , H_{04} and H_{05} were rejected.

Multiple Regression Analysis

To determine the combined contribution of Generative AI use, academic engagement and creativity in predicting self-regulated learning, multiple regression analysis was conducted.

Table 5

Regression Model

R	R ²	Adjusted R ²	F	p
.743	.552	.549	194.62	<.001

The obtained R^2 value of .552 indicates that Generative AI use, academic engagement and creativity jointly explained **55.2% of the variance in self-regulated learning**. The overall regression model was statistically significant, $F(3,496) = 194.62$, $p < .001$.

Table 6
Regression Coefficients

Predictor	B	Beta	t	p
Generative AI Use	.184	.211	4.49	<.001
Academic Engagement	.471	.487	10.02	<.001
Creativity	.226	.243	5.26	<.001

All three variables significantly predicted self-regulated learning. Academic engagement was the strongest predictor ($\beta = .487$), followed by creativity ($\beta = .243$) and Generative AI use ($\beta = .211$).

Therefore, **H₀6 was rejected**.

Summary of Hypothesis Testing
Table 7
Hypothesis Testing

Hypothesis	Result	Decision
H ₀ 1: GAI Use–Academic Engagement	$r = .56, p < .001$	Rejected
H ₀ 2: GAI Use–Creativity	$r = .49, p < .001$	Rejected
H ₀ 3: GAI Use–SRL	$r = .52, p < .001$	Rejected
H ₀ 4: Academic Engagement–SRL	$r = .67, p < .001$	Rejected
H ₀ 5: Creativity–SRL	$r = .58, p < .001$	Rejected
H ₀ 6: Joint prediction of SRL	$R^2 = .552, p < .001$	Rejected

Discussion

The findings indicate that Generative AI use is significantly and positively associated with academic engagement. This suggests that students who use AI for meaningful academic purposes may participate more actively in learning activities. AI-based explanations, feedback and brainstorming may provide students with additional opportunities to interact with academic content. A significant positive relationship was also found between Generative AI use and creativity. This may be because AI tools can provide alternative ideas and perspectives that stimulate students during brainstorming and problem-solving activities. However, productive use requires students to modify and critically evaluate AI-generated ideas rather than simply reproducing them. The significant relationship between Generative AI use and self-regulated learning indicates that AI may support students' learning-management processes. Students may use AI for study planning, practice, feedback and clarification. Nevertheless, these benefits depend upon students maintaining responsibility for their own learning. Academic engagement showed the strongest relationship with self-regulated learning. This suggests that students who actively participate in academic



activities are more likely to plan, monitor and evaluate their learning effectively. The regression analysis further showed that Generative AI use, academic engagement and creativity jointly explained 55.2% of the variance in self-regulated learning. Academic engagement emerged as the strongest predictor, indicating that active participation in learning remains more important than technology use alone.

Educational Implications

The findings suggest that higher education institutions should promote **responsible and purposeful use of Generative AI**. Students should be trained to use AI for brainstorming, feedback, explanation and learning support while continuing to perform independent analysis and evaluation. Teachers can design AI-supported assignments that require students to compare AI-generated responses with scholarly sources, identify errors, revise AI outputs and provide personal reflections. Such activities can encourage both critical engagement and creativity. Institutions should also develop clear policies concerning academic integrity, disclosure of AI assistance, privacy and responsible AI use. GenAI should be integrated as a learning support tool rather than a substitute for students' independent thinking.

Limitations

The statistical data used in this paper are synthetic and intended only for demonstrating a compact empirical research-paper format. Actual field research may produce different findings. The study is also limited by its correlational design. Therefore, the reported relationships should not be interpreted as evidence of direct causal effects. Future studies using experimental and longitudinal designs may provide stronger evidence regarding the educational effects of GenAI.

Conclusion

Generative AI is becoming an increasingly important component of higher education. The present illustrative analysis indicates positive relationships between Generative AI use, academic engagement, creativity and self-regulated learning. The findings suggest that GenAI can provide meaningful academic support when students use it actively and responsibly. However, the strongest predictor of self-regulated learning in the present model was academic engagement rather than AI use alone. This highlights an important educational principle: **technology can support learning, but active student involvement remains central to effective learning**. Therefore, higher education institutions should focus not simply on increasing students' access to GenAI but on developing the skills required to use it critically, creatively, ethically and independently.

References

1. Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., et al. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences*, 103, 102274.
2. Miao, F., & Holmes, W. (2023). Guidance for Generative AI in Education and Research. UNESCO.
3. Ng, D. T. K. (2024). Empowering student self-regulated learning and science education through ChatGPT: A pioneering pilot study. *British Journal of Educational Technology*.
4. 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.



5. Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. Theory Into Practice, 41(2), 64–70.
6. UNESCO. (2023). Guidance for Generative AI in Education and Research. UNESCO.