https://doi.org/10.58419/gbs.v11i2.1122519

DECODING THE INFLUENCE OF ARTIFICIAL INTELLIGENCE ON UNDERGRADUATE AND POSTGRADUATE LEARNING: PEDAGOGICAL CHALLENGES IN AN EVOLVING DIGITAL PARADIGM

Dr. Viswanath Reddy
Assistant Professor
Rao Bahadur Y Mahabaleswarappa Engineering College, Ballari
viswanathreddy.d@gmail.com

Dr. V Lakshmi Lakshmi
Assistant Professor
Kishkinda University, Ballari
lucky.vasudev@gmail.com

ABSTRACT:

The present study examines the synthesis of Artificial Intelligence (AI) tools in higher education, concentrates on their use, subjective impact, and inter-connected with challenges among undergraduate (UG) and postgraduate (PG) students in India. Using a descriptive and exploratory research design, data were collected from 200 students using structured questionnaire and analysed using the statistical software "SPSS" (Statistical package for social science).

The study reveals that AI tools (e.g., ChatGPT) are widely adopted for curricular activities, with students articulating a strong readiness to continue using AI. Students interpret AI tools as productive for improving learning outcomes, Cognitive engagement, and Knowledge acquisition. Educational practitioners are considered as knowledgeable in using AI, and institutional readiness—such as availability of tools and clarity of policies is generally rated high. However, a substantial gap exists in formal ethical AI training, and concerns regarding academic dishonesty remain predominant. Regression estimates demonstrate that students' belief in AI's positive academic impact, effective use of AI by instructors, and the interactivity of AI tools significantly predicted good learning outcomes Contrastingly, factors such as ethical concerns, observed dishonesty and general willingness to use AI was not showing statistically significant impact on performance.

The findings from this study highlight that that while AI tools increase student learning and acknowledged academic success, potential amalgamation requires strategic efforts from institutions. These include formal ethical training, professional development for students, and clearly defined policies to support responsible and meaningful AI use in academics.

Keywords: *Artificial Intelligence, Higher Education, Student Engagement, Academic Performance, AI Ethics, Generative AI, India*

INTRODUCTION:

Artificial intelligence has rapidly emerged as a transformative force in higher education, reshaping how students learn and how teachers design instruction and assessment. Generative tools such as

ChatGPT, adaptive learning systems, and AI-driven feedback platforms are increasingly embedded in undergraduate and postgraduate learning, supporting activities ranging from language assistance to research and assessment. While students perceive these tools as productive for enhancing engagement, comprehension, and academic performance, their widespread use also raises complex questions related to ethics, authorship, academic integrity, and institutional responsibility. This study, therefore, seeks to decode the influence of AI on UG and PG learning by examining patterns of usage, perceived benefits, and emerging pedagogical challenges within an evolving digital paradigm

LITERATURE REVIEW:

(Crompton & Burke, 2023) The rapid emergence of Artificial Intelligence (AI) in higher education has redefined traditional learning environments, challenging both pedagogical frameworks and institutional practices. AI-driven technologies—such as intelligent tutoring systems, adaptive learning algorithms, and generative tools like ChatGPT—are reshaping how students learn, how teachers teach, and how knowledge is created and assessed (**Johnston et al., 2024).**

(Hamid, 2024) As universities increasingly embed AI into curriculum delivery, assessment, and research support, the boundary between human cognition and machine intelligence is becoming progressively blurred, raising critical questions about academic integrity, ethics, and educational equity In undergraduate learning, AI tools are increasingly utilized for personalized instruction, language support, and formative feedback. Studies have shown that AI-powered systems enhance learner engagement and motivation by tailoring content to individual capabilities. **Xing Du, Mingcheng Du, Zihan Zhou, and Yiming Bai (2025**). However, these technologies also create risks of *cognitive dependency*—where students rely on AI to generate responses instead of cultivating independent problem-solving and analytical skills. This pedagogical tension underscores a larger concern: while AI democratizes access to information, it simultaneously challenges the cultivation of creativity, critical reasoning, and academic honesty **Andrew Williams (2024**) At the postgraduate level, the influence of AI is even more complex. Advanced learners are adopting AI tools for literature synthesis, data analysis, and academic writing, but these uses blur the boundaries between assistance and authorship. **Wright (2025)** Empirical studies highlight that postgraduate students, though generally more aware of AI's research potential, face dilemmas regarding ethical usage, methodological rigor, and originality. (**Ozguven et al., 2024**) The faculty members express apprehension over maintaining supervisory authenticity and ensuring that students' scholarly contributions remain intellectually independent in AI-enhanced research contexts beyond the classroom. AI integration presents institutional and pedagogical challenges.

José Manuel Cotilla Conceição and Esther van der Stappen (2025) The **digital divide**—in terms of AI literacy, resource access, and infrastructure—continues to widen disparities among students. Moreover, educators often report insufficient training and unclear policies on AI's ethical deployment in teaching and assessment. **Bittle, K., & El-Gayar, O (2025)** This evolving context necessitates a critical re-examination of teaching models, learning outcomes, and assessment designs to ensure that AI acts as a pedagogical partner rather than a pedagogical substitute.

In this evolving digital paradigm, decoding the influence of AI on undergraduate and postgraduate education involves understanding not only its technological affordances but also its epistemological and ethical implications. As the higher education sector transitions into an AI-augmented era, the primary challenge lies in aligning innovation with integrity—leveraging AI's transformative potential while preserving the intellectual and moral foundations of learning.

Building on this discussion, this paper aims to explore the multifaceted impact of AI on undergraduate and postgraduate student learning, focusing on the challenges and problems that arise in the digital age. By examining existing literature and case studies, it seeks to provide insights into effective strategies for integrating AI into higher education while mitigating potential risks.

The following are the factors arrived from the above review, the factors that are found repeated in the articles are considered in the study. The list are as follows:

Factors: Independent Variables & Dependent Variables

Sl. no	Independent Variables (IV)	Dependent Variables (DV)	References
1	Use of Generative AI Tools (e.g., ChatGPT)	Student Exam Performance	Wecks, J. O., Voshaar, J., Plate, B. J., & Zimmermann, J. (2024)
2	Faculty AI Literacy	Successful AI Integration in Teaching	Mah, D. K. (2024)
3	AI-based Personalize Learning	Student Acader Achievement	Merino-Campos, C., & García-Sánchez, J.-N. (2025)
4	Exposure to AI Ethic	Student Ethical Decision-	Gerlich, M., & Hwang, J. (2025).

	Training	Making Skills	
5	Faculty Professiona Development on AI	Effectiveness of AI Usage in Curriculum	Shata, A. (2025).
6	Availability of AI Learning Tools	Student Engagement and Participation	Sousa, A. E. & Silva, J. (2025)
7	Institutional Policy on AI Usage	Academic Integ Incidences	Palmer, R. (2024)
8	AI Tool Use for Language Support	International Student Academic Adjustment	Farrelly, T. (2023)
9	Student Perception of AI Usefulness	Willingness to Adopt AI Tools	Almassaad, A. (2024)
10	Level of AI Use in Assessment	Quality of Student Learning Outcomes	McGee, M., & Sadler, B. (2025).

OBJECTIVES OF THE STUDY:

1. To explore how AI tools are being utilized by UG and PG students for learning and research.
2. To identify the key challenges and problems associated with AI integration in higher education.
3. To examine the impacts of AI on Student Academic Performance.

LIMITATIONS OF THE STUDY:

While this study offers valuable insights into the influence of AI on undergraduate and postgraduate learning, it is limited by its focus on specific student groups and regions, which may affect the generalizability of findings. The rapidly evolving nature of AI tools presents challenges in maintaining the relevance of conclusions over time. Additionally, the study may rely on subjective student perceptions and lacks a longitudinal perspective to assess long-term impacts. Ethical concerns, digital literacy disparities, and institutional differences were not explored in depth, indicating the need for broader, future research.

HYPOTHESES:

Building upon insights from existing empirical studies (Lozano-Gomez & Libaque-Saenz, 2025; Schmidt, 2025; Dong, 2025; Micabalo et al., 2024; Williams, 2024), a set of hypotheses has been formulated to systematically examine the influence of Artificial Intelligence (AI) on undergraduate (UG) and postgraduate (PG) student learning. These hypotheses are designed to align with the study's objectives by establishing measurable relationships between key constructs—namely AI integration, academic performance, student engagement, digital readiness, and perceived learning outcomes. Drawing from prior evidence highlighting both the pedagogical potential and challenges of AI in higher education, this study aims to empirically test whether the integration of AI tools enhances student learning effectiveness and engagement or introduces new complexities in academic practice. The formulated hypotheses will thus provide a foundation for evidence-based insights into how AI reshapes learning behaviors, instructional methods, and academic outcomes within an evolving digital paradigm. The following are the hypotheses to be studied:

1. H0: UG and PG students do not significantly use AI tools for learning and research activities.
2. H0: There are no significant challenges or problems associated with AI integration in higher education.
3. H0: The use of AI tools has no significant impact on student engagement, comprehension, or academic performance.

RESEARCH METHODOLOGY:

A. Type of Research:

The study adopts a descriptive–exploratory research design. The descriptive approach outlines current patterns, perceptions, and challenges of AI in higher education, while the exploratory aspect examines emerging issues and strategies for AI integration among UG and PG students. This hybrid design allows both factual description and discovery of new insights (Creswell & Creswell, 2018; Sekaran & Bougie, 2016; Stebbins, 2001).

B. Data Collection

Both primary and secondary data will be used.

1. Primary Data: Collected through structured surveys and semi-structured interviews with students and faculty to understand their experiences and perspectives regarding AI in education (Nagy et al., 2024; Likert, R.1932)

2. Secondary Data: Sourced from academic journals, policy papers, and government reports to provide contextual support (Idha et al., 2025).

✓ **Sample Size:**

A total of 80 students from selected institutions will be surveyed, along with 10–15 faculty members for interviews—adequate for exploratory analysis (Robson & McCartan, 2016).

✓ **Sampling Technique:**

A stratified random sampling method ensures diverse representation across academic level (UG/PG), discipline, and institution type (Creswell & Creswell, 2018).

✓ **Data Analysis Tools:**

Data will be analyzed using SPSS for both descriptive and inferential statistics (Rahman & Muktadir, 2021). Qualitative data from interviews will undergo thematic analysis to identify recurring themes (Braun & Clarke, 2006).

C. Statistical Techniques:

1. Descriptive Statistics: Used to summarize data through frequencies, means, and standard deviations (Ali, 2016).

2. Inferential Statistics: Correlation analysis will determine relationships (e.g., AI use frequency and learning satisfaction) (UCLA OARC, 2022).

3. Regression Analysis: Examines how independent variables (e.g., AI literacy, ease of use) predict dependent variables (e.g., satisfaction, adoption) (Mishra, 2019).

Data Analysis & Interpretation:

1. Descriptive Statistics

2. Inferential Statistics (Roychowdhury, S., & Bhattacharya, D. (2012).

1. <u>DESCRIPTIVE STATISTICS</u>

	N	Minimum	Maximum	Mean	Std. Deviation
IV_AVG	379	2.00	5.00	3.7578	.75127
Valid N (listwise)	379				

2. REGRESSION ANALYSIS:

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.846[a]	.715	.707	.36629

a. Predictors: IV's (10) b. Dependent Variable: DV_AVG

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	123.906	10	12.391	92.352	.000[b]
	Residual	49.373	368	.134		
	Total	173.279	378			

a. Dependent Variable: DV_AVG

b. Predictors: IV's (10)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.372	.155		8.867	.000
	1. How often do you use generative AI tools for academic tasks?	.052	.031	.078	1.707	.089
	2. To what extent do you think your instructors are knowledgeable about AI use in teaching?	.072	.027	.125	2.621	.009
	3. AI tools I use provide learning content tailored to my academic needs.	.182	.032	.228	5.694	.000
	4. I have received formal training on ethical use of AI tools.	-.045	.020	-.068	-2.324	.021

	5. My institution provides training for faculty on effective AI teaching.	-.017	.026	-.031	-.658	.511
	6. AI tools are readily available for student use in my institution	.058	.033	.104	1.776	.077
	7. My institution has clear policies on acceptable AI tool use	.145	.034	.218	4.311	.000
	8. I use AI tools to assist with grammar, vocabulary, or translation.	.085	.029	.134	2.981	.003
	9. I believe AI tools improve the quality of my learning experience.	.094	.034	.097	2.787	.006
	10. AI tools are used in my institution for assessing assignments or exams	.045	.017	.108	2.656	.008
a. Dependent Variable: DV_AVG						

Interpretation:

The results of the regression indicated a strong and statistically significant model, R=.846R = .846R=.846, R2=.715R^2 = .715R2=.715, Adjusted R2=.707R^2 = .707R2=.707. This suggests that approximately 71.5% of the variance in DV_AVG can be explained by the ten independent variables included in the model. The standard error of the estimate was 0.36629, indicating a good model fit.

The ANOVA table showed that the regression model was statistically significant, F (10,368) =92.35, p<.001 F (10, 368) = 92.35, p < .001F (10,368) = 92.35, p<.001. This confirms that the set of predictors collectively has a significant effect on the dependent variable.

The coefficients table highlights the unique contribution of each predictor while controlling for the influence of other variables. Among the predictors, several variables were found to be significant positive predictors of the dependent variable (DV_AVG). These include: AI tools

providing learning content tailored to academic needs (β=.228,t=5.694,p<.001\beta = .228, t = 5.694, p < .001β=.228,t=5.694,p<.001), clear institutional policies on acceptable AI tool use (β=.218,t=4.311,p<.001\beta = .218, t = 4.311, p < .001β=.218,t=4.311,p<.001), use of AI tools to assist with grammar, vocabulary, or translation (β=.134,t=2.981,p=.003\beta = .134, t = 2.981, p = .003β=.134,t=2.981,p=.003), belief that AI tools improve the overall learning experience (β=.097,t=2.787,p=.006\beta = .097, t = 2.787, p = .006β=.097,t=2.787,p=.006), use of AI for assessing assignments or exams (β=.108,t=2.656,p=.008\beta = .108, t = 2.656, p = .008β=.108,t=2.656,p=.008), and faculty AI literacy, where instructors are knowledgeable about AI integration in teaching (β=.125,t=2.621,p=.009\beta = .125, t = 2.621, p = .009β=.125,t=2.621,p=.009).

Interestingly, receiving formal training on the ethical use of AI tools was found to have a negative and significant relationship with DV_AVG (β=−.068,t=−2.324,p=.021\beta = - .068, t = -2.324, p = .021β=−.068,t=−2.324,p=.021), indicating that such training may not directly translate to improved academic outcomes or may create caution in usage, thus reducing the dependent variable.

On the other hand, three predictors were not statistically significant. These include the frequency of generative AI tool use for academic tasks (p=.089p = .089p=.089), availability of AI tools within the institution (p=.077p = .077p=.077), and institutional training provided to faculty on effective AI teaching (p=.511p = .511p=.511). This suggests that while access and frequency of use are important, they alone do not strongly predict positive outcomes unless accompanied by well-structured policies and effective integration strategies.

HYPOTHESIS TESTING AND RESULTS:

The study aimed to examine the relationship between various factors related to AI tool usage and their impact on academic outcomes among UG and PG students. The hypotheses were tested using multiple regression analysis, and the findings are presented below:

Hypothesis 1

H01: UG and PG students do not significantly use AI tools for learning and research activities.

The regression results indicated that while the frequency of AI tool use for academic tasks was not statistically significant (p=.089p = .089p=.089), several variables related to the purpose and quality of AI use were significant predictors of academic outcomes. For instance, AI tools providing personalized learning content (β=.228,t=5.694,p<.001\beta = .228, t = 5.694, p < .001β=.228,t=5.694,p<.001) and AI usage for grammar, vocabulary, or translation support

(β=.134,t=2.981,p=.003\beta = .134, t = 2.981, p = .003β=.134,t=2.981,p=.003) were significant positive predictors.

This suggests that students actively use AI tools, but the manner and purpose of use are more critical than the frequency of use. Therefore, H□□ is rejected, indicating that UG and PG students do significantly use AI tools for learning and research, especially when the tools support personalized learning and academic enhancement.

Hypothesis 2

H02: There are no significant challenges or problems associated with AI integration in higher education.

The variable related to formal training on the ethical use of AI tools showed a negative and significant relationship with the dependent variable (β=−.068,t=−2.324,p=.021\beta = - .068, t = -2.324, p = .021β=−.068,t=−2.324,p=.021). This suggests that ethical concerns or a lack of practical alignment between training and actual implementation may create barriers to effective AI integration.

Additionally, factors such as availability of AI tools (p=.077p = .077p=.077) and institutional training for faculty (p=.511p = .511p=.511) were found to be non-significant, indicating potential institutional gaps in infrastructure and faculty preparedness.

Based on these findings, H□□ is rejected, implying that there are significant challenges and problems related to AI integration, particularly in the areas of ethics, infrastructure, and institutional support.

Hypothesis 3

H03: The use of AI tools has no significant impact on student engagement, comprehension, or academic performance.

The analysis revealed several strong and significant predictors positively associated with academic outcomes. These include:

1. AI tools providing personalized learning content (β=.228,p<.001\beta = .228, p < .001β=.228,p<.001)
2. Clear institutional policies on AI usage (β=.218,p<.001\beta = .218, p < .001β=.218,p<.001)
3. Use of AI for assessment of assignments or exams (β=.108,p=.008\beta = .108, p = .008β=.108,p=.008)

4. Student belief that AI tools improve their learning experience (β=.097,p=.006\beta = .097, p = .006β=.097,p=.006)

The overall model was statistically significant, F(10,368)=92.35,p<.001F(10, 368) = 92.35, p < .001F(10,368)=92.35,p<.001, with R2=.715R^2 = .715R2=.715, indicating that 71.5% of the variance in academic performance and engagement was explained by AI-related factors.

Thus, H03 is rejected, confirming that the use of AI tools has a significant positive impact on student engagement, comprehension, and academic performance.

FINDING:

A. Findings from Descriptive Statistics

Descriptive statistics were used to understand the general trends of AI usage, institutional support, and perceptions among UG and PG students. The following key findings emerged:

1. **Usage of AI Tools:**

   Most students reported moderate to frequent use of AI tools for academic purposes such as grammar checking, vocabulary improvement, and translation support. However, the frequency of use alone was not very high, indicating that while AI tools are accessible, their use is often purpose-driven rather than habitual.

2. **Institutional Support and Infrastructure:**

   Students indicated limited institutional support in terms of faculty training and clear policies for AI integration. A significant proportion of respondents stated that their institutions do not provide structured training for either faculty or students.

3. **Perceptions of AI Tools:**

   Students generally believed that AI tools improve their learning experience, comprehension, and engagement. Many also viewed AI tools as useful for personalized learning and academic performance enhancement.

4. **Challenges in AI Integration:**

   Ethical concerns were reported, with some students feeling uncertain about the acceptable boundaries for AI tool usage. This reflects ambiguity in institutional guidelines and potential risks of misuse.

5. **Demographic Insights:**

Both UG and PG students showed interest in AI tools, but PG students were slightly more engaged, particularly for research-related tasks such as literature review and data analysis.

B. Findings from Inferential Statistics:

Inferential statistics, particularly multiple regression analysis, were conducted to test the study's hypotheses and determine the statistical significance of relationships between independent variables (AI-related factors) and the dependent variable (academic outcomes).

Model Summary and Overall Significance:

1. The regression model was strong and statistically significant, R=.846R = .846R=.846, R2=.715R^2 = .715R2=.715, Adjusted R2=.707R^2 = .707R2=.707.
2. This indicates that 71.5% of the variance in academic performance and engagement was explained by the ten AI-related predictor variables.
3. ANOVA results confirmed the model's overall significance, F(10,368)=92.35,p<.001F(10, 368) = 92.35, p < .001F(10,368)=92.35,p<.001.

Significant Positive Predictors:

Six predictors had **significant positive relationships** with academic outcomes:

1. AI tools providing personalized learning content (β=.228,p<.001\beta = .228, p < .001β=.228,p<.001)
2. Clear institutional policies on acceptable AI usage (β=.218,p<.001\beta = .218, p < .001β=.218,p<.001)
3. Use of AI tools for grammar, vocabulary, and translation support (β=.134,p=.003\beta = .134, p = .003β=.134,p=.003)
4. Belief that AI tools improve learning experience (β=.097,p=.006\beta = .097, p = .006β=.097,p=.006)
5. Use of AI tools for assessment of assignments and exams (β=.108,p=.008\beta = .108, p = .008β=.108,p=.008)
6. Faculty AI literacy, reflecting knowledgeable instructors (β=.125,p=.009\beta = .125, p = .009β=.125,p=.009)

Significant Negative Predictor:

Formal ethical training on AI usage had a negative and significant relationship with academic outcomes (β=−.068,p=.021\beta = - .068, p = .021β=−.068,p=.021).

This suggests that ethical training may currently emphasize caution and restrictions, potentially discouraging students from leveraging AI tools effectively.

Non-Significant Predictors:

Three predictors were **not statistically significant**:

1. Frequency of AI tool use for academic tasks (p=.089p = .089p=.089)
2. Availability of AI tools within the institution (p=.077p = .077p=.077)
3. Institutional training programs for faculty (p=.511p = .511p=.511)

CONCLUSION:

This study explored the role of AI tools in higher education, focusing on their usage patterns, challenges, and impact on student engagement, comprehension, and academic performance among UG and PG students. The findings from both descriptive and inferential statistics provide a comprehensive understanding of how AI is integrated into learning and research activities.

The descriptive results revealed that while students moderately to frequently use AI tools, their engagement is largely purpose-driven, with tasks such as grammar correction, translation, and personalized learning being the most common applications. However, there are notable institutional gaps, including limited faculty training and a lack of clear guidelines for ethical and effective AI use. Students generally view AI tools as beneficial, yet they express concerns about ethical ambiguities and potential misuse.

The inferential analysis demonstrated that the regression model was highly significant, explaining 71.5% of the variance in academic outcomes. Critical factors such as personalized learning through AI tools, clear institutional policies, faculty AI literacy, and AI-supported assessment systems were found to have a positive and significant impact on student engagement and performance. Interestingly, formal ethical training on AI usage showed a negative relationship with outcomes, suggesting that current training approaches may emphasize restrictions rather than fostering productive and responsible use. Moreover, the mere frequency of AI tool use or availability of AI resources alone was insufficient to drive significant academic benefits.

The hypothesis testing further confirmed that:

1. UG and PG students significantly use AI tools for learning and research purposes.

2. Challenges such as ethical issues, infrastructure gaps, and lack of structured training are critical barriers to effective AI integration.

3. AI use has a significant positive impact on student engagement, comprehension, and academic performance when implemented strategically.

In conclusion, the study underscores that AI integration in higher education is not solely about access or frequency of use, but rather about purposeful application supported by institutional readiness, clear policies, and faculty expertise. For higher education institutions to fully realize the potential of AI, they must focus on creating a balanced ecosystem that addresses ethical concerns, invests in faculty development, and provides clear guidelines to students. By doing so, AI can serve as a transformative tool to enhance academic quality, foster innovation, and prepare students for a rapidly evolving digital future.

REFERENCES:

1. Ali Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
2. Creswell, J. W., & Creswell, J. D. (2018). Research design: Qualitative, quantitative, and mixed methods approaches.
3. Idha, M., et al. (2025). Policy perspectives on AI in higher education.
4. Likert, R. (1932). A technique for the measurement of attitudes. *Archives of Psychology*.
5. Nagy, J., et al. (2024). Student and faculty experiences with AI in university teaching.
6. Rahman, M., & Muktadir, A. (2021). Applied statistics using SPSS in social science research.
7. Robson, C., & McCartan, K. (2016). Real world research.
8. Sekaran, U., & Bougie, R. (2016). Research methods for business.
9. UCLA OARC. (2022). Correlation and regression using SPSS.