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The Role of AI-Assisted Learning Tools in Higher Education: Balancing Efficiency, Critical Thinking and Academic Integrity

Hanafiah Hasin[1], Anita Jamil[1], Zaleha Mahat[1], Rahayu Sehat[1], Eka Fauzihardani[2]
[1]Faculty of Accountancy, Universiti Teknologi MARA, Cawangan Melaka, Kampus Alor Gajah, Malaysia
[2]Faculty of Economics and Business Universitas Negeri Padang, Indonesia
*anitajamil@uitm.edu.my
Corresponding Author: Anita Jamil

Abstract: This study examines the dual nature of AI-assisted learning tools in higher education. While AI tools enhance student learning efficiency and academic performance, they also present risks such as over-reliance, reduced critical thinking, and ethical concerns. This research investigates the benefits and drawbacks of AI adoption in higher education, using student survey responses to analyse perceptions. The findings indicate that AI tools contribute to improved efficiency and comprehension but highlight dependency and academic integrity concerns. A cross-sectional survey of 383 Malaysian university students was conducted to explore the academic and ethical dimensions of AI usage in learning.

Keywords: *AI in education, benefits and risks, student learning, academic integrity, AI ethics*

1. Introduction

The implementation of Artificial Intelligence (AI) technology in higher education reformulates learning systems by developing customised educational content coupled with immediate assessment feedback and individualised tutoring algorithms. Intelligent tutoring systems, together with automated essay grading and academic chatbots, use artificial intelligence to boost student involvement, increase learning understanding and simplify academic tasks. AI works to create an inclusive educational environment through its adaptation to different learning preferences, together with its disability support abilities. Two key aspects of Artificial Intelligence (AI) modernisation within higher education involve new teaching practices and personalised learning, along with computer-aided assessment methods and adaptive educational resources. The integration of artificial intelligence tools like intelligent tutoring systems, academic chatbots, and automated grading software enhances student involvement and improves comprehension levels while easing the demands of students' workloads. AI promotes educational inclusivity through its ability to support learners with diverse preferences and its provision of assistance to students with disabilities.

Two obstacles exist when students use AI to assist their education. Extensive usage of artificial intelligence systems leads students to use digital resources heavily, thus compromising their ability to solve problems and think critically. The ethical risks that stem from plagiarism of automated content and non-authorised tutor sessions threaten both learning standards and core values of major educational institutions.

The deployment of AI systems in higher education creates both positive benefits, such as accessibility and efficiency, alongside unmanaged risks that demand suitable handling. The implementation of AI-limited programs in conjunction with institutional policies on academic integrity should guide universities in developing clear guidelines for responsible AI usage, which combines AI-driven support with traditional learning methods.

The research evaluates both the advantages and disadvantages of AI learning tools, examining student reactions to these digital tools. The study investigates optimal implementation methods for AI to contribute to higher education AI governance discussions, which will maximise AI value in cognitive growth instead of automated knowledge delivery. In the Malaysian context, the transformative nature of AI in education has been widely acknowledged (Younas et al., 2024; Choi et al., 2025; Zhao, 2025; Crain et al., 2025), with institutions now facing the challenge of striking a balance between innovation and integrity (Francis et al., 2025).

Problem Statement

The integration of Artificial Intelligence (AI) in higher education has transformed learning by enhancing efficiency, accessibility, and personalisation. AI-powered tools such as intelligent tutoring systems and chatbots

provide immediate feedback and customised support, improving student engagement and academic outcomes. However, despite these advantages, AI adoption raises critical concerns related to ethical implications, academic integrity, and students' cognitive development.

Excessive dependence on AI systems by students creates dual problems because it hinders their independent learning skills and weakens their capacity to think critically and solve complex problems. The repeated application of AI creates cognitive offloading or reinforcement, leading students to lose their independent abilities for information synthesis and interpretation, thus making them less intellectually autonomous (Elbadiansyah et al., 2024). The absence of proper supervision allows AI-assisted learning to lead students toward knowledge consumption instead of meaningful knowledge building. A growing amount of AI-generated content poses higher risks of academic dishonesty, including plagiarism, as students employ deceptive methods in their studies.

The identification of AI-assisted work through traditional plagiarism detection tools becomes doubtful, thus requiring an update to assessment strategies and academic integrity policies (Bui & Tong, 2025). Academic authenticity requires students to undergo adaptive assessments and multiple evaluation approaches to maintain authenticity. AI integration has the potential to exacerbate existing educational gaps between different student groups. AI provides personalised education to students, but beneficiaries with restricted access to technology, such as disadvantaged students, face obstacles to accessing these improvements. Penalties within AI systems can lead to systematic prejudice against students, while students require access to policies and practices that promote inclusive learning. The integration of AI systems requires immediate and responsible implementation due to these significant obstacles. Universities need to establish specific policies for AI applications while promoting an understanding of AI among both students and lecturers, ensuring that every student has equal access to educational resources.

This study critically examines the benefits and drawbacks of AI-assisted learning tools, evaluates students' perceptions of AI's role in academic development, and proposes best practices for the ethical and responsible adoption of AI in higher education. By addressing existing research gaps, this study contributes to the discourse on sustainable AI integration in academic settings.

Research Objectives

This study aims to:

- Examine the benefits of AI-assisted learning tools in higher education.
- Analyse the risks and challenges associated with AI usage among students.
- Evaluate student perceptions of AI's role in academic development and learning.

Research Questions

- What are the primary benefits of AI-assisted learning tools in higher education?
- What potential risks do students associate with AI usage?
- How can AI be integrated responsibly into higher education while maintaining academic integrity?

2. Literature Review

The inclusion of Artificial Intelligence (AI) within higher education transformed teaching and learning approaches while providing students with improved accessibility together with individualised lessons and operational efficiency. Intelligent tutoring systems, alongside generative AI tools, can be enhanced through the support of AI-assisted tools, thereby improving both learner engagement and educational achievements (Maphalala & Ajani, 2025; Choi et al., 2025). The successful implementation of AI in education requires proper ethical guidelines because academic trustworthiness, along with potential biases and AI reliance issues, pose substantial risks, according to Crain and colleagues (2025). The research follows the guidelines of the Technology Acceptance Model (TAM) and Self-Regulated Learning (SRL) Theory. Students adopt and use AI-based learning tools by evaluating their usability benefits and ease of utilisation, according to TAM (Davis, 1989). The SRL theory stresses students' capacity to manage their learning process yet raises doubts about how AI will affect their autonomous thinking abilities and cognitive commitment (Zimmerman, 2002). The

established frameworks serve as bases to evaluate how AI affects student efficiency along with their critical thinking abilities and ethical matters in higher education learning environments.

AI-Assisted Learning Tools and Student Efficiency

Real-time feedback, adaptive learning and self-paced instructions are provided by AI-powered tools, which increase student efficiency (Zhao, 2025; Ismoilovna, 2025). Research indicates that AI simplifies complex content, thereby reducing cognitive load and freeing the students to concentrate on more qualitative thinking (Choi et al., 2025; Fried & Alshibli, 2024). Studies found that learning environments with AI support enhance comprehension and reduce study hours (Hutapea et al., 2024). As well as being used for creative tasks, generative AI tools have been shown to increase academic productivity by up to 69% (Freeman et al., 2024) through tools like automated summarisation systems.

Consequently, although there are studies involving AI in deep learning, there is not much research related to the long-term effects of AI on deep learning. According to scholars (Bermeo et al., 2025; Ismoilovna, 2025), overreliance on AI may diminish students' problem-solving ability and result in passive knowledge consumption. Consequently, institutions must strategically incorporate AI tools to achieve a balance in gains from efficiency and the development of critical thinking (Zhao, 2025; Choi et al., 2025).

Hypothesis 1 (H1): *AI-assisted learning tools improve student efficiency and learning outcomes.*

AI Dependency and the Decline of Critical Thinking

While AI enhances personalised learning and engagement, concerns have been raised about its impact on students' independent problem-solving and analytical reasoning skills. Studies suggest that frequent AI tool usage may discourage students from engaging deeply with academic material, reducing their ability to think critically (Gerlich, 2025; Maphalala & Ajani, 2025). AI-generated responses can lead to cognitive offloading, where students become reliant on automation instead of developing their reasoning skills (Bermeo et al., 2025; Delello et al., 2025).

The issue is illuminated by the Self-Regulated Learning (SRL) framework. In SRL theory, students were envisioned to be able to plan, monitor and assess their learning (Zimmerman, 2002). If the reliance on AI becomes excessive, then cognitive engagement becomes passive knowledge acquisition instead of active (Radović & Seidel, 2024; Glick et al., 2024).

On the contrary, some research indicates that, in a multimodal learning environment, proper AI can bolster self-regulation and metacognition (Wu et al., 2025). That is, how AI tools are structured and incorporated into educational settings § (Octaberlina et al., 2024; Panit, 2025). Considering these contradictions, further research needs to be done to determine the long-term cognitive impact of AI on learning.

Hypothesis 2 (H2): *AI-assisted learning tools encourage over-reliance and reduce critical thinking.*

Ethical Challenges and Academic Integrity

The use of AI in education presents significant challenges related to academic integrity, including plagiarism, authorship concerns, and ethical AI use (Maphalala & Ajani, 2025; Bùi & Tong, 2025). AI-powered writing assistants can blur the distinction between student-generated work and AI-generated content, making it harder for educators to assess originality (Francis et al., 2025; Mauti & Ayieko, 2025).

Student teachers, according to Obed et al. (2025), acknowledged the academic usefulness of ChatGPT to exceed 50%, yet they appeared to ignore its ethical issues. Schools face difficulties in maintaining academic integrity standards because their policies about AI ethical standards remain inconsistent (Arbab et al., 2024; Shishavan, 2024). Research findings indicate that the implementation of AI literacy training programs should teach students how to use AI responsibly while practising responsible learning methods (Asrifan et al., 2024; Zary, 2024). The AI Literacy Framework (ALiF) establishes a structured AI education model that focuses on providing transparency and enabling accountability and ethical decision-making processes (Zary, 2024). Institutions need to employ both AI detection tools and alternative assessment methods to sustain academic integrity together with their AI benefits (Hossain et al., 2025).

Hypothesis 3 (H3): *AI-assisted learning tools impact academic integrity and ethical learning behaviours.*

Research Gaps in AI-Assisted Learning

Despite the increasing integration of Artificial Intelligence (AI) in higher education, several research gaps remain unaddressed. First, while existing literature highlights the benefits of AI-assisted learning tools in enhancing efficiency and academic performance (Zhao et al., 2024; Choi et al., 2025), there is limited research on their long-term cognitive impact. Specifically, studies have not sufficiently explored whether AI fosters sustained learning improvements or contributes to cognitive offloading, where students become overly dependent on AI-generated content, potentially weakening their problem-solving and analytical reasoning abilities over time (Radović & Seidel, 2024; Elbadiansyah et al., 2024).

Second, most research on AI in education focuses on general adoption trends rather than discipline-specific applications. AI's role varies across academic fields, enhancing computational modelling in STEM, facilitating research synthesis in the social sciences, and raising concerns about originality and authorship in the humanities (Gerlich, 2025; Kohnke & Zaugg, 2025). However, few comparative studies assess how AI's impact differs across disciplines, making it challenging to develop tailored AI integration strategies that align with specific educational needs.

Third, while AI-assisted learning tools have been linked to concerns about academic integrity and ethical risks (Bùi & Tong, 2025; Mauti & Ayieko, 2025), there is insufficient empirical evidence on the effectiveness of institutional AI policies in preventing plagiarism, unauthorised AI usage, and over-reliance on AI-generated outputs. Additionally, the role of AI literacy programs in promoting ethical AI use remains underexplored, with little research evaluating their actual impact on student behaviour, critical thinking, and adherence to academic integrity standards (James & Andrews, 2024; Jain, 2025).

Fourth, much of the existing research relies on self-reported survey data, which may introduce biases in assessing AI's effectiveness and ethical challenges (Francis et al., 2025). There is a need for mixed-method and experimental studies that incorporate quantitative AI usage tracking alongside qualitative insights to provide a more comprehensive understanding of AI's impact on student learning, academic integrity, and cognitive engagement (Deshmukh & Mehta, 2025; Wu et al., 2025).

Finally, most studies focus on higher education, leaving gaps in understanding AI's implications for K-12 education, corporate training, and informal learning environments (Obed et al., 2025; Younas et al., 2024). As AI becomes increasingly integrated into lifelong learning and workforce development, future research must examine its broader impact beyond universities, particularly in preparing students for AI-driven workplaces (Tripathi, 2024, Uppal & Hajian, 2024).

Addressing these research gaps will contribute to a more nuanced understanding of AI's role in education, ensuring that its adoption enhances learning outcomes while safeguarding critical thinking, academic integrity, and equitable access to educational resources.

3. Methodology

Research Design

This study employs a cross-sectional descriptive and analytical survey design to examine the impact of AI-assisted learning tools on university students' academic experiences. A survey-based approach is used to capture a broad range of student experiences and behavioural patterns related to AI adoption.

Guided by the Technology Acceptance Model (TAM) and Self-Regulated Learning (SRL) theory, this study examines how AI usage frequency, perceived benefits, dependency risks, and ethical concerns influence student learning outcomes. The conceptual framework integrates these independent variables (IVs) and their impact on the dependent variable (DV), student learning outcomes.

Population and Sampling

The study focuses on Malaysian university students across diverse disciplines who are engaged in AI-assisted learning. Purposive sampling was employed to ensure that only participants with direct AI tool usage

experience were included. This method aligns with Cohen's (1992) guidelines for statistical power in behavioural research.

Data Collection

An online survey is structured through email lists of graduate students at universities, academic platforms, and various social media channels. Several sections of the survey focus on students' experiences, perceptions and ethical thoughts on AI-assisted learning. Demographic and academic background details from multiple choice questions and levels of AI adoption, perceived effectiveness and ethical considerations measured on a Likert scale are collected. In addition, the open-ended responses also allow students to elaborate on their experiences and their concerns for qualitative insights into the usage of AI. To enhance data credibility, surveys were distributed through institutional email lists and authenticated digital forms, minimising the risk of spam or unreliable entries.

Data Analysis

Statistics play a critical role throughout the study as they use both descriptive and inferential methods to evaluate AI adoption patterns and modifications in educational results. The summary of AI usage trends, together with student perceptions, makes use of descriptive statistics that employ mean values along with standard deviations and frequency distributions. Inferential statistical procedures determine how different variables interrelate with each other. The study uses correlation analysis to measure the magnitude and pattern of how often students use AI technology and their academic results. The research evaluates academic performance and ethical concerns stemming from AI usage through regression analysis methods. The hypothesis testing process employs various statistical procedures, including t-tests and ANOVA. They measure AI adoption patterns between groups of different demographic characteristics and academic majors as well as educational levels until they detect meaningful variations. The chi-square tests identify statistical relationships between university students' ethical apprehensions about AI and their adoption behaviour. These research methods create a detailed explanation regarding the impact AI learning tools have on students' academic journeys.

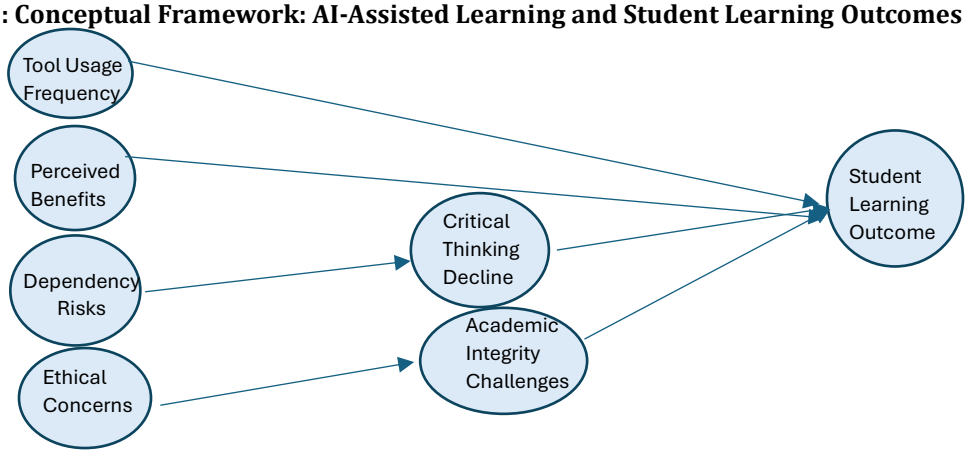
Ethical Considerations

This study adheres to university research ethics guidelines and complies with data protection regulations, including the General Data Protection Regulation (GDPR) for European participants. All participants provide informed consent, ensuring voluntary participation. To maintain anonymity and confidentiality, personally identifiable information is removed from responses. The collected data is securely stored using encrypted databases, and participants retain the right to withdraw from the study at any stage. No deceptive practices are used, and transparency is maintained throughout the research process.

Conceptual Framework

The conceptual framework visually represents the relationships between AI-assisted learning factors and student learning outcomes. It integrates variables such as AI tool usage, perceived benefits, dependency risks, and ethical concerns, examining their direct and indirect impact on student academic performance.

Figure 1: Conceptual Framework: AI-Assisted Learning and Student Learning Outcomes



4. Findings

Descriptive Statistics

Table 1 presents the demographic characteristics of the 383 university students who participated in this study.

Table 1: Demographic Profile

			Frequency	Per cent	Valid Percent	Cumulative Percent
Age	Valid	1.00	305	79.6	79.6	79.6
		2.00	77	20.1	20.1	99.7
		4.00	1	.3	.3	100.0
		Total	383	100.0	100.0	
Gender	Valid	1.00	92	24.0	24.0	24.0
		2.00	291	76.0	76.0	100.0
		Total	383	100.0	100.0	
Education	Valid	1.00	373	97.4	97.4	97.4
		2.00	10	2.6	2.6	100.0
		Total	383	100.0	100.0	

The majority of respondents (79.6%) fall within the 18-22 age range, suggesting that findings primarily reflect the experiences of undergraduate students in the early academic stages. The sample is predominantly female (76.0%), which may influence the generalizability of AI adoption patterns across genders. Additionally, 97.4% of respondents are undergraduate students, indicating that AI-assisted learning insights are largely derived from undergraduate experiences.

Correlation Analysis (Pearson Correlation)

A Pearson correlation test was conducted to examine the relationship between AI usage frequency and academic performance.

Table 2: Correlations

		Use frequently	Academic performance
Use frequently	Pearson Correlation	1	.251**
	Sig. (2-tailed)		.000
	N	383	383
Academic performance	Pearson Correlation	.251**	1
	Sig. (2-tailed)	.000	
	N	383	383

**. Correlation is significant at the 0.01 level (2-tailed).

The results indicate a positive correlation ($r = 0.251$, $p < 0.01$) between AI usage frequency and academic performance, suggesting that increased AI adoption is associated with better academic outcomes. These findings support the hypothesis (H1) that AI tools improve student efficiency and learning performance.

Hypothesis Testing Results

H1: AI Tools Improve Student Efficiency and Learning Outcomes

The Pearson correlation analysis supports H1, confirming that frequent AI tool usage positively correlates with academic performance ($r = 0.251$, $p < 0.01$). This finding suggests that AI-assisted learning tools enhance students' efficiency and outcomes by providing adaptive learning support and streamlining study efforts.

H2: AI-Assisted Tools Encourage Over-Reliance and Reduce Critical Thinking

An independent samples t-test was conducted to compare perceptions of critical thinking enhancement among low and high AI users.

Table 3: Independent Samples T-Test for AI Usage and Critical Thinking

	Usage frequency	N	Mean	Std. Deviation	Std. Error Mean
Enhance critical thinking	1.00	4	3.0000	.81650	.40825
	5.00	61	4.0164	.80606	.10320

Table 4: Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Enhance critical thinking	Equal variances assumed	.176	.676	-2.442	63	.017	-1.01639	.41629	-1.84828	-.18450
	Equal variances not assumed.			-2.414	3.395	.085	-1.01639	.42109	-2.27246	.23968

Results reveal that students with high AI usage (M = 4.016, SD = 0.806) reported significantly higher critical thinking scores than those with low AI usage (M = 3.00, SD = 0.816), t = -2.442, p = 0.017. These findings do not support H2, as AI usage appears to enhance rather than reduce critical thinking. Contrary to concerns about AI leading to passive learning, students who frequently engage with AI tools reported greater perceived critical thinking abilities. This suggests that structured AI usage may facilitate cognitive engagement rather than diminishing problem-solving skills. Thus, H2 is NOT supported, as AI usage enhances rather than diminishes critical thinking skills.

H3: AI Tools Impact Academic Integrity and Ethical Learning Behaviors

A Chi-square test was conducted to assess whether AI reliance is associated with concerns about academic integrity and over-reliance.

Table 5: Chi-Square Tests for AI Usage and Over-Reliance

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	35.533[a]	16	.003
Likelihood Ratio	37.104	16	.002
Linear-by-Linear Association	.043	1	.835
N of Valid Cases	383		

a. 10 cells (40.0%) have expected count less than 5. The minimum expected count is .01.

The Chi-square test ($\chi^2(16) = 35.533$, p = 0.003) confirms that AI usage significantly influences ethical concerns related to academic integrity. This supports H3, indicating that frequent AI users are more likely to express ethical concerns about over-reliance and potential misuse in academic settings.

Table 6: Summary of Hypothesis Testing

Hypothesis	Result	Interpretation
H1: AI tools improve student efficiency and learning outcomes.	**Supported**	AI usage positively correlates with academic performance (**r = 0.251, p < 0.01**).
H2: AI-assisted tools encourage over-reliance and reduce critical thinking.	**Not Supported**	AI usage enhances rather than reduces critical thinking (**t = -2.442, p = 0.017**).

H3: AI tools impact academic integrity and ethical learning behaviours.	**Supported**	AI usage is significantly related to concerns about over-reliance (**$\chi^2(16) = 35.533$, $p = 0.003$**).

Discussion

AI and Student Learning Efficiency

The positive correlation ($r = 0.251$, $p < 0.01$) supports prior research indicating that AI enhances learning efficiency (Ward et al., 2024; Zakaria et al., 2024). AI-powered learning tools provide adaptive learning, automate tasks, and offer real-time feedback, improving academic performance. From a Technology Acceptance Model (TAM) perspective, AI tools are perceived as useful and easy to integrate into academic routines, reinforcing their growing role in education.

AI Usage and Critical Thinking Development

Contrary to initial concerns, the t-test results ($t = -2.442$, $p = 0.017$) indicate that higher AI usage correlates with enhanced critical thinking skills. These findings align with Self-Regulated Learning (SRL) theory, suggesting that AI functions as a cognitive scaffold, guiding students toward self-directed learning rather than replacing cognitive effort (Deshmukh & Mehta, 2025).

Prior research has found that AI fosters analytical reasoning and cognitive flexibility by offering diverse perspectives and problem-solving strategies (Wu et al., 2025; Tzirides et al., 2025). However, some studies have suggested that AI's effectiveness depends on how it is integrated into learning, as passive AI consumption may still hinder independent problem-solving abilities (Williams & Beam, 2019). From an SRL perspective, AI supports self-directed learning, reinforcing the idea that structured AI engagement enhances cognitive development rather than replacing critical thinking skills. Future research should explore the long-term effects of AI usage on cognitive engagement to better understand its role in active versus passive learning processes.

AI Usage and Academic Integrity Concerns

The Chi-square test results ($\chi^2(16) = 35.533$, $p = 0.003$) confirm that frequent AI users express significant ethical concerns about over-reliance and academic integrity. These findings align with prior research highlighting that AI tools can facilitate plagiarism and automated content generation (Bùi & Tong, 2025).
From a TAM perspective, while AI is perceived as useful, its unregulated adoption leads to ethical dilemmas, underscoring the need for clear institutional guidelines on AI ethics. Universities must develop AI literacy programs and implement academic integrity policies to prevent misuse while fostering responsible AI engagement.

Practical Implications for Universities and Educators

The findings highlight the necessity for universities to develop structured AI integration strategies that enhance learning while upholding academic integrity. AI tools should complement, rather than replace, traditional learning methods, fostering self-regulated learning and critical thinking. Implementing AI literacy programs is essential to educate students on responsible AI usage, ensuring they critically engage with AI-generated content rather than relying on it passively.

As there are grave AI-facilitated plagiarism and academic dishonesty concerns, universities need to make sure to revise their assessment strategies, prioritising problem-solving, analytical reasoning, and creativity rather than memorisation-based evaluations. Multimodal evaluations, peer assessments, and project-based learning are alternative models for assessment that can increase originality and discourage unethical AI use. Furthermore, AI detection tools should be improved to signal the difference between responsible AI assistance and academic misbehaviour for the sake of maintaining integrity policies in the space of fair enforcement.
Institutions should also establish comprehensive AI policies defining acceptable AI applications (e.g., grammar checking, research assistance) and unethical practices (e.g., AI-generated essays, plagiarism). Interdisciplinary collaborations among educators, technologists, and ethicists can help shape best practices for AI adoption. By prioritising transparency, accountability, and responsible AI governance, universities can create an ethical AI-enhanced learning environment that maximises educational benefits while safeguarding academic standards.

Limitations of the Study

Despite its contributions, this study has several limitations that should be acknowledged.

First, the study relies on self-reported survey data, which may introduce response bias as students might overestimate or underestimate their AI usage and its impact. Future research should incorporate objective performance metrics such as academic records or AI usage logs to enhance validity. Second, the sample consists predominantly of undergraduate students (97.4%), limiting the generalizability of the findings to postgraduate and professional education contexts. Future research should include a more diverse sample encompassing graduate students, educators, and industry professionals.

Third, this study is cross-sectional, capturing perceptions at a single point in time. Given the rapid evolution of AI technologies, future studies should adopt longitudinal research designs to assess AI's long-term impact on learning behaviours and academic integrity. Fourth, disciplinary differences in AI adoption were not explored in depth. AI's role varies across academic fields—enhancing computational efficiency in STEM, improving research synthesis in social sciences, and raising ethical concerns in the humanities. Future research should analyse discipline-specific AI applications to inform tailored institutional policies.

Finally, this study focuses solely on higher education, excluding AI's impact on K-12 education, corporate training, and informal learning environments. As AI continues to shape lifelong learning and workforce development, future studies should explore its broader educational implications beyond university settings.

Despite these limitations, this study contributes valuable insights into AI's role in education, offering practical recommendations for AI adoption, academic integrity policies, and critical thinking development.

Directions for Future Research

Future research should address key gaps to explore AI's impact on education further.

First, longitudinal studies are needed to assess AI's long-term effects on learning, cognitive engagement, and academic integrity, determining whether AI fosters sustained academic improvement or dependency. Second, experimental and mixed-method approaches should be used to combine quantitative surveys, qualitative interviews, and AI usage tracking, providing a holistic understanding of AI's effectiveness and ethical challenges.

Third, discipline-specific AI applications require further investigation, recognising that STEM, humanities, and business studies have distinct AI adoption patterns and ethical considerations. A comparative analysis can help develop customised AI policies across different academic disciplines. Fourth, AI's impact beyond higher education should be explored, including K-12 education, workforce training, and informal learning environments. Understanding how AI affects professional development and career readiness is crucial as AI becomes more integrated into lifelong learning.

Finally, there is a need for research on AI literacy programs and institutional policy frameworks that promote responsible AI use. Studies should assess the effectiveness of AI training programs, academic integrity guidelines, and enforcement mechanisms to ensure ethical and effective AI adoption in education. By addressing these research gaps, future studies can provide comprehensive insights into AI's role in shaping the future of education, ensuring that AI serves as a learning enhancement tool rather than a replacement for cognitive development.

5. Conclusion

This study provides empirical insights into the impact of AI-assisted learning tools on student efficiency, critical thinking, and academic integrity in higher education. The findings confirm that AI enhances learning outcomes, fosters cognitive engagement, and streamlines academic processes. However, concerns about AI-facilitated academic misconduct and ethical implications highlight the need for structured AI governance and literacy programs.

The study supports the assertion that AI tools improve student efficiency by enhancing research capabilities, facilitating personalised learning, and automating repetitive tasks. However, the findings challenge the notion that AI weakens critical thinking, instead suggesting that AI can enhance cognitive engagement when integrated

effectively. This aligns with Self-Regulated Learning (SRL) theory, which emphasises autonomous learning through AI-driven feedback mechanisms.

Despite its benefits, the study underscores valid concerns regarding AI over-reliance and academic integrity. The significant association between frequent AI use and concerns about dependency and misconduct highlights the need for universities to establish clear AI policies that differentiate responsible AI usage from academic dishonesty. Institutions must develop ethical frameworks, adaptive assessments, and AI literacy programs to ensure that AI complements rather than replaces intellectual effort.

By implementing responsible AI governance, higher education institutions can harness AI's full potential while safeguarding academic integrity and critical thinking development, ensuring that AI remains an educational tool for enhancement rather than a shortcut for cognitive effort.

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