

Generative AI Chatbots in Higher Education: An Exploratory Study of Student Support, Satisfaction, and Challenges

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Abstract: Artificial intelligence (AI) chatbots trained using large language models offer significant opportunities and pose challenges for the higher education (HE) sector (McGrath et al., 2025). This study examines the emerging application of generative AI (GenAI) chatbots in higher education, focusing on student support, satisfaction, and implementation challenges. Recent empirical research indicates that students hold positive attitudes and have high awareness of GenAI in academic research and learning environments (Farran et al., 2026). Using Partial Least Squares Structural Equation Modelling (PLS-SEM), this study considers key factors influencing chatbot adoption, student perceptions, and educational results. The findings highlight the critical role of perceived usefulness, ease of use, and efficiency, while addressing concerns about data privacy and ethical aspects. The paper discusses strategic recommendations for integrating GenAI into higher education governance.

Keywords: Artificial Intelligence, Generative AI, ChatGPT, Higher Education, Personal Learning, Ethical Issues, Student Awareness

1. Introduction

OpenAI, an organisation dedicated to developing safe and responsible artificial intelligence, introduced ChatGPT, an interactive AI chatbot that has transformed how users interact with AI systems. Following foundational developments in machine learning and support from major technology leaders, conversational AI has rapidly expanded into academic settings.

By 2024, advanced deep learning-based models such as GPT-4o, Gemini 1.5 Pro, and Claude 3 led the field (Deng & Yu, 2023). Generative AI chatbots leverage deep learning algorithms and Large Language Models (LLMs) to process queries and produce human-like textual responses through complex interactive interfaces. Despite the rapid adoption of these technologies, systematic data-driven evaluation of their impact on higher education practices, academic support structures, and overall student learning outcomes remains needed.

2. Problem Statement

Higher Education Institutions (HEIs) are increasingly moving toward technology-driven settings in which artificial intelligence plays a central operational and pedagogical role (Ahmad, 2020; Mustar & Wright, 2010). AI tools such as ChatGPT support a wide variety of academic tasks, including idea generation, literature research, and drafting assistance—enhancing processes and raising academic productivity. However, the rapid use of these tools creates dynamic challenges for academic integrity, data privacy, and instructional design, prompting teachers to advocate for flexible assessment and evaluation strategies (Adeshola & Adepoju, 2023).

3. Literature Survey

Recent studies show varying impacts of AI chatbots on student participation and learning dynamics. Deng and Yu (2023) observed that while chatbots significantly improved several dimensions of learning performance, their direct impact on boosting long-term intrinsic student motivation varied. Conversely, Okonkwo and Ade-Ibijola (2021) and Wollny et al. (2021) noted that interactive AI chatbots elevated student engagement when deployed as supplemental tutors. While conventional educational chatbots followed rigid, pre-programmed paths, modern GenAI platforms support bespoke learning by incorporating experiential and joint principles crafted to each student's needs.

4. Objectives and Research Questions

This study considers the multi-faceted role of AI chatbots in higher education. The main objectives are:

- To investigate the potential and benefits of AI chatbots in supporting student learning in higher education.
- To identify key operational, ethical, and instructional challenges with implementing AI chatbots.
- To propose institutional strategies to reduce identified challenges and boost student satisfaction.

Research Questions

- RQ1: What are the primary consequences and possible benefits of integrating AI chatbots into higher education?
- RQ2: What are the key challenges, limitations, and ethical issues associated with implementing AI chatbots?
- RQ3: What institutional recommendations can be derived to optimise GenAI integration in higher education?

5. Research Methodology

To examine student satisfaction and adoption determinants, the study used a survey-based empirical approach. Data were gathered by measuring student experiences across key

structural constructs: *Perceived Ease of Use*, *Perceived Usefulness*, *Perceived Efficiency*, *Trust in AI Chatbots*, *Privacy Worries*, *Ethical Issues*, *System Quality*, and User Fulfilment.

Following the statistical methodology established by Hair et al. (2021), we applied Partial Least Squares Structural Equation Modelling (PLS-SEM) to examine the relationships between exogenous constructs and endogenous outcomes (Adoption and Satisfaction). The authors evaluated measurement models for indicator reliability, internal consistency, convergent validity, and discriminant validity before assessing structural links.

6. Analysis and Results

6.1 Evaluation of the Reflective Measurement Model

Following the PLS-SEM evaluation procedure, we examined outer loadings using a standard threshold of 0.60 for exploratory research. Table 1 summarises the diagnostic impact and reliability improvements resulting from refining specific indicator items.

Table 1: Impact Resulting from the Exclusion of Low-Loading Indicators

Construct	Indicators Excluded	Initial Cronbach's α	Revised Cronbach's α	Initial ρ_c	Revised ρ_c	Initial AVE	Revised AVE	Impact Summary
Privacy Concerns	Misuse_Concerns, Comfort Sharing	0.679	0.838	0.797	0.901	0.481	0.752	Significant improvement in internal consistency & convergent validity
Social Influence	Peer_Influence	0.683	0.697	0.804	0.832	0.515	0.624	Reliability and AVE met the required cutoffs.
Facilitating Conditions	Technical_Infrastructure	0.859	0.885	0.9	0.921	0.648	0.745	Improved construct reliability
Perceived Efficiency	Response_Promptness	0.791	0.901	0.871	0.938	0.649	0.835	Convergent validity significantly strengthened.
Perceived Ease of Use	Simplicity	0.712	0.733	0.807	0.827	0.51	0.548	Achieved satisfactory indicator loadings

6.2 Reliability and Convergent Validity Assessment

Reliability and construct validity were validated using Cronbach's alpha (α), composite reliability (ρ_c and ρ_a), and Average Variance Extracted (AVE). All modified constructs met or exceeded accepted statistical thresholds ($\alpha > 0.70$, $\rho_c > 0.70$, AVE > 0.50), confirming strong internal consistency and convergent validity (Table 2).

Table 2: Reliability and Convergent Validity Evaluation of the Modified Construct Model

Construct	Cronbach's Alpha (α)	ρ_a	Composite Reliability (ρ_c)	Average Variance Extracted (AVE)
Perceived Ease of Use	0.733	0.759	0.827	0.548
Perceived Usefulness	0.929	0.933	0.945	0.741
Perceived Efficiency	0.901	0.901	0.938	0.835
Trust in AI-Chatbots	0.812	0.815	0.877	0.641
Privacy Concerns	0.838	0.868	0.901	0.752
Perceived Interactivity	0.859	0.866	0.896	0.59
System Quality	0.695	0.713	0.831	0.622
Information Quality	0.829	0.831	0.88	0.595
Social Influence	0.697	0.713	0.832	0.624
Facilitating Conditions	0.885	0.886	0.921	0.745
Accessibility	0.73	0.732	0.822	0.491
Ethical Considerations	0.775	0.784	0.857	0.603
Learning Outcomes	0.918	0.934	0.939	0.756
Personalized Learning Experience	0.903	0.916	0.928	0.72
User Satisfaction	0.895	0.9	0.923	0.707
Adoption of AI-Chatbots	0.913	0.921	0.933	0.7

7. Summary and Future Research Directions

Integrating AI-driven chatbots into higher instructional platforms offers revolutionary potential for both learners and educators. GenAI tools serve as flexible virtual assistants that deliver interactive, bespoke learning support and enhance student productivity. Furthermore, insights from student use enable institutions to adjust curriculum design more proactively to meet learning objectives.

However, widespread adoption also introduces risks that must be managed, particularly around academic integrity, data privacy, and trust. Institutions must formulate comprehensive policies and moral guidelines. Future research should examine the long-term effects of AI chatbot integration throughout diverse academic disciplines and evaluate adaptive regulatory structures in higher education administration.

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