

Effects of AI-Based Chatbot on Learning Attitudes of Higher Education Students

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Abstract— The AI in education sector has changed the way people learn, and AI chatbots are becoming a significant part of higher education. This study examines the impact of AI chatbots on the learning attitudes of postgraduate students in Karnataka using a descriptive research design. Three independent variables — ease of use, perceived trust, and technological factors — and their influence on learning attitude (dependent variable) are investigated. A structured questionnaire was administered to a convenience sample of 368 postgraduate students. Data were analyzed using SPSS, including descriptive statistics, independent samples t-test, and one-way ANOVA. The instrument demonstrated high internal consistency (Cronbach's alpha = 0.957, 49 items). Key findings indicate that AI chatbots contribute to improved understanding of complex concepts (M = 4.53), better learning efficiency, and enhanced academic performance. Students primarily engaged AI chatbots for concept clarification (38.9%) and personalized learning (26.4%), with most spending 0–1 hour per day (33.7%). While AI chatbots positively affected both intrinsic and extrinsic motivation, data privacy and confidentiality dimensions received relatively lower ratings (M = 3.69–3.90). The study concludes that AI chatbots positively influence learning attitudes and provides insights for educators, policymakers, and technology developers integrating AI chatbots in higher education.

Keywords— AI Chatbots, Learning Attitude, Postgraduate Students, Academic Performance, Student Engagement

I. INTRODUCTION

AI is transforming education by enabling learning through engaging, intelligent applications. AI-driven chatbots have become increasingly popular as academic support systems that help students with inquiries, explain difficult topics, and provide individualized instruction. By offering prompt feedback and personalized assistance, these chatbots create more engaging and accessible learning environments.

Despite their growing prevalence, limited research has been conducted on how AI chatbots affect students' learning attitudes, particularly in India and among postgraduate (PG) students in Karnataka. Previous research in global contexts indicates that students perceive chatbots as efficient tools for saving time, clarifying uncertainties, and augmenting overall learning engagement.

However, concerns persist regarding data privacy, ethical issues, and the reliability of chatbot-generated responses. These challenges highlight the importance of a balanced evaluation of the advantages and limitations of chatbot adoption in academic settings.

There are also methodological and contextual limitations in the existing literature. The majority of studies are conducted in Western, Middle Eastern, or Southeast Asian contexts, making it challenging to generalize findings to India. Moreover, many studies rely on basic statistical instruments, and there is scope for more advanced analytical approaches. Sampling issues particularly the use of convenience sampling further limit the generalizability of existing findings.

To address these gaps, the current study investigates the impact of AI chatbots on the learning attitudes, engagement levels, and academic performance of postgraduate students in Karnataka. The research employs both quantitative and qualitative data, conducting advanced statistical analyses including reliability testing, ANOVA, and regression analysis to examine the relationships among perceived ease of use, trust, and learning outcomes.

A. Purpose

The primary objective of this research is to understand the effect of AI-driven chatbots on the learning attitudes of postgraduate students in higher education. The study examines the potential of these tools to enhance learning efficiency, engagement, and academic performance, and identifies factors that support or hinder their adoption. Additionally, the study aims to provide guidance to educators and policymakers on the effective integration of AI chatbots in the learning process.

B. Objectives

1. To examine the impact of AI-based chatbots on the learning attitudes of postgraduate students in higher education institutions in Karnataka.
2. To analyze how factors such as perceived ease of use, perceived trust, and technological aspects influence students' learning attitudes toward AI chatbots.

3. To evaluate how AI chatbot usage contributes to students' learning efficiency, understanding of complex concepts, and overall academic performance.
4. To study the influence of AI chatbot usage on students' intrinsic and extrinsic motivation in the learning process.
5. To identify the major purposes for which postgraduate students use AI chatbots and how these relate to their learning attitudes.
6. To examine students' perceptions regarding privacy, data security, and reliability of AI-based chatbots in higher education.

II. LITERATURE REVIEW

The swift implementation of AI chatbots in higher education has attracted significant scholarly attention, particularly regarding student acceptance, behavioral intentions, attitudes, and learning outcomes. Recent studies demonstrate how AI chatbots are progressively changing academic support systems, teaching practices, and student interaction across educational institutions.

Empirical research examining factors affecting chatbot adoption using sophisticated analytical approaches has grown substantially. A study by Noor Irliana Mohd Rahim et al. (2022) and Nisar Ahmed Dahri et al. (2024) employing PLS-SEM-ANN models suggests that perceived trust, habit, motivation, and behavioral intention are key factors influencing chatbot use and user satisfaction. These findings indicate that students who develop trust and frequent interaction with AI systems are more inclined to use chatbots for academic goals. Similarly, studies by Md. Rabiul et al. (2024), Abdullatif (2023), and Elif Esiyok et al. (2024) confirmed the importance of the Technology Acceptance Model in AI-based education, demonstrating that perceived usefulness and ease of use significantly influence intention to use AI chatbots.

Cross-cultural and contextual aspects of chatbot adoption have also received attention. Dongmin Ma et al. (2024) demonstrated that students' cultural background and prior technology experience significantly influence attitudes and intentions to use AI. Comparative studies in China, Malaysia, Pakistan, Bangladesh, Saudi Arabia, and the UAE, as reported by Weiqi Tian et al. (2024), Abdulrahman et al. (2023), and Ghazala Bilquise et al. (2023), identified local educational context, language support, and institutional readiness as key factors in chatbot acceptance.

Studies examining student attitudes, motivation, and learning satisfaction regarding AI chatbots have yielded mixed results. John Mark R. Asio et al. (2023) observed moderate levels of student interest and engagement with AI technologies. In contrast, Taha Ahmed et al. (2023) and Thomas K.F. Chiu et al. (2023) indicated that AI chatbots positively affect both intrinsic and extrinsic motivation, particularly when facilitated by effective teachers. Experimental and pilot studies across Saudi Arabian higher educational institutions established improvements in task value, self-efficacy, and self-regulated learning among postgraduate chatbot users, though limitations in sample size and sampling methods were noted.

Qualitative research has also contributed important insights. Ludvigsen et al. (2023) found that AI chatbots are frequently used by students even outside formal instructional contexts, while raising concerns about accuracy, bias, and reliability. Afef Saihi et al. (2024) and Chan and Hu (2023) noted similar concerns regarding privacy and response bias, while acknowledging the transformative potential of generative AI in higher education learning experiences.

Meta-analyses and systematic reviews by Deng Yu et al. (2023) confirmed that chatbot-based learning has a moderate to strong positive impact on learning outcomes across different settings. While these findings are encouraging, the literature consistently calls for more research on long-term impacts, effective classroom integration strategies, and ethical governance models for AI chatbots in higher education.

In summary, the existing literature demonstrates that AI chatbots positively affect behavioral intentions, motivation, satisfaction, and academic performance. Nevertheless, issues related to ethics, cultural adaptability, response reliability, and long-term effectiveness remain. Continued research is necessary to address these gaps and develop robust, inclusive, and reliable AI chatbot systems for higher education.

A. Research Gap

1. There is a complete absence of studies regarding the impact of AI-based chatbots on the learning attitudes of higher education students in Karnataka and India more broadly.
2. Existing research has largely focused on adoption intention, while limited studies have specifically analyzed learning attitude as a dependent variable in relation to AI chatbot usage.
3. Most studies have focused on 10th grade, pre-university, and undergraduate students, leaving a gap in research on postgraduate students.

4. The predominant use of convenience sampling in prior studies limits the generalizability of findings.
5. Limited attention has been given to privacy, data security, and trust concerns in relation to their direct impact on learning attitudes in the Indian higher education context.

III. METHODOLOGY

A. Research Design

A descriptive research design was adopted to examine the impact of AI chatbots on the learning attitudes of postgraduate students in higher education.

B. Source of Data

Primary data were collected through a structured questionnaire comprising Likert scale and multiple-choice items, distributed online via Google Forms.

C. Sampling Design

Stratified sampling was employed, dividing the student population based on geographical distribution to ensure proportional representation of PG students across Karnataka.

D. Sample Size

The sample size was determined using Cochran's formula (1977): $n = (Z^2 \times p \times q) / e^2$, where $Z = 1.96$ (95% confidence level), $p = q = 0.5$, and $e = 0.05$, yielding a minimum sample size of 368 respondents. According to the All India Survey on Higher Education (2021–22), there are 17,69,083 higher education students in Karnataka. The sample is statistically adequate and representative at a 95% confidence level with a 5% margin of error.

E. Tools Used for Analysis

SPSS was used for data analysis. Descriptive statistics, independent samples t-test, one-way ANOVA, and regression analysis were employed to examine how ease of use, perceived trust, and technological factors affected students' learning attitudes.

F. Hypotheses

Ha: There is a significant difference between gender and the learning attitudes of higher education students.

H0: There is no significant difference between gender and the learning attitudes of higher education students.

Ha: There is a significant difference between frequency of AI chatbot use and the learning attitudes of higher education students.

H0: There is no significant difference between frequency of AI chatbot use and the learning attitudes of higher education students.

Ha: There is a significant impact of technological factors, ease of use, and perceived trust on the learning attitudes of higher education students.

H0: There is no significant impact of technological factors, ease of use, and perceived trust on the learning attitudes of higher education students.

IV. DATA ANALYSIS AND INTERPRETATION

A. Demographic Profile of Respondents

This study consisted of 368 respondents. The instrument demonstrated high reliability with a Cronbach's alpha of 0.957 across 49 items. Gender-wise, 194 (52.7%) were male and 174 (47.3%) were female. Regarding field of study, the largest group was from commerce (171, 46.5%), followed by science (94, 25.5%), arts (70, 19.0%), and other disciplines (33, 9.0%).

In terms of daily AI chatbot usage, 124 respondents (33.7%) used AI chatbots for 0–1 hour per day, 108 (29.3%) for 1–3 hours, 104 (28.3%) for 3–5 hours, and 32 (8.7%) for more than 5 hours, indicating that moderate usage of up to one hour per day was most prevalent. Concept clarification was the most important reason for AI chatbot use (143, 38.9%), followed by personalized learning (97, 26.4%), language learning (53, 14.4%), other purposes (38, 10.3%), and time management (37, 10.1%).

Hypothesis testing based on demographic factors showed that gender was not a significant predictor of learning attitudes among postgraduate students ($t = -1.432$, $p = 0.153 > 0.05$), resulting in acceptance of the null hypothesis. Similarly, frequency of daily AI chatbot usage did not generate a significant difference in learning attitudes ($F = 1.280$, $p = 0.151 > 0.05$), leading to acceptance of the null hypothesis.

B. Descriptive Statistics of Study Constructs

Descriptive statistics were computed using a five-point Likert scale across 368 respondents. The highest mean score (4.53) was observed for enhanced learning experience under the ease of use dimension, indicating that students strongly agree that AI chatbots improve comprehension of complex concepts. Learning efficiency was rated 4.26, emphasizing time-saving advantages.

Device compatibility sub-constructs scored strongly (4.18–4.39), while interface design was rated slightly lower (3.98–4.14), reflecting moderate routine motivation.

Under perceived trust, credibility of information achieved the highest mean (4.14), while privacy and data security recorded the lowest scores throughout the study (3.69–3.90), indicating student reservations about data confidentiality. For technological factors, speed of response (4.04–4.19) and system reliability (3.92–4.15) were rated highly. Within the learning attitude (dependent variable), goal setting (4.17), extrinsic motivation (4.16), and academic performance (4.12) were the most highly rated dimensions, while intrinsic motivation ranged from 3.99–4.11. The overall positive mean scores (3.69–4.53) confirm a positive relationship between all variables, with ease of use emerging as the strongest predictor, followed by perceived trust and technological factors.

C. Regression Analysis

Model Summary

TABLE I. MODEL SUMMARY

Model	R	R Square	Adjusted R Square
1	.683	.467	.463

a. Predictors: (Constant), Ease_of_use, Technological_factors, Perceived_trust

The R value of 0.683 indicates a positive relationship among the variables. The R² value of 0.467 implies that the independent variables collectively explain 46.7% of the variance in the dependent variable (learning attitude).

ANOVA

TABLE II. ANOVA

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	96.637	3	32.212	106.294	<.001
Residual	110.310	364	.303		
Total	206.947	367			

a. Dependent Variable: Learning_attitude

b. Predictors: (Constant), Ease_of_use, Technological_factors, Perceived_trust

Since F = 106.294 and sig. < 0.05, the model fit is confirmed, validating the suitability of running regression analysis.

Coefficients

TABLE III. REGRESSION COEFFICIENTS

Model	B	Std. Error	Beta	T	Sig.
(Constant)	1.229	.165		7.458	<.001
Perceived_trust	.337	.050	.383	6.710	<.001
Technological_factors	.128	.049	.140	2.623	.009
Ease_of_use	.228	.047	.252	4.838	<.001

Since the significance value is < 0.05 for all independent variables, the alternative hypothesis is accepted: technological factors, ease of use, and perceived trust significantly influence the learning attitudes of higher education students.

D. Findings

The descriptive study of 368 postgraduate students in Karnataka identified that AI chatbots have a positive impact on learning attitudes across all measured constructs. Enhanced learning experience achieved the highest mean score (M = 4.53), confirming that students strongly agree that AI chatbots improve understanding of complex concepts. Device compatibility (M = 4.39) and learning efficiency (M = 4.26) were also highly rated, reflecting the value students place on accessibility and time-saving features. Interface design and technical support were moderately positive (M = 3.92–4.15).

In terms of perceived trust, credibility of information had the highest mean (M = 4.14), while privacy and data security recorded the lowest scores throughout the study (M = 3.69–3.90), reflecting ongoing student reservations about data confidentiality. Regarding technological factors, speed of response (M = 4.19) and system reliability (M = 4.15) received the best ratings. Goal setting (M = 4.17), extrinsic motivation (M = 4.16), and academic performance (M = 4.12) were the highest-rated dimensions of learning attitude, with intrinsic motivation ranging from M = 3.99–4.11.

Demographically, most respondents were male (52.7%) with a commerce background (46.5%), and primarily used AI chatbots for concept clarification (38.9%) and personalized learning (26.4%), dedicating 0–1 hour per day (33.7%).

V. CONCLUSION

This study examined the effect of AI chatbots on the learning attitudes of postgraduate students in Karnataka, with a focus on ease of use, perceived trust, and technological factors as primary influencing variables. The results demonstrate that AI chatbots positively affect students' learning attitudes, assisting them in understanding complex concepts, improving learning efficiency, and enhancing academic performance. Students valued the user-friendly interface, prompt response times, and cross-device compatibility.

However, concerns regarding data privacy and security were evident, recording the lowest mean scores in the study ($M = 3.69-3.90$). The t-test revealed no significant gender-based difference in learning attitudes ($t = -1.432, p = 0.153$), and the one-way ANOVA showed no significant difference by frequency of AI chatbot usage ($F = 1.280, p = 0.151$), resulting in acceptance of the null hypotheses in both cases. Regression analysis validated that ease of use, perceived trust, and technological factors collectively exert a significant positive influence on the learning attitudes of postgraduate students, thereby supporting the alternative hypothesis.

Overall, AI chatbots serve as effective supplementary learning tools in higher education, fostering both intrinsic and extrinsic motivation among postgraduate students. Addressing data privacy concerns and encouraging more frequent, purposeful use remain important areas for improvement. These findings provide valuable insights for educators, policymakers, and technology developers in effectively integrating AI chatbots into higher education systems.

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