ChatGPT Vs. DeepSeek: A Structural Equation Modelling Analysis of College Students' Preferences

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Abstract- This study will investigate the factors influencing the adoption of ChatGPT or DeepSeek among college students in Chennai, focusing on usability, performance, awareness, cost, and institutional influence. As AI-driven chatbots increasingly shape academic learning and research, understanding the key drivers behind students' chatbot preferences will improve their adoption and effectiveness in educational settings. This research will aim to identify the reasons why students prefer one chatbot over the other and assess the relative importance of different influencing factors. To achieve these objectives, the study will employ a structured questionnaire to collect primary data from students across various academic disciplines, including Science & Technology, Business & Management, Social Sciences, and Health Sciences. The questionnaire will cover demographic details, chatbot usage patterns, user satisfaction levels, and perceptions of each chatbot. Responses will be analysed using Structural Equation Modelling (SEM) in SmartPLS, enabling a detailed examination of the relationships between the independent variables (usability, performance, awareness, cost, privacy, and institutional influence) and the dependent variable (chatbot preference). The findings of this study will offer valuable insights for AI chatbot developers, academic institutions, and policymakers to refine chatbot adoption strategies. Understanding the factors that influence students' choices will help enhance chatbot functionalities, optimize pricing models, and strengthen institutional support for AI-driven learning tools. Furthermore, this research will contribute to the broader discourse on AI adoption in higher education, providing recommendations for improving chatbot usability, engagement, and accessibility among students. The study's insights will be particularly useful for universities looking to integrate AI chatbots into academic support systems, ensuring that students benefit from efficient, cost-effective, and user-friendly AI-driven learning tools.

Keywords: Chatbot adoption, ChatGPT, DeepSeek, usability, institutional influence, SEM modeling, student preference, AI in education.

INTRODUCTION

The rapid advancement of artificial intelligence (AI) has significantly transformed the landscape of digital learning and knowledge acquisition. Among the various AI-driven tools available, conversational AI models such as ChatGPT and DeepSeek have gained substantial traction among college students. These models serve as interactive assistants, aiding in academic research, content generation, and problem-solving. However, differences in usability, accessibility, performance, and trustworthiness have led to diverse preferences among students. This study aims to analyze the factors influencing the choice between ChatGPT and DeepSeek among college students in Chennai, utilizing Structural Equation Modelling (SEM) to understand the determinants of their adoption and usage.

ChatGPT, developed by OpenAI, has gained widespread popularity for its ability to generate human-like responses, facilitate academic assistance, and support multiple functionalities, including coding, content writing, and conceptual explanations. In contrast, DeepSeek, an emerging AI-powered conversational model, has positioned itself as a robust alternative with a strong focus on enhanced contextual understanding, accuracy, and affordability. While both models are designed to improve user experience, the underlying reasons behind students' preference for one over the other remain underexplored. This research seeks to bridge this gap by providing an empirical evaluation of the key factors influencing students' choices.

REVIEW OF LITERATURE

According to recent research, college students are increasingly using ChatGPT and other generative AI tools over conventional search engines when they need academic help (Zhang & Yang, 2024)[3]. Relative

advantage, interoperability, usability, observability, and trialability are some of the factors affecting ChatGPT adoption. Students think ChatGPT is creative, adaptable, and easy to use, allowing them to pursue their academic objectives on their own (Raman et al., 2023)[2]. However, conventional resources have not yet completely taken over, and preferences for obtaining assistance still differ depending on the work and other conditions (Hou et al., 2024)[1]. Key factors affecting students' academic help-seeking preferences include GenAI fluency, GenAI distortions, and age. As ChatGPT adoption grows, educators should focus on developing students' critical thinking skills and improving the tool's fluency and reliability (Zhang & Yang, 2024)[3].

RESEARCH PROBLEM AND RATIONALE

With AI-driven educational tools becoming integral to academic workflows, it is crucial to understand the preferences of students to enhance the effectiveness of such platforms. Previous studies have examined AI adoption in education, focusing on general usability and ethical concerns. However, limited research has specifically compared ChatGPT and DeepSeek, especially using quantitative methodologies like SEM. Given that students' choices are influenced by factors such as usability, affordability, trust, institutional influence, and privacy concerns, this study employs an empirical approach to model these relationships statistically.

The research also aligns with the broader discourse on AI ethics, data privacy, and digital literacy, which are pivotal considerations for educational institutions integrating AI tools into their curriculum. By understanding the preference dynamics between ChatGPT and DeepSeek, educators, policymakers, and AI developers can refine these technologies to better serve students' needs. Additionally, insights from this study can guide future AI developments tailored to educational settings.

RESEARCH OBJECTIVES

This study aims to:
1. To identify the key factors influencing the adoption and preference of ChatGPT and DeepSeek among college students in Chennai.
2. To analyze the impact of usability, performance, cost, privacy, and institutional influence on students' selection of AI tools.
3. To develop a Structural Equation Model to evaluate the interrelationships among these factors.
4. To provide recommendations for AI developers and educational policymakers based on empirical findings

RESEARCH METHODOLOGY

This study adopts a quantitative research design, employing survey data collection from college students in Chennai. The data were analyzed using SmartPLS and SEM modeling to establish causal relationships among identified factors. The findings contribute to the growing body of literature on AI adoption in education and inform stakeholders about optimizing AI tools for student engagement and academic efficiency.

By offering a structured and empirical analysis of ChatGPT and DeepSeek, this research will provide valuable insights into how AI-driven academic tools can be tailored to meet student needs, ultimately shaping the future of AI in education.

HYPOTHESIS OF THE STUDY

H_1 - Awareness & Perception significantly positively affect the Usage & Preference of Chatbots.
H_2 - Cost & Accessibility significantly positively affect the Usage & Preference of Chatbots.
H_3 - Institutional & Social Influence has a significant positive effect on the Usage & Preference of Chatbots.
H_4 - Usability & Features significantly positively affect the Usage & Preference of Chatbots.
H_5 - Performance & Satisfaction don't significantly affect the Usage & Preference of Chatbots.

PROPOSED RESEARCH MODEL

CHART 1 – STRUCTURAL EQUATION MODEL OF THE STUDY
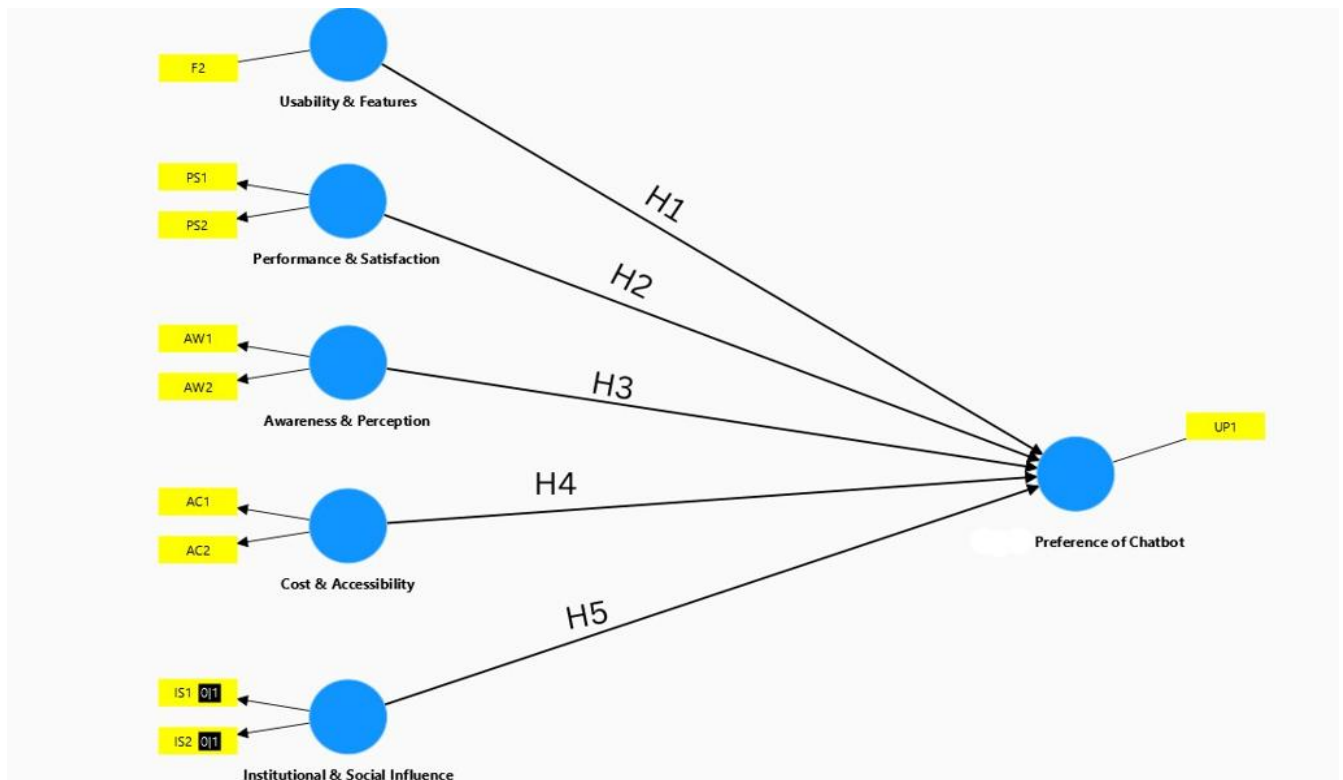
Source: Computed by Researcher using SmartPLS

RESULTS & DISCUSSION

STRUCTURAL EQUATION MODELING - INTERRELATIONSHIPS AMONG AWARENESS & PERCEPTION, COST & ACCESSIBILITY, INSTITUTIONAL & SOCIAL INFLUENCE, USABILITY & FEATURES, PERFORMANCE & SATISFACTION AND USAGE & PREFERENCE OF CHATBOTS

Table 1 - Reliability and Validity Test Results

	VIF	Composite reliability (rho_c)	Average variance extracted (AVE)
Awareness & Perception	2.069	0.74	0.588
Cost & Accessibility	1.363	0.942	0.891
Institutional & Social Influence	1.136	0.884	0.793
Performance & Satisfaction	1.17	0.728	0.573

Source: Computed by Researcher using SmartPLS

The Variance Inflation Factor (VIF) values for all constructs are well below the threshold of 5, indicating the absence of multicollinearity concerns. This suggests that the independent variables are not highly correlated, ensuring the stability and reliability of the regression estimates. Among the constructs, *Awareness & Perception* has a VIF of 2.069, which is the highest but still within acceptable limits, while *Institutional & Social Influence* has the lowest VIF at 1.136, suggesting minimal collinearity issues.

Composite Reliability (ρc) values are all above the recommended threshold of 0.7, demonstrating strong internal consistency and reliability across all constructs. *Cost & Accessibility* exhibits the highest composite reliability (0.942), indicating that the items within this construct are highly consistent in measuring the underlying concept. *Performance & Satisfaction* has the lowest composite reliability (0.728), which is still acceptable but suggests that

there may be room for improvement in refining the measurement items for this construct.

The Average Variance Extracted (AVE) values for all constructs exceed the minimum threshold of 0.5, confirming adequate convergent validity. This indicates that each construct explains more than 50% of the variance of its indicators. *Cost & Accessibility* has the highest AVE (0.891), meaning it captures a substantial portion of variance from its measurement items, signifying strong construct validity. On the other hand, *Performance & Satisfaction* has the lowest AVE (0.573), suggesting that while it meets the required threshold, it has relatively lower explanatory power in terms of variance captured from its indicators.

Overall, the results indicate that the measurement model exhibits good reliability and validity, with all constructs showing acceptable levels of internal consistency and convergent validity. The construct *Cost & Accessibility* demonstrates the strongest measurement properties, while *Performance & Satisfaction* could potentially benefit from further refinement in item selection to enhance its reliability and validity.

Table 2 - R^2 Results

	R-square	R-square adjusted
Usage & Preference of Chatbot	0.721	0.706

Source: Computed by Researcher using SmartPLS

The table presents the *R-square* and *R-square adjusted* values for the construct *Usage & Preference of Chatbot*. The *R-square* value of 0.721 indicates that the independent variables in the model explain 72.1% of the variance in the dependent variable (*Usage & Preference of Chatbot*). This suggests a strong explanatory power of the model.

The *R-square adjusted* value of 0.706 accounts for the number of predictors in the model and provides a more accurate estimate of the explained variance. Since the adjusted *R-square* is slightly lower than the *R-square*, it suggests that some predictors may have a marginal impact on the dependent variable, but the model remains robust and reliable. Overall, these values indicate a well-fitted model with strong predictive ability regarding chatbot usage and preference.

Table 3 - Path Coefficient

Relationships	Path Estimates	Standard deviation (STDEV)	T statistics	P values
Awareness & Perception -> Usage & Preference of Chatbot	0.292	0.078	3.767	0.000
Cost & Accessibility -> Usage & Preference of Chatbot	0.107	0.046	2.321	0.010
Institutional & Social Influence -> Usage & Preference of Chatbot	0.578	0.165	3.498	0.000
Performance & Satisfaction -> Usage & Preference of Chatbot	-0.028	0.065	0.425	0.336
Usability & Features -> Usage & Preference of Chatbot	0.482	0.116	4.169	0.000

Source: Computed by Researcher using SmartPLS

The results of the structural equation modeling (SEM) analysis provide key insights into the factors influencing the *Usage & Preference of Chatbot*. The *Awareness & Perception* construct has a significant positive effect on chatbot usage, with a path estimate of 0.292 (p = 0.000, T = 3.767). This indicates that as awareness and perception of chatbots improve, their usage and preference increase. The strong significance of this relationship suggests that initiatives aimed at educating users about chatbots and improving their perception could lead to higher adoption rates.

Cost & Accessibility also plays a role in influencing chatbot usage, but its effect is relatively weaker, with a path coefficient of 0.107 (p = 0.01, T = 2.321). While the relationship is statistically significant, the low coefficient suggests that affordability and accessibility are not the primary factors driving chatbot adoption. This implies that while ensuring affordability and availability is important, other factors may have a stronger influence on user preference.

The most influential factor in this study is *Institutional & Social Influence*, with a path estimate of 0.578 (p = 0.000, T = 3.498). This highlights the crucial role of institutional support and social acceptance in shaping user preference for chatbots. If chatbots are widely endorsed by institutions and positively perceived within social circles, their adoption is likely to increase significantly. This finding suggests that chatbot providers should focus on institutional collaborations and social marketing strategies to enhance credibility and encourage usage.

On the other hand, *Performance & Satisfaction* has a negative and statistically insignificant effect on chatbot usage, with a path estimate of -0.028 (p = 0.336, T = 0.425). This suggests that user satisfaction with chatbot performance does not have a direct impact on preference and adoption. A possible interpretation is that users may have other priorities, such as usability and institutional influence, that outweigh performance concerns. Alternatively, users might be engaging with chatbots out of necessity rather than satisfaction with their performance.

Finally, *Usability & Features* emerge as another strong predictor of chatbot usage, with a path estimate of 0.482 (p = 0.000, T = 4.169). This suggests that a user-friendly interface, functionality, and ease of use significantly enhance chatbot preference. Given its strong impact, chatbot developers should prioritize improving usability and incorporating intuitive features to drive higher adoption rates.

The findings indicate that *Institutional & Social Influence* and *Usability & Features* are the strongest drivers of chatbot usage, while *Awareness & Perception* and *Cost & Accessibility* also contribute but to a lesser extent. Interestingly, *Performance & Satisfaction* do not significantly impact chatbot preference, suggesting that users may be willing to overlook performance issues if other factors, such as usability and social acceptance, are favourable. These insights provide valuable guidance for chatbot developers and marketers aiming to enhance adoption and user engagement.

FINDINGS OF THE STUDY

- Institutional & Social Influence (β = 0.578, p = 0.000) has the strongest positive impact, indicating that institutional endorsement and social acceptance significantly drive chatbot usage.

- Usability & Features (β = 0.482, p = 0.000) is another major determinant, highlighting that an intuitive interface and functionality enhance chatbot adoption.

- Awareness & Perception (β = 0.292, p = 0.000) also has a significant positive effect, suggesting that increasing awareness can drive preference.

- Cost & Accessibility (β = 0.107, p = 0.01) is significant but weaker in influence, implying that affordability matters but is not a primary driver.

- Performance & Satisfaction (β = -0.028, p = 0.336) is not significant, indicating that chatbot preference is influenced by other factors rather than performance satisfaction.

RECOMMENDATIONS

Based on the findings, several recommendations can enhance chatbot adoption and user engagement. First, leveraging institutional and social influence is crucial. Encouraging educational institutions, organizations, and influential communities to endorse chatbots can significantly boost their usage. Implementing targeted campaigns that highlight peer recommendations and testimonials can further strengthen social acceptance. Second, enhancing usability and features is essential. Chatbot interfaces should be intuitive, with personalized responses, multilingual support, and seamless integration into existing platforms like learning management systems and customer service portals. Third, increasing awareness and perception through workshops, webinars, and targeted marketing campaigns can educate users on the benefits and functionalities of chatbots. Addressing misconceptions and showcasing success stories will also help build trust. Fourth, optimizing cost and accessibility is important. Offering tiered pricing models, including freemium plans, can cater to different user segments, while improving accessibility features will ensure compatibility across various devices and internet conditions. Lastly, refining performance and satisfaction metrics is necessary. Identifying user pain points, improving chatbot responsiveness, and implementing feedback loops for continuous enhancements can contribute to better user

experiences. These recommendations align with the study's findings and can drive greater chatbot adoption and engagement.

CONCLUSION

This study provides a nuanced understanding of the factors shaping college students' preferences between ChatGPT and DeepSeek in an educational context. Through Structural Equation Modelling, it becomes evident that social and institutional validation, as well as practical design elements like usability, are central to the adoption of AI chatbots. While awareness and cost-related considerations do influence decisions, they are less decisive than anticipated. Interestingly, perceived performance does not significantly sway user preference, indicating a shift in how students value AI tools—not solely on technical capabilities, but more on accessibility, social proof, and functional ease. These insights offer a pathway for developers, educators, and policymakers to refine AI tools to better align with student expectations and learning environments. Ultimately, the findings underscore the importance of user-centric design, strategic institutional partnerships, and educational outreach in fostering meaningful integration of AI chatbots in higher education.

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