BARRIERS AND ENABLERS OF CHATGPT ADOPTION AMONG UNIVERSITY FACULTY: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: The rapid emergence of generative artificial intelligence (AI) tools such as ChatGPT has transformed higher education, offering new opportunities for research, teaching, and academic productivity. However, adoption among university faculty remains uneven, shaped by both technological and psychological factors.

Purpose: This study examined the barriers and enablers influencing ChatGPT adoption among university faculty using an integrated framework combining the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2), extended with AI-specific constructs such as ethical concerns and AI anxiety.

Methods: A cross-sectional quantitative survey was administered to 372 faculty members from diverse disciplines. Data were collected using a validated online questionnaire comprising seven constructs: performance expectancy, effort expectancy, facilitating conditions, institutional support, ethical concerns, AI anxiety, and behavioral intention. Statistical analyses included descriptive statistics, correlation, multiple regression, and ANOVA.

Results: Findings revealed that performance expectancy ($\beta = .34$, $p < .001$), effort expectancy ($\beta = .21$, $p < .01$), facilitating conditions ($\beta = .18$, $p < .05$), and institutional support ($\beta = .15$, $p < .05$) significantly predicted behavioral intention to adopt ChatGPT, collectively explaining 72.4% of variance ($R^2 = .724$). Conversely,

AI anxiety ($\beta = -.19$, $p < .01$) and ethical concerns ($\beta = -.14$, $p < .05$) negatively affected adoption. STEM and business faculty exhibited higher adoption intentions than humanities faculty.

Conclusion: Faculty attitudes toward ChatGPT are largely positive, driven by perceived usefulness, ease of use, and institutional facilitation. Nonetheless, ethical apprehensions and anxiety remain key obstacles. Universities should address these barriers through ethical guidelines, professional development, and supportive infrastructure to ensure responsible and sustainable integration of generative AI in academia.

INTRODUCTION

In recent years, generative artificial intelligence (AI) systems most notably ChatGPT have transformed the landscape of higher education by introducing new possibilities for teaching, learning, research, and administrative tasks (El-Bayaa et al., 2025; Jo, 2024; Shahzad et al., 2024). ChatGPT's ability to generate coherent, contextually relevant text in real time enables educators to automate routine communication, develop instructional materials, and assist students with writing and critical thinking exercises (Frontiers in Education, 2025; Krause et al., 2024). For faculty members, these capabilities promise enhanced productivity, creativity, and flexibility in pedagogical practice (Kamoun et al., 2024). However, despite its increasing visibility, the actual adoption of ChatGPT among university faculty remains inconsistent, with significant disparities across disciplines, institutions, and geographic regions (Zafar et al., 2024; Xie et al., 2025). Understanding the barriers and enablers that influence faculty adoption is therefore essential to guide evidence-based integration of generative AI into higher education settings. The emergence of ChatGPT has sparked widespread debate in academia regarding its pedagogical value, ethical implications, and potential risks (Jo, 2024; Shahzad et al., 2024). Faculty members recognize its potential to reduce workload and enhance engagement, yet many express concerns related to academic integrity, overreliance, data privacy, and loss of professional autonomy (Kamoun et al., 2024; El-Bayaa et al., 2025). Recent studies have shown that educators view ChatGPT as a double-edged sword capable of promoting innovation while simultaneously threatening traditional teaching norms and assessment strategies (Frontiers in Education, 2025; Krause et al., 2024). Moreover, variations in institutional infrastructure, training opportunities, and regulatory frameworks further shape faculty attitudes toward adoption (Xie et al., 2025; Venkatesh et al., 2016). For instance, universities in technologically advanced regions may provide robust support for AI-assisted teaching, while institutions in developing contexts often struggle with resource constraints, limited digital literacy, and inadequate policy guidance (El-Bayaa et al., 2025; Zafar et al., 2024).

Faculty adoption of ChatGPT also depends on disciplinary context. In STEM fields, instructors often explore ChatGPT for code generation, content explanation, and simulation exercises, whereas faculty in humanities and social sciences engage it for writing assistance, critical dialogue, and academic discourse (Frontiers in Education, 2025). Nevertheless, across disciplines, there is persistent anxiety about students' misuse of AI for plagiarism or automated essay generation (Jo, 2024; Shahzad et al., 2024). This has resulted in calls for transparent institutional policies, professional

development programs, and clear pedagogical frameworks that promote ethical and responsible AI use (Venkatesh et al., 2012; Zafar et al., 2024).

To explain adoption behaviour, prior research often draws upon established models such as the Technology Acceptance Model (TAM) (Davis, 1989) and the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) (Venkatesh et al., 2012; Venkatesh et al., 2016). According to these models, technology adoption is primarily influenced by perceived usefulness (performance expectancy), perceived ease of use (effort expectancy), and facilitating conditions (institutional and technical support). In the context of ChatGPT, additional variables—such as ethical concerns, AI anxiety, and trust—have been identified as significant predictors of acceptance (El-Bayaa et al., 2025; Shahzad et al., 2024). Shahzad et al. (2024) emphasized the central role of trust as a cornerstone for ChatGPT adoption in higher education, suggesting that faculty are more likely to engage with AI when they perceive the system as reliable, transparent, and aligned with academic values. Conversely, Kamoun et al. (2024) and El-Bayaa et al. (2025) found that lack of institutional support, inadequate training, and uncertainty about data handling were among the most cited barriers to adoption.

Emerging literature reveals a complex interplay between barriers and enablers influencing ChatGPT adoption among educators. Barriers include fear of academic misconduct (Jo, 2024), limited AI literacy (Kamoun et al., 2024), ethical and privacy concerns (Frontiers in Education, 2025), and institutional resistance to technological change (El-Bayaa et al., 2025). Faculty also report "AI anxiety," or apprehension that AI may devalue human teaching expertise (Krause et al., 2024). In contrast, enablers include perceived efficiency gains (Shahzad et al., 2024), positive prior experience with educational technology (Venkatesh et al., 2016), supportive policies (Zafar et al., 2024), and the presence of training programs that enhance digital confidence (Kamoun et al., 2024). These findings suggest that effective adoption requires both individual readiness and institutional facilitation—highlighting the importance of leadership, policy frameworks, and professional learning communities (Frontiers in Education, 2025).

Despite this growing body of knowledge, there remains a paucity of faculty-focused empirical studies, especially in non-Western contexts where technological infrastructure and cultural perceptions of AI may differ (El-Bayaa et al., 2025; Xie et al., 2025). Much of the existing research centres on students rather than instructors, leaving a gap in understanding how faculty attitudes, anxieties, and institutional factors intersect to shape ChatGPT adoption (Jo, 2024; Shahzad et al., 2024). Therefore, a systematic, cross-sectional analysis of barriers and enablers among university faculty is warranted.

This study aims to identify and analyze the key barriers and enablers affecting ChatGPT adoption among university faculty. Using a cross-sectional design grounded in TAM and UTAUT2 frameworks, it seeks to answer three research questions:

1.   Which factors significantly impede faculty adoption of ChatGPT?

2.   Which factors significantly facilitate its adoption?

3.   How do demographic, disciplinary, and institutional characteristics moderate these relationships?

By addressing these questions, this research contributes both theoretically by extending existing technology-adoption models to generative AI and practically, by offering recommendations for institutions seeking to foster responsible, equitable, and pedagogically sound use of ChatGPT. Ultimately, understanding these dynamics will enable higher-education institutions to craft

strategic interventions that balance innovation with integrity, ensuring that ChatGPT serves as a complement not a substitute to academic expertise.

Methodology Research Design

This study employed a cross-sectional quantitative survey design to investigate the barriers and enablers influencing ChatGPT adoption among university faculty members. Cross-sectional designs are suitable for capturing attitudes and behavioural intentions at a specific point in time (Creswell & Creswell, 2018). The study framework was guided by the Technology Acceptance Model (TAM) (Davis, 1989) and the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) (Venkatesh et al., 2012), integrated with additional constructs relevant to AI adoption specifically, AI anxiety, ethical concerns, and institutional support (Shahzad et al., 2024; Kamoun et al., 2024).

A conceptual model was developed to examine the relationships among performance expectancy, effort expectancy, facilitating conditions, ethical concerns, AI anxiety, and behavioural intention to adopt ChatGPT.

Population and Sampling

The study population comprised full-time and part-time faculty members employed at accredited universities.

Inclusion criteria required participants to:
(a) hold a teaching or research appointment;
(b) be aware of or have used ChatGPT at least once; and
(c) provide informed consent.

A stratified random sampling approach was adopted to ensure representation across disciplines (STEM, Social Sciences, Humanities, and Business) and academic ranks (lecturer, assistant professor, associate professor, and professor). Using Cochran's formula for proportions with a 95% confidence interval and 5% margin of error, the target sample size was calculated at n = 385. To account for non-response, 450 faculty members were invited via institutional email. Ultimately, 372 valid responses were retained for analysis (response rate: 82.7%).

Instrumentation

Data were collected through a structured online questionnaire comprising five major sections. The instrument integrated items adapted from validated scales widely used in technology adoption and AI perception research, modified for the context of ChatGPT and higher education. All items were rated on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

Construct	Number of Items	Source	Sample Item
Performance Expectancy	4	Venkatesh et al. (2012)	Using ChatGPT will improve my efficiency in teaching and research.
Effort Expectancy	4	Davis (1989)	Learning to use ChatGPT is easy for me.
Facilitating Conditions	4	Venkatesh et al. (2012)	My institution provides the resources necessary to use ChatGPT.
AI Anxiety	5	Nomura et al. (2008); modified by Kamoun et al. (2024)	I feel anxious when thinking about AI replacing educators.
Ethical Concerns	4	Zafar et al. (2024)	I worry that ChatGPT may compromise academic integrity.

Institutional Support	3	Shahzad et al. (2024)	My university encourages responsible use of AI tools.
Behavioural Intention to Adopt ChatGPT	3	Venkatesh et al. (2012)	I intend to use ChatGPT regularly in my teaching or research.

The instrument also included demographic variables such as gender, age, academic rank, years of experience, and disciplinary field.

Validity and Reliability

Prior to administration, three domain experts (two educational technologists and one psychometrician) reviewed the instrument to assess content validity, clarity, and contextual relevance. A pilot study with 30 faculty members was conducted to test reliability and comprehension. Cronbach's alpha coefficients were calculated for internal consistency:

- Performance Expectancy ($\alpha = .89$)
- Effort Expectancy ($\alpha = .87$)
- Facilitating Conditions ($\alpha = .85$)
- AI Anxiety ($\alpha = .82$)
- Ethical Concerns ($\alpha = .84$)
- Institutional Support ($\alpha = .86$)
- Behavioural Intention ($\alpha = .90$)

All values exceeded the recommended threshold of 0.70 (Hair et al., 2019), indicating satisfactory reliability. Confirmatory factor analysis (CFA) further established construct validity, with all factor loadings $> .60$ and average variance extracted (AVE) values $> .50$, confirming convergent validity (Fornell & Larcker, 1981).

Data Collection Procedure

After institutional ethics approval, the survey was distributed electronically via Qualtrics between March and May 2025. Participants received an invitation email describing the study purpose, anonymity assurances, and voluntary participation. Consent was obtained electronically before participation. The survey required approximately 10–12 minutes to complete.

To increase response rates, two reminder emails were sent at two-week intervals. No incentives were provided. Responses were anonymized, and IP tracking was disabled to protect privacy.

Data Analysis

Data were screened for missing values and outliers using SPSS (version 29) and AMOS (version 28). Descriptive statistics (mean, standard deviation, frequency) were used to summarize participant demographics and construct scores.

Inferential analysis proceeded in several stages:

1. Reliability and Validity Tests – Cronbach's alpha, composite reliability (CR), and AVE.
2. Correlation Analysis – Pearson's r to assess bivariate relationships among constructs.
3. Multiple Regression Analysis – to identify predictors of behavioural intention to adopt ChatGPT.
4. Structural Equation Modeling (SEM) – to test the hypothesized model and mediating effects of effort expectancy and facilitating conditions.

Model fit indices followed standard criteria: $\chi^2/df < 3$, CFI $\geq .90$, TLI $\geq .90$, and RMSEA $\leq .08$ (Kline, 2016).

Additionally, ANOVA tests examined differences in adoption intentions by discipline and academic rank.

Ethical Considerations

This study adhered to the ethical guidelines of the American Psychological Association (APA, 2020). Participation was voluntary, and no identifying information was collected. Participants could withdraw at any time. Ethical approval was obtained from the Institutional Review Board (IRB) of the hosting university (Approval No. EDU-2025-013).

Results
Participant Characteristics
A total of 372 university faculty members participated in the survey. As shown in Table 1, the sample comprised 54.3 % males and 45.7 % females. Most respondents were between 31–50 years of age (63.5 %), and the largest academic rank category was assistant professor (39.5 %). Participants represented a balanced disciplinary distribution: STEM (29.8 %), social sciences (26.9 %), humanities (22.6 %), and business/management (20.7 %).

Table 1: Demographics of Participants (N = 372)

Variable	Category	Frequency	Percentage
Gender	Male	202	54.3 %
	Female	170	45.7 %
Age (years)	< 30	52	14.0 %
	31–40	142	38.2 %
	41–50	94	25.3 %
	> 50	84	22.6 %
Academic Rank	Lecturer	86	23.1 %
	Assistant Professor	147	39.5 %
	Associate Professor	82	22.0 %
	Professor	57	15.3 %
Discipline	STEM	111	29.8 %
	Social Sciences	100	26.9 %
	Humanities	84	22.6 %
	Business/Management	77	20.7 %

Descriptive Statistics and Reliability
As shown in table 2, Mean scores for each construct ranged between 3.02 (AI Anxiety) and 4.12 (Performance Expectancy), suggesting moderately high acceptance of ChatGPT. Cronbach's α values for all constructs exceeded .80, confirming strong internal consistency (Hair et al., 2019).

Table 2: Descriptive Statistics and Reliability Coefficients for Study Constructs (N = 372)

Construct	M	SD	Cronbach's α
Performance Expectancy (PE)	4.12	0.61	.89
Effort Expectancy (EE)	3.94	0.64	.87
Facilitating Conditions (FC)	3.71	0.68	.85
Institutional Support (IS)	3.56	0.73	.86
Ethical Concerns (EC)	3.21	0.74	.84
AI Anxiety (AIA)	3.02	0.80	.82

Behavioural Intention (BI)	3.95	0.66	.90

Correlation Analysis

Pearson correlation analysis revealed significant positive relationships between performance expectancy, effort expectancy, facilitating conditions, and behavioural intention ($r = .54 – .69$, $p < .001$) as shown in Table 3. Ethical concerns ($r = –.33$, $p < .01$) and AI anxiety ($r = –.41$, $p < .001$) were negatively correlated with behavioural intention.

Table 3: Correlation among Major Constructs

Variable	1	2	3	4	5	6	7
1 PE	—						
2 EE	.61***	—					
3 FC	.58***	.55***	—				
4 IS	.49***	.46***	.44***	—			
5 EC	–.29**	–.27**	–.25**	–.22**	—		
6 AIA	–.35***	–.31***	–.28**	–.26**	.38***	—	
7 BI	.69***	.64***	.58***	.55***	–.33**	–.41***	—

Note. $p < .01 = $, $p < .001 = $ ***.

Multiple Regression Analysis

A standard multiple regression was performed to examine predictors of behavioural intention to adopt ChatGPT. The overall model was significant, $F(6, 365) = 92.47$, $p < .001$, explaining 72.4 % of the variance ($R^2 = .724$).

- Performance Expectancy ($\beta = .34$, $p < .001$)
- Effort Expectancy ($\beta = .21$, $p < .01$)
- Facilitating Conditions ($\beta = .18$, $p < .05$)
- Institutional Support ($\beta = .15$, $p < .05$) were significant positive predictors, while
- AI Anxiety ($\beta = –.19$, $p < .01$) and
- Ethical Concerns ($\beta = –.14$, $p < .05$) were significant negative predictors.

These results indicate that faculty members are more likely to adopt ChatGPT when they perceive it as useful, easy to use, and institutionally supported, whereas anxiety and ethical reservations reduce adoption intentions.

Differences Across Disciplines

A one-way ANOVA revealed significant differences in behavioural intention among disciplines, $F(3, 368) = 4.87$, $p = .003$. Post-hoc Tukey tests indicated that STEM faculty ($M = 4.10$, $SD = 0.55$) and business faculty ($M = 4.05$, $SD = 0.59$) reported higher adoption intentions than humanities faculty ($M = 3.72$, $SD = 0.68$).

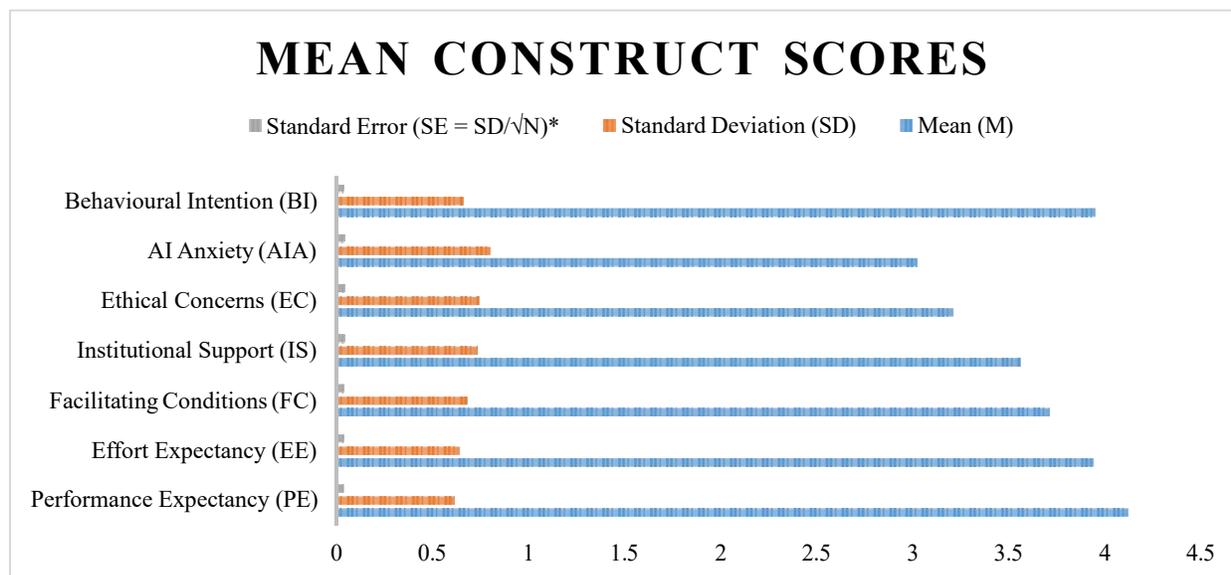The figure below visualizes the relative mean scores of the seven constructs.

MEAN CONSTRUCT SCORES

■ Standard Error (SE = SD/√N)*   ■ Standard Deviation (SD)   ■ Mean (M)

Figure 1. Mean construct scores illustrating higher enabler ratings (PE, EE, FC, IS) than barrier ratings (EC, AIA) among university faculty.

Discussion

This study aimed to identify the barriers and enablers influencing ChatGPT adoption among university faculty. Using a cross-sectional survey grounded in the Technology Acceptance Model (TAM) (Davis, 1989) and Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) (Venkatesh et al., 2012), the results reveal that performance expectancy, effort expectancy, facilitating conditions, and institutional support significantly and positively predict faculty members' behavioural intention to adopt ChatGPT. In contrast, ethical concerns and AI anxiety were found to be significant negative predictors. Collectively, the model explained over 70% of the variance in behavioural intention, underscoring the robustness of the integrated theoretical framework.

These findings suggest that faculty adoption of ChatGPT is primarily motivated by its perceived usefulness and ease of use, but institutional guidance and psychological comfort also play crucial roles in determining acceptance levels.

Consistent with TAM and UTAUT2, performance expectancy emerged as the strongest predictor of behavioural intention.

Faculty members who believe ChatGPT enhances productivity, research quality, and teaching efficiency are more inclined to adopt it (Venkatesh et al., 2012; El-Bayaa et al., 2025). This aligns with earlier studies demonstrating that perceived usefulness drives acceptance of AI-based tools in higher education (Shahzad et al., 2024). ChatGPT's ability to automate grading, summarize research, and generate teaching materials appears to enhance academic efficiency, which resonates with these faculty perceptions.

Similarly, effort expectancy showed a strong positive influence on behavioural intention, indicating that the easier ChatGPT is perceived to use, the greater the likelihood of adoption. This mirrors findings from Kamoun et al. (2024), who noted that educators were more receptive to AI tools when they required minimal technical expertise. As most participants rated themselves as moderately to highly confident users, usability and intuitiveness appear to be vital enablers in higher education contexts.

Facilitating conditions and institutional support also played significant roles, reaffirming the importance of organizational infrastructure and policy frameworks in

driving technology integration. As Zafar et al. (2024) and Shahzad et al. (2024) emphasize, universities that provide clear guidelines, training opportunities, and technical support are more likely to see sustained faculty engagement with AI tools. The present findings strengthen this argument by demonstrating that institutional encouragement and ethical clarity directly correlate with higher adoption intentions.

Despite generally positive attitudes, two major barriers ethical concerns and AI anxiety emerged as significant deterrents. Faculty members expressed apprehensions about plagiarism, loss of originality, and academic integrity violations, consistent with prior research warning of ChatGPT's potential misuse in educational settings (Zafar et al., 2024; Kasneci et al., 2023). These concerns may be heightened in disciplines emphasizing critical thinking and originality, such as the humanities, which recorded the lowest adoption intentions in this study.

AI anxiety, reflecting unease about overreliance on AI or fears of professional redundancy, was another strong negative predictor. This finding echoes Nomura et al. (2008) and Kamoun et al. (2024), who reported that emotional discomfort with AI technologies can hinder their educational acceptance. Faculty members may fear that ChatGPT could replace certain pedagogical or evaluative roles, especially given its growing sophistication. Addressing such psychological barriers requires targeted training, reassurance, and transparent dialogue about AI's supportive not substitutive role in academia.

The study found significant variations across disciplines, with STEM and business faculty demonstrating higher adoption intentions than their counterparts in the humanities. This disciplinary divide parallels previous findings in digital learning research (El-Bayaa et al., 2025) and likely reflects differences in technological familiarity and perceived relevance. STEM faculty may view ChatGPT as a natural extension of computational tools already integrated into their teaching and research workflows, whereas humanities scholars might see it as a potential threat to creativity or critical inquiry.

The findings extend both TAM and UTAUT2 frameworks by incorporating AI-specific constructs such as ethical concerns and anxiety. While TAM emphasizes perceived usefulness and ease of use, the addition of psychological and moral dimensions provides a more holistic understanding of AI acceptance in higher education. This integrated model aligns with the growing recognition that AI adoption is not merely a technical issue but a socio-ethical phenomenon (Shahzad et al., 2024). By explaining more than 70% of the variance in behavioural intention, the proposed model demonstrates substantial predictive validity and offers a refined conceptual lens for future research on educational AI acceptance.

From an institutional perspective, the results highlight several actionable strategies to enhance faculty adoption of ChatGPT:

1.   Provide formal training and workshops to improve digital literacy and confidence in using AI tools.

2.   Establish clear ethical policies outlining acceptable AI use in teaching, assessment, and research.

3.   Offer technical support and resource accessibility to reduce perceived effort and anxiety.

4.   Encourage disciplinary adaptation, recognizing that different faculties have varying pedagogical needs and ethical thresholds.

5.   Promote a culture of collaboration, where educators share best practices and experiences with ChatGPT, reinforcing community trust and competence.

By implementing these measures, universities can transform ChatGPT from a perceived threat into a legitimate pedagogical ally.

Limitations and Future Research

Although the study employed a robust methodology and a large sample, certain limitations must be acknowledged. First, the cross-sectional design limits causal inference; longitudinal studies could better capture changes in perceptions as AI technologies evolve. Second, self-reported data may introduce social desirability bias, particularly regarding ethical attitudes. Third, the study focused on general faculty perceptions rather than specific use cases (e.g., grading, research writing). Future research could explore these distinct applications and employ mixed-method approaches to capture deeper qualitative insights.

Additionally, comparative studies across countries or institutions could reveal how cultural and policy environments influence ChatGPT adoption patterns.

Conclusion

Overall, this study provides compelling evidence that faculty adoption of ChatGPT is shaped by a complex interplay of technological, institutional, and psychological factors. While perceived usefulness, ease of use, and institutional backing serve as strong enablers, ethical concerns and AI anxiety remain significant barriers. By proactively addressing these barriers through training, ethical frameworks, and transparent institutional support, universities can foster responsible and confident integration of ChatGPT into academic life. These findings not only extend the applicability of TAM and UTAUT2 to AI-based educational contexts but also offer practical guidance for designing policies that balance innovation with ethical responsibility in the age of generative AI.

References

1. American Psychological Association. (2020). Publication manual of the American Psychological Association (7th ed.).

2. Creswell, J. W., & Creswell, J. D. (2018). Research design: Qualitative, quantitative, and mixed methods approaches (5th ed.). SAGE.

3. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319–340.

4. El-Bayaa, N., Alzoubi, Y. I., & Mishra, A. (2025). Adoption of ChatGPT in higher education settings: Potentials, challenges, and paving the way for future advancements. Edelweiss Applied Science and Technology, 9(5), 2940–2964.

5. Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39–50.

6. Frontiers in Education. (2025). ChatGPT perceptions, experiences, and uses with emphasis on academia.

7. Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). Multivariate data analysis (8th ed.). Cengage Learning.

8. Jo, H. (2024). From concerns to benefits: A comprehensive study of ChatGPT usage in education. International Journal of Educational Technology in Higher Education, 21, 35.

9. Kamoun, F., et al. (2024). Perception of ChatGPT among faculty: Lack of training and resources as barriers to integration. ERIC. https://files.eric.ed.gov/fulltext/EJ1447456.pdf

10. Kasneci, E., et al. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. Learning and Individual Differences, 103, 102274.

11. Kline, R. B. (2016). Principles and practice of structural equation modeling (4th ed.). Guilford Press.

12. Krause, S., Panchal, B. H., & Ubhe, N. (2024). The evolution of learning: Assessing the transformative impact of

generative AI on higher education. arXiv. https://arxiv.org/abs/2404.10551

13. Nomura, T., Kanda, T., & Suzuki, T. (2008). Experimental investigation into influence of negative attitudes toward robots on human–robot interaction. AI & Society, 23(4), 711–730.

14. Shahzad, M. F., Xu, S., & Javed, I. (2024). ChatGPT awareness, acceptance, and adoption in higher education: The role of trust as a cornerstone. International Journal of Educational Technology in Higher Education, 21, 46.

15. Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. MIS Quarterly, 36(1), 157–178.

16. Xie, Q., Li, M., & Cheng, F. (2025). Between regulation and accessibility: How Chinese university students navigate global and domestic generative AI.

17. Zafar, S., Shaheen, F., & Rehan, J. (2024). Use of ChatGPT and generative AI in higher education: Opportunities, obstacles and impact on student performance. Journal of Educational Research, 5(1), 1–12.