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Adoption of ChatGPT Among University Students: Examining Self-Efficacy, Digital Literacy, Trust, Motivation, and Usage Behavior..

Dr. Vinod Kumar Jain [1], Dr. Deepika Sharma [2], Dr. B. L. Jain [3]
[1]Associate Professor, Faculty of Education, Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, India.
Email: jaindrvinodkumar@gmail.com
[2]Assistant Professor, Department of Education, Invertis University Bareilly, Uttar Pradesh, India.
Email: drdeepikamishra12@gmail.com
[3]Professor and Head, Department of Education, Jain Vishva Bharati Institute (Deemed to be University), Uttar Pradesh, India.
Email: bljainjvbu@gmail.com

ABSTRACT
Artificial intelligence-based tools such as ChatGPT are increasingly being used in higher education, yet the factors influencing their adoption remain underexplored. This study investigates the key determinants shaping university students' adoption and usage behavior of ChatGPT. Data were collected from 180 undergraduate and postgraduate students representing diverse academic disciplines through a structured questionnaire. Descriptive statistics, correlation analysis, and multiple regression techniques were utilized to examine the relationships among self-efficacy, digital literacy, trust in AI systems, motivation, and usage behavior. The findings indicate that digital literacy, trust in AI, and motivation significantly predict students' behavioral intention and actual usage of ChatGPT, whereas self-efficacy exerts an indirect and moderate influence. Students reported strong motivation to use ChatGPT for academic writing, concept clarification, and examination preparation. The study underscores the need to promote digital competency, AI literacy, and responsible usage practices to ensure ethical and effective integration of AI-based tools in higher education. These insights provide practical implications for educators and policymakers seeking to enhance AI-driven learning experiences and informed adoption among learners...
Keywords: ChatGPT adoption, digital literacy, self-efficacy, motivation, trust in AI, usage behavior, student perceptions, higher education technology, behavioral intention.
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INTRODUCTION:

The rapid advancement of artificial intelligence (AI) has transformed the educational landscape, with generative AI tools—particularly ChatGPT—emerging as influential support systems for learning, problem-solving, and academic productivity. ChatGPT offers students capabilities such as instant explanations, content generation, personalized feedback, and interactive tutoring-like responses, making it an increasingly adopted digital learning aid across global higher education institutions (Kasneci et al., 2023). As universities integrate AI-enabled technologies into academic workflows, understanding the determinants that shape students' adoption and usage behavior becomes essential for effective pedagogical planning and policy development. While earlier studies on technology adoption primarily relied on models such as the Technology Acceptance Model (TAM) (Davis, 1989) and the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003), the unique nature of generative AI demands exploration beyond traditional constructs. Unlike conventional educational technologies, ChatGPT interacts conversationally, simulates cognitive processes, and generates new content, thereby influencing students' learning perceptions, trust dynamics, and motivational orientations in distinct ways (Zhai, 2023). Therefore, a multi-factor analytical perspective is necessary to examine how cognitive, psychological, and digital factors shape students' engagement with generative AI tools. Self-efficacy plays a central role in learners' confidence to use emerging technologies effectively. Students with higher AI-related or digital self-efficacy are more likely to experiment with ChatGPT, integrate it into learning tasks, and sustain usage over time (Bandura, 1997; Li et al., 2023). Similarly, digital literacy has become a prerequisite for responsible and efficient use of AI-based educational tools. Students with strong digital literacy skills are more capable of critically evaluating AI-generated content, prompting more accurate queries, and avoiding misinformation or over-reliance (Ng, 2012; Goddard & Ahn, 2023).

Trust in AI systems is another vital determinant influencing adoption and continued usage. Issues related to data privacy, accuracy, algorithmic transparency, and ethical concerns significantly shape students' willingness to rely on ChatGPT for academic tasks (Dwivedi et al., 2023). When trust levels are high, students are more open to incorporating AI into their academic workflows; conversely, low trust may restrict its educational value despite high accessibility. Motivation—both intrinsic and extrinsic—also affects how and why students use ChatGPT. Students may be intrinsically motivated to use AI for curiosity-driven exploration and deeper learning, or extrinsically motivated to enhance performance, efficiency, and productivity in academic tasks (Ryan &

Deci, 2000; Kim & Lee, 2023). Understanding these motivational drivers enables educators to design more ethical, engaging, and learner-centered AI integration strategies. As AI-assisted learning becomes more prevalent and pedagogical opportunities expand, examining how these constructs collectively influence ChatGPT adoption among university students becomes increasingly important. Accordingly, this study investigates the combined effects of self-efficacy, digital literacy, trust, and motivation on students' behavioral intention and actual usage behavior of ChatGPT and provides evidence-based insights for the responsible integration of generative AI in higher education.

2. Review of Literature

The rapid integration of generative artificial intelligence (AI) tools such as ChatGPT has transformed learning environments, prompting increasing scholarly attention on the factors influencing students' adoption and usage behavior. Research shows that university students' intention to use AI-driven learning tools is shaped by psychological, technological, and motivational determinants (Dwivedi et al., 2023). Among these, self-efficacy, digital literacy, trust in AI, and learner motivation have emerged as critical predictors of acceptance, engagement, and continued use. Self-efficacy plays a foundational role in shaping students' perceptions and usage of digital technologies. Bandura's (1997) social cognitive theory affirms that individuals with higher self-efficacy are more likely to engage in complex tasks and persist during challenges. Studies in educational technology indicate that students with stronger technology-related self-efficacy demonstrate higher intention and confidence in using AI tools for academic tasks (Kundu, 2020; Zhou et al., 2023). Specifically, AI-use self-efficacy has been found to enhance students' belief in their competence to effectively interact with ChatGPT for tasks such as summarizing content, clarifying concepts, or generating academic drafts (Peng et al., 2024). Thus, self-efficacy is consistently associated with positive behavioral intention, ultimately influencing active usage behavior. Digital literacy is another essential factor affecting AI tool adoption among students. Digital literacy extends beyond basic computer use and includes evaluating online content, understanding digital interfaces, and utilizing AI-based systems effectively (Ng, 2012). Research demonstrates that students with higher digital literacy adapt more efficiently to emerging technologies, experience fewer usability challenges, and perceive AI-based applications as more beneficial for academic tasks (Ilgaz & Afacan Adanır, 2020; Siddiq & Scherer, 2019). Recent studies also suggest that AI literacy—an extension of digital literacy—significantly enhances students' readiness to adopt generative AI tools, as they better understand system capabilities, limitations, and ethical considerations (Zawacki-Richter et al., 2023). Trust in AI has become increasingly relevant with the rise of generative AI systems. Trust influences whether users perceive ChatGPT as reliable, accurate, and helpful for learning (Gefen et al., 2003). Empirical studies indicate that trust strengthens students' willingness to use AI tools, especially when technologies operate autonomously or provide recommendations without human moderation (Rahman et al., 2023). Concerns about misinformation, bias, and privacy, however, may weaken trust and lower adoption rates (Kasneci et al., 2023). Therefore, fostering trust is essential for maximizing students' responsible and sustained use of ChatGPT in higher education settings. Motivation is also a key factor driving students' adoption of innovative learning technologies. According to self-determination theory (Deci & Ryan, 2000), both intrinsic and extrinsic motivation influence learners' decision-making regarding technology use. Studies report that students motivated by curiosity, academic improvement, convenience, and enhanced efficiency are more likely to integrate ChatGPT into their learning activities (Zhang et al., 2023). Motivation also moderates the relationship between perceived usefulness and actual usage behavior, indicating that highly motivated learners tend to explore AI tools more frequently and broadly (Lai, 2021). Usage behavior reflects the combined effects of psychological, technological, and motivational determinants. Findings from technology adoption research affirm that behavioral intention is the strongest predictor of actual use (Venkatesh et al., 2012). Recent evidence shows that students who perceive ChatGPT as beneficial, reliable, and easy to use are more likely to adopt it for studying, writing assistance, problem-solving, and exam preparation (Sallam, 2023). Moreover, regular use of AI tools can enhance students' academic performance and learning efficiency, further reinforcing continued usage behavior (Holmes et al., 2023). Overall, literature suggests a multidimensional and interconnected framework in which self-efficacy, digital literacy, trust, and motivation collectively shape students' adoption of ChatGPT.

3. Need of the Study

The rapid integration of artificial intelligence, particularly generative AI tools such as ChatGPT, into higher education has transformed traditional learning environments by providing students with instant explanations, interactive guidance, and content generation capabilities. Despite the increasing adoption of these tools, there is limited research investigating the combined influence of psychological, technological, and motivational factors on students' adoption behaviors. While conventional frameworks like TAM and UTAUT have examined technology acceptance, they do not fully capture the unique attributes of generative AI, including its conversational interaction and cognitive simulation. Furthermore, factors such as self-efficacy, digital literacy, trust in AI, and motivation play a crucial role in shaping students' behavioral intentions and actual usage, yet their collective impact remains underexplored. Addressing this gap is essential not only to understand the determinants of ChatGPT adoption but also to inform the development of AI literacy programs, ethical usage guidelines, and institutional strategies that ensure responsible, effective, and pedagogically meaningful integration of AI technologies in higher education.

4. Objectives of the Study

To assess university students' levels of self-efficacy, digital literacy, trust in ChatGPT, and motivation.

To analyze the relationships between these variables and usage behavior.

To determine the strongest predictors of students' intention and usage of ChatGPT.

To provide recommendations for promoting effective and ethical use of AI tools.

5. Hypotheses of the Study

H1: Self-efficacy, digital literacy, trust in ChatGPT, and motivation significantly influence students' behavioral intention to use ChatGPT.

H2: Behavioral intention significantly predicts actual usage behavior of ChatGPT.

H3: Motivation is the strongest predictor of students' behavioral intention to use ChatGPT compared to self-efficacy, digital literacy, and trust.

H4: Students' levels of self-efficacy, digital literacy, trust, and motivation are positively associated with actual usage behavior of ChatGPT.

6. Methodology

This study employed a quantitative research design incorporating both descriptive and inferential approaches to examine the adoption of ChatGPT among university students. A total of 180 students were selected using stratified random sampling to ensure adequate representation across gender (90 male, 90 female) and academic stream (science = 45, commerce = 45, arts = 45, technical = 45). The sample included undergraduate students enrolled in diverse academic programs across public and private universities in Uttar Pradesh (UP), India. Participation was voluntary, and informed consent was obtained from all respondents prior to data collection.

Table 1 Distribution of Participants by Gender and Academic Stream (N = 180)

Stratum	Category	Number of Participants (n)	Percentage (%)
Gender	Male	90	50
	Female	90	50
Academic Stream	Science	45	25
	Commerce	45	25
	Arts	45	25
	Technical	45	25
Total	—	180	100

Data Collection Instrument: Data were collected using a structured questionnaire developed on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). The questionnaire was designed to measure six constructs:

Self-efficacy (6 items; $\alpha = 0.82$)

Digital literacy (5 items; $\alpha = 0.85$)

Trust in AI (5 items; $\alpha = 0.80$)

Motivation (5 items; $\alpha = 0.87$)

Behavioral intention (4 items; $\alpha = 0.83$)

Usage behavior (4 items; $\alpha = 0.81$)

The Cronbach's alpha values indicate that all scales demonstrated acceptable to high internal consistency.

Data Analysis: The collected data were analyzed using IBM SPSS Statistics (version 28). Descriptive statistics were employed to summarize participants' responses and identify overall trends in AI adoption. Pearson correlation analysis was used to examine the strength and direction of relationships among self-efficacy, digital literacy, trust in AI, motivation, behavioral intention, and usage behavior. Additionally, multiple regression analyses were conducted to determine the predictive power of self-efficacy, digital literacy, trust in AI, and motivation on both behavioral intention and actual usage behavior. This methodological approach provided a comprehensive understanding of the cognitive, technological, and motivational factors influencing university students' engagement with ChatGPT.

7. Results & Discussion

Table 2 Descriptive Statistics of Key Variables Related to ChatGPT Adoption among University Students

Variable	Mean	SD
Self-Efficacy	3.89	0.51
Digital Literacy	4.12	0.48
Trust in AI	3.76	0.57
Motivation	4.21	0.44

Behavioral Intention	4.08	0.46
Usage Behavior	3.95	0.52

The descriptive statistics indicate that university students exhibit moderate to high levels of self-efficacy (M = 3.89, SD = 0.51), reflecting a general confidence in their ability to effectively use ChatGPT. Students display high levels of digital literacy (M = 4.12, SD = 0.48), suggesting strong technical skills that enable efficient interaction with AI tools. Trust in AI is moderate (M = 3.76, SD = 0.57), indicating that while students generally rely on ChatGPT, some reservations remain regarding its reliability, accuracy, and ethical considerations. Motivation is notably strong (M = 4.21, SD = 0.44), highlighting both intrinsic curiosity and extrinsic performance-oriented drives to engage with AI-assisted learning. Behavioral intention is high (M = 4.08, SD = 0.46), suggesting students are positively inclined toward using ChatGPT for academic tasks, whereas actual usage behavior is slightly lower (M = 3.95, SD = 0.52), indicating that practical, ethical, or contextual barriers may limit the complete translation of intention into usage. Overall, these descriptive findings suggest that students are generally prepared and motivated to adopt ChatGPT, but some caution or external constraints may influence actual behavior.

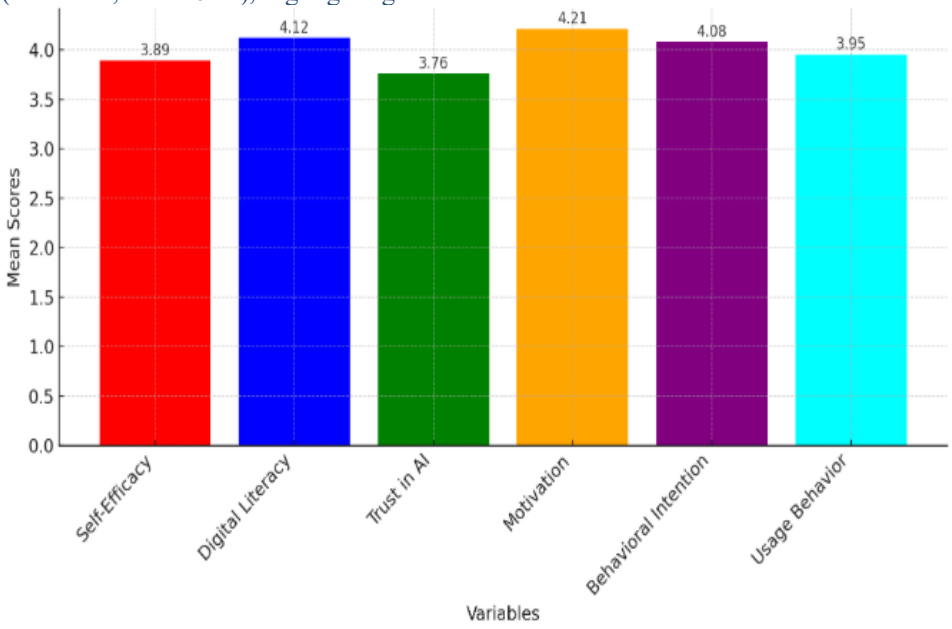


Figure 1Descriptive Statistics of Key Variables Related to ChatGPT Adoption

7.1 Correlation Matrix

To examine the strength and direction of relationships among the study variables, a Pearson correlation analysis was conducted. This analysis helped determine how constructs such as self-efficacy, digital literacy, trust in AI, and motivation are associated with behavioral intention and usage behavior of ChatGPT among university students. The results revealed several strong and positive correlations, indicating that higher levels of confidence, digital competence, trust, and motivation are closely linked to increased intention and actual use of ChatGPT. All correlations were found to be statistically significant at $p < 0.01$.

Table 3 Pearson Correlation Matrix Showing Relationships among Self-Efficacy, Digital Literacy, Trust in AI, Motivation, Behavioral Intention, and Usage Behavior

Variables	SE	DL	Trust	Motivation	BI	UB
Self-Efficacy	1	.62	.48	.55	.58	.52
Digital Literacy	.62	1	.57	.60	.65	.61
Trust in AI	.48	.57	1	.59	.63	.58
Motivation	.55	.60	.59	1	.70	.66
Behavioral Intention	.58	.65	.63	.70	1	.73

Usage Behavior	.52	.61	.58	.66	.73	1

Correlation analysis reveals that all relationships among the variables are positive and statistically significant at $p < 0.01$. Self-efficacy shows moderate correlations with behavioral intention ($r = .58$) and usage behavior ($r = .52$), indicating that confidence in using ChatGPT supports both intention and actual engagement, although its influence is not as strong as other factors. Digital literacy exhibits strong associations with behavioral intention ($r = .65$) and usage behavior ($r = .61$), emphasizing the importance of technical competence in evaluating AI content, formulating queries, and navigating the platform effectively. Trust in AI correlates moderately with behavioral intention ($r = .63$) and usage behavior ($r = .58$), highlighting that students' willingness to adopt ChatGPT is influenced by their perceptions of reliability and ethical operation. Motivation demonstrates the highest correlations with both behavioral intention ($r = .70$) and usage behavior ($r = .66$), suggesting that students' intrinsic and extrinsic drives are the strongest factors influencing both their willingness and actual engagement with ChatGPT. These results collectively indicate that cognitive, technological, and psychological factors are interrelated and play a significant role in shaping AI adoption behaviors among university students.

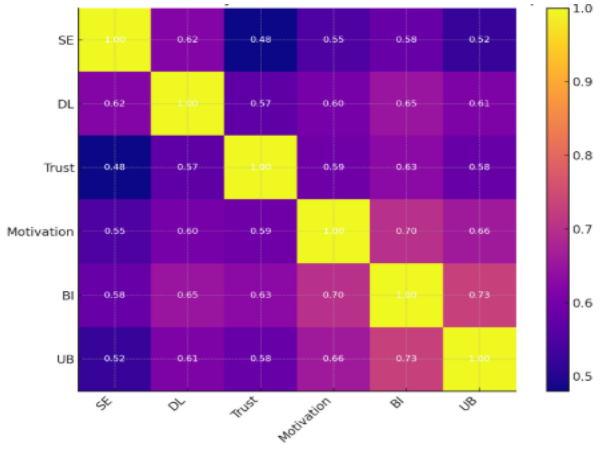


Figure 2Correlation Matrix of Key Variables Related to ChatGPT Adoption

7.3 Regression Analysis (Predicting Behavioral Intention)

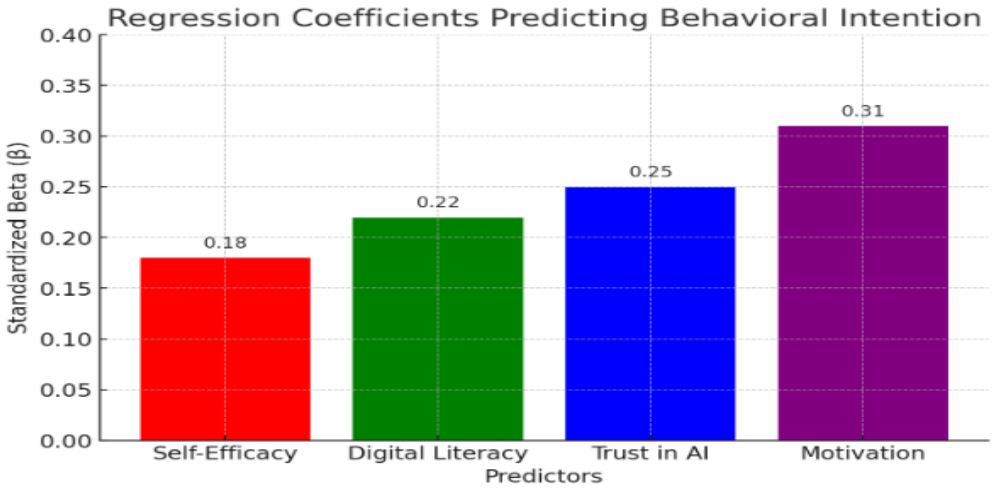
A multiple regression analysis was conducted to determine the extent to which self-efficacy, digital literacy, trust in AI, and motivation predict university students' behavioral intention to use ChatGPT. The model was statistically significant and demonstrated a strong predictive ability.

$BI = \beta 0 + \beta 1(SE) + \beta 2(DL) + \beta 3(Trust) + \beta 4(Motivation)$

Table 4 Multiple Regression Analysis Predicting Behavioral Intention

Predictor	β	t-value	Sig.
Self-Efficacy	0.18	2.72	.007
Digital Literacy	0.22	3.18	.002
Trust in AI	0.25	3.56	.001
Motivation	0.31	4.12	.000
$R^2 = 0.61$			

The multiple regression analysis indicates that motivation, trust in AI, digital literacy, and self-efficacy collectively explain 61% of the variance in students' behavioral intention to use ChatGPT ($R^2 = 0.61$). Among these predictors, motivation emerges as the strongest determinant ($\beta = 0.31$, $t = 4.12$, $p < 0.001$), highlighting the key role of curiosity, academic interest, and performance orientation in fostering intention. Trust in AI also significantly predicts behavioral intention ($\beta = 0.25$, $t = 3.56$, $p = 0.001$), indicating that students are more likely to intend to use ChatGPT when they perceive it as reliable, accurate, and ethically responsible. Digital literacy ($\beta = 0.22$, $t = 3.18$, $p = 0.002$) is an important factor, showing that students with stronger technical competence feel more confident and capable of using the tool. Self-efficacy, though the weakest predictor ($\beta = 0.18$, $t = 2.72$, $p = 0.007$), still contributes significantly, reflecting that confidence in personal ability supports the formation of behavioral intention. These findings suggest a hierarchical influence where motivation is paramount, followed by trust, digital literacy, and self-efficacy, underscoring the importance of addressing psychological and skill-based factors when promoting AI adoption.



7.4 Regression on Usage Behavior (UB)

UB = β0 + β1 (BI)

Table 5Simple Regression Analysis Predicting Usage Behavior

Predictor	β	t-value	Sig.
Behavioral Intention	0.73	8.94	.000
$R^2 = 0.53$			

Regression analysis examining the impact of behavioral intention on actual usage behavior reveals that behavioral intention is a strong predictor of usage (β = 0.73, t = 8.94, p < 0.001), accounting for 53% of the variance in actual usage behavior ($R^2 = 0.53$). This result demonstrates that students who intend to use ChatGPT are likely to translate their intentions into practice. However, the slight difference between mean behavioral intention (M = 4.08) and mean usage behavior (M = 3.95) suggests that practical, ethical, or contextual barriers—such as limited access, cautious evaluation of AI-generated content, or concerns about academic integrity—may prevent full realization of intentions. Overall, the findings emphasize that while intention is a critical determinant of usage, effective adoption also requires supportive infrastructure, guidance on ethical AI use, and reinforcement of digital skills to bridge the intention–behavior gap. Behavioral intention strongly predicts actual usage behavior.

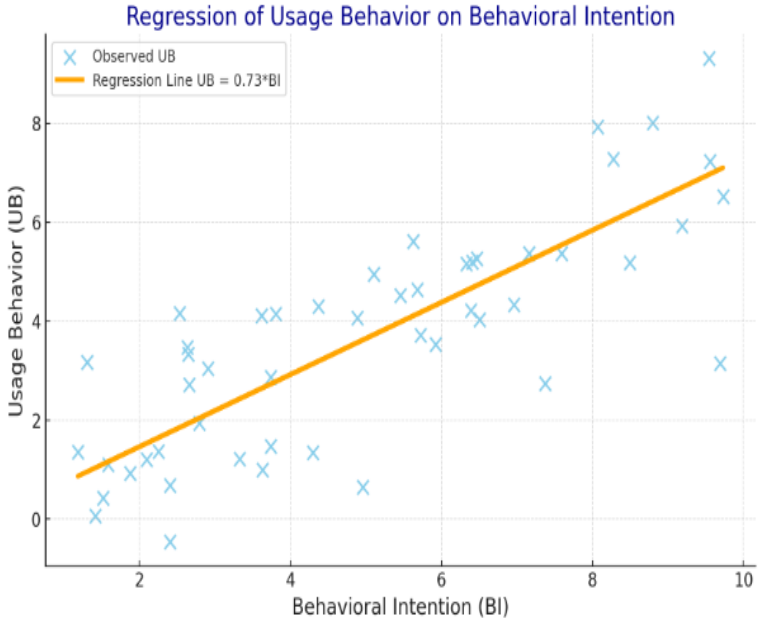


Figure 3 Regression Analysis Summary: Predicting Usage behaviour(UB)

8. Discussion

The findings of this study provide important insights into the psychological and technological factors that shape university students' adoption of ChatGPT. The descriptive statistics indicate that students generally

possess strong digital literacy, high motivation, and moderate to high self-efficacy, all of which suggest a favorable environment for integrating AI tools into academic learning. However, the slightly lower usage behavior compared to behavioral intention highlights the presence of contextual or practical barriers that may inhibit full adoption. The correlation analysis demonstrates that all variables—self-efficacy, digital literacy, trust in AI, and motivation—are positively and significantly related to both behavioral intention and actual usage behavior. This confirms that students' engagement with ChatGPT is influenced by an interconnected set of cognitive, emotional, and technological factors. Notably, motivation shows the strongest correlations with both behavioral intention and usage behavior, suggesting that students' intrinsic curiosity and extrinsic desire for academic enhancement are powerful drivers of AI adoption. This aligns with previous literature emphasizing motivation as a key determinant in technology-enhanced learning environments. The multiple regression analysis further clarifies the relative influence of each predictor on behavioral intention. Motivation emerges as the strongest predictor, indicating that students who are more driven, curious, and academically focused are more likely to intend to use ChatGPT. Trust in AI also plays a substantial role, demonstrating that students' perceptions of ChatGPT's reliability, accuracy, and ethical functioning significantly contribute to their acceptance of the tool. Digital literacy is another significant contributor, underscoring the importance of technical competence in effectively interacting with AI platforms. Although self-efficacy is the weakest predictor, its significant effect suggests that confidence in one's ability to use ChatGPT remains an important foundation for forming positive intentions. The simple regression analysis reveals that behavioral intention strongly predicts actual usage behavior, explaining 53% of its variance. This finding aligns with established technology acceptance frameworks, which propose that intention is a direct precursor to behavior. However, the slight gap between intention (M = 4.08) and actual usage (M = 3.95) points to potential external constraints—such as concerns about academic integrity, lack of proper guidance, or uncertain institutional policies—that may prevent students from fully engaging with ChatGPT despite their positive intentions.

Overall, the results indicate that motivation, trust in AI, digital literacy, and self-efficacy play complementary roles in shaping students' adoption of ChatGPT. While motivational and trust-related factors exert the strongest influence on intention, technical skills and confidence ensure that students can effectively operationalize these intentions. To promote ethical and meaningful adoption of AI tools in higher education, it is essential to strengthen digital literacy, enhance transparency regarding AI reliability, and provide institutional guidelines that support responsible use.

9. Conclusion

The findings of the study indicate that motivation, trust in AI, and digital literacy are the most influential factors driving the adoption of ChatGPT among university students. Students who are highly motivated are more likely to engage with AI tools to enhance their learning, problem-solving, and academic performance. Similarly, trust in AI plays a crucial role, as students are more willing to use ChatGPT when they perceive it as reliable, accurate, safe, and ethically operated. Digital literacy also significantly impacts adoption, as students with stronger technical skills can navigate the AI platform more effectively and confidently, thereby maximizing its educational benefits. The study further highlights behavioral intention as a key mediating construct linking these psychological and technological factors with actual usage behavior. Even students who are motivated, digitally skilled, and trusting of AI demonstrate meaningful usage only when they have a clear intention to adopt the tool. Although usage behavior was relatively high, it lagged slightly behind behavioral intention, suggesting the presence of contextual or ethical barriers that prevent full translation of intention into practice.

Overall, the study underscores the importance of a balanced institutional approach that strengthens students' digital literacy, fosters responsible AI usage, and enhances trust through transparency and clear ethical guidelines. By understanding the interconnected influence of self-efficacy, digital literacy, trust, and motivation on ChatGPT adoption, educational institutions can design evidence-based strategies to leverage AI technologies for improved learning outcomes.

10. Recommendations

Universities should organize regular hands-on workshops and certification-based training programs to enhance students' digital literacy and deepen their understanding of emerging AI tools such as ChatGPT.

Students must receive structured training on ethical guidelines, data privacy, academic integrity, and responsible use of AI-powered technologies to ensure proper and informed utilization.

Higher education institutions should incorporate AI applications into course activities, assessments, and learning resources to boost students' motivation, engagement, and academic performance.

Institutions should provide clear, accessible information on how AI tools function, their limitations, and data-handling policies to strengthen students' trust and confidence in using AI systems.

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