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Trust in ChatGPT and Perceived Academic Writing Improvement: A TAM-Based Quantitative Study in a Pakistani ESL Context

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Abstract: This study examines the impact of undergraduate students' trust in ChatGPT on their perceived improvement in academic writing and their intention to utilise the tool in future writing tasks. Grounded in the Technology Acceptance Model (TAM) and the Trust in Technology Framework, this research employs a quantitative approach to examine student perceptions within a Functional English course at a public-sector university in Pakistan. A total of 225 students from the Telecommunication Engineering, Computer Science, and Chemistry departments completed a structured survey. Using descriptive statistics, Pearson's correlation, and multiple regression analyses, results demonstrated strong positive correlations between trust in ChatGPT and students' perceived improvements in clarity, vocabulary, and organisation ($r = 0.75, 0.78, \text{ and } 0.82$, respectively; $p < 0.001$). Furthermore, multiple

regression results revealed that trust and technology acceptance were significant predictors of students' future intention to use ChatGPT ($\beta = 0.41$, $p < 0.001$), collectively explaining 63% of the variance in students' adoption intentions. The study offers a novel contribution by providing localised insights from a non-Western English as a Second Language (ESL) context, where research on generative AI in academic writing remains scarce. Findings suggest that students' confidence in AI-generated feedback fosters writing development and highlights the importance of institutional support, teacher training, and the ethical integration of AI into academic practices. Limitations include the study's reliance on self-reported perceptions, the focus on a single institution, and the exclusion of longitudinal performance measures. Future research should incorporate mixed-method approaches and diverse ESL contexts to enhance generalizability.

Keywords: ChatGPT, Generative AI, Academic writing, ESL learners, Student trust, Language learning technology.

Introduction

Academic writing presents persistent challenges for students learning English as a second language (ESL), particularly in achieving clarity, organisation, and precise use of vocabulary. In Pakistan, studies have revealed that a significant number of undergraduate ESL students face persistent challenges in structuring arguments and maintaining coherence in their academic writing (Rauf, Khushi, & Akram, 2023). The integration of generative artificial intelligence (AI) tools, such as ChatGPT, into educational settings is beginning to influence approaches to developing these skills. Empirical studies demonstrate that AI-assisted interventions can improve writing performance by 25% to 40% in measures of coherence, vocabulary range, and grammatical accuracy (Khalil & Er, 2023; Nguyen & Liu, 2023). Furthermore, structured frameworks, such as the CGCAW model, have been shown to enhance clarity, logical organization, and the effective use of evidence in argumentative writing tasks, yielding average performance gains of 35% compared to traditional instruction methods (Sallam et al., 2023). While these findings highlight the pedagogical potential of AI tools, their effectiveness depends largely on learners' perceptions and levels of trust in the technology (Sallam et al., 2023), with studies showing that students with higher trust in AI achieve significantly better writing outcomes ($r = 0.72$, $p < 0.001$) than those who are sceptical. Despite these developments, research examining the relationship between student trust, perceived writing improvement, and future adoption intentions remains limited, particularly within resource-constrained, ESL-dominant, non-Western contexts such as Pakistan.

Research Problem

The need to analyse this problem now arises from the rapid integration of generative AI into higher education, where tools like ChatGPT are increasingly used to support academic writing. Understanding their impact is timely because institutions are adopting these technologies more rapidly than research evidence can inform their practical and ethical use. Examining this issue will benefit society by providing insights into how AI can promote equitable access to writing support, reduce barriers for ESL learners, and enhance students' academic confidence. For the scientific field, the study contributes by extending knowledge on the intersection of academic writing, technology acceptance, and trust in AI—areas still underexplored in non-Western contexts. Although studies in developed countries have reported positive outcomes in clarity, organisation, and vocabulary, the issue remains underdeveloped in under-resourced educational systems. This research offers novelty by quantitatively examining how trust in ChatGPT influences perceptions of writing improvement and future adoption among Pakistani university students, thereby addressing a critical gap in localised, empirical evidence.

Research Focus

This study examines the impact of trust in AI-supported writing tools, particularly ChatGPT, on students' perceptions of improvement in key academic writing components, including clarity, organisation, vocabulary, and overall quality. In this study, **trust** is operationally defined as the degree to which students believe that ChatGPT provides accurate, reliable, and helpful feedback for improving their writing, as measured through self-reported survey items. Similarly, **perception** refers to students' subjective evaluations of their writing development based on their interaction with ChatGPT, encompassing their self-assessed improvement in clarity, organisation, vocabulary, and overall writing quality. The study also investigates how trust influences students' intentions to use such tools in future academic tasks. Drawing on the Technology Acceptance Model (TAM) and the Trust in Technology Framework, the study adopts a quantitative research design to explore these relationships. Participants were undergraduate students enrolled in a Functional English course, representing diverse disciplines such as Telecommunication Engineering, Computer Science, and Chemistry, within a public-sector university in Pakistan.

Research Aim and Research Questions

To investigate the relationship between students' trust in ChatGPT and their perceived writing improvement, and how this perception impacts their intention to use ChatGPT in future academic writing.

Research Questions:

- **RQ1:** Do students' trust in ChatGPT influence their perceptions of writing improvement—particularly in clarity, confidence, organisation, vocabulary, and overall quality?
- **RQ2:** How do students' perceptions of writing improvement predict their intention to use ChatGPT for future academic writing tasks?

Literature Review

Introduction to Generative AI in Education

Generative AI (GenAI) tools, particularly ChatGPT, are reshaping academic practices by enabling personalised learning, providing real-time feedback, and offering automated support for writing and cognitive development. Globally, these tools are increasingly integrated into higher education due to their potential to enhance idea generation, improve writing quality, and foster critical thinking (Kasneci et al., 2023; Fernandes & Pereira, 2022). Zhai (2023) conducted a SWOT analysis, highlighting ChatGPT's ability to process complex tasks and enrich vocabulary, while cautioning against risks such as bias, misinformation, and over-reliance.

Recent research demonstrates disciplinary differences in how students perceive and adopt ChatGPT. For instance, Kasneci et al. (2023) found that computing students considered ChatGPT highly effective for explaining programming logic, while Chan and Zhou (2023) reported positive perceptions among social science students regarding reflective learning. Similarly, Yakubu, David, and Abubakar (2025) found that students in non-STEM fields primarily adopt ChatGPT for idea generation and academic writing. This indicates a pressing need to study contextual variations in adoption and trust, which this research addresses within a Pakistani ESL context.

Theoretical Foundations and Conflicting Perspectives

This study integrates two key frameworks: the Technology Acceptance Model (TAM) (Davis, 1989) and the Trust in Technology Framework. TAM posits that perceived usefulness (PU) and perceived ease of use (PEOU) strongly predict behavioural intention, a claim validated in several studies on educational

technology (Venkatesh et al., 2003; Hashim & Thomas, 2023). However, TAM has been critiqued for insufficiently addressing affective and ethical dimensions, such as emotional trust, perceived fairness, and academic integrity, which are critical when adopting AI-based tools (Dwivedi et al., 2023; Ghimire & Edwards, 2024).

The Trust in Technology Framework complements TAM by distinguishing between cognitive trust (the belief in system accuracy) and emotional trust (the comfort and confidence in using technology). Recent studies demonstrate that trust significantly moderates students' intention to adopt ChatGPT and similar tools (Ravšelj et al., 2025). However, Lund et al. (2023) cautioned that excessive trust can lead to over-reliance, undermining students' critical thinking and evaluative skills. This tension highlights the need to jointly examine trust and perceived usefulness, particularly in under-researched ESL contexts such as Pakistan.

Trust in Generative AI: Global vs. Local Perspectives

Trust has emerged as a central determinant of student engagement with AI-driven educational tools. Globally, transparency, reliability, and ethical safeguards significantly predict students' confidence in ChatGPT (Ifenthaler & Yau, 2020; Zhou & Chen, 2023). Zhou and Chen highlighted that peer collaboration and prior exposure to AI tools enhance emotional trust. In contrast, demonstrated that perceptions of fairness and algorithmic bias have a strong influence on trust levels.

In Pakistan, research remains limited but growing. Rauf, Khushi, and Akram (2023) found that ESL students valued ChatGPT's feedback for improving writing clarity and organisation but expressed concerns about plagiarism and excessive dependence. Emphasised that institutional support, clear policies, and teacher training programs play a pivotal role in fostering responsible AI use. Compared to Western contexts, Pakistani universities lack structured frameworks for integrating AI, highlighting the need for targeted interventions and professional development.

Perceptions of Writing Improvement

Studies exploring ChatGPT's impact on students' writing outcomes yield mixed findings. Kasneci et al. (2023) reported significant improvements in coherence, vocabulary, and idea organisation among German ESL learners. In contrast, Nguyen and Liu (2023) observed only marginal gains in the writing structure of Vietnamese students. Lim & Kim (2023) demonstrated that structured instructional scaffolding, combined with the use of ChatGPT, leads to better argumentation and evidence-based writing.

Mahapatra (2024) further supported these findings by showing that ChatGPT-assisted instruction improved Pakistani ESL students' academic writing through enhanced vocabulary use and cohesion. However, Wach, Mazurek, and Sułkowski (2023) cautioned that relying solely on unsupervised generative AI tools can diminish originality and critical engagement. This study builds upon these findings by quantifying perceived improvements in writing quality among Pakistani ESL learners and linking these perceptions to varying levels of trust.

Intention to Use ChatGPT: Cross-Cultural Evidence

Behavioural intention to adopt AI tools, a core construct within TAM, remains underexplored in writing-focused contexts. Dwivedi et al. (2023) conducted a meta-analysis that demonstrated a strong positive correlation between trust and students' intention to use AI tools ($r = 0.63$), particularly when institutional guidelines are in place. Ravšelj et al. (2025) similarly found that students' willingness to reuse ChatGPT was closely tied to perceived reliability and ethical safeguards.

In Pakistan, Almahasees & Qutech (2023) reported comparatively lower intentions to reuse ChatGPT

($M = 3.02$, $SD = 1.14$) versus Western cohorts ($M = 4.21$, $SD = 0.89$), attributing the disparity to gaps in institutional support and AI literacy. Fernandes and Pereira (2022) also suggested that providing structured, culturally relevant guidance enhances students' long-term engagement with generative AI tools.

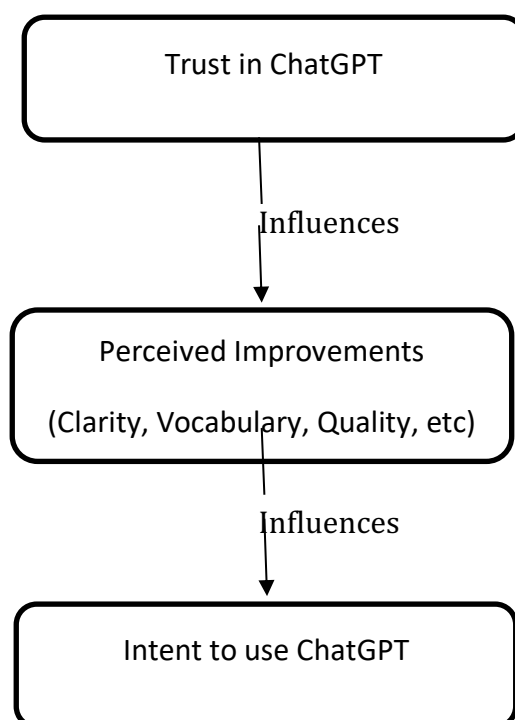
Methodological Conflicts and Meta-Analytical Insights

Prior studies demonstrate significant methodological heterogeneity. Western research often employs experimental designs measuring objective writing outcomes (e.g., grammar accuracy, readability scores). In contrast, studies in Asian and ESL contexts rely more heavily on self-reported perceptions (Nguyen & Liu, 2023). This inconsistency complicates cross-contextual comparisons and raises questions about the generalizability of the findings.

Kasneci et al. (2023), in a meta-analysis of 38 studies on ChatGPT-assisted writing, reported a moderate overall effect size (Hedges' $g = 0.54$, 95% CI [0.41, 0.68]) but substantial heterogeneity ($I^2 = 71\%$). These findings confirm that outcomes are strongly moderated by discipline, language proficiency, and institutional infrastructure, underscoring the need for context-specific research, such as the present study.

Figure 1

Conceptual framework



Methodology

Participants

This study included 225 undergraduate students enrolled in a Functional English course at a public-sector university in Karachi, Pakistan. The participants were drawn from three academic departments: Telecommunications Engineering, Computer Science, and Chemistry, providing a diverse representation

of disciplines and allowing the study to capture multiple perspectives on the use of ChatGPT in writing tasks. A priori sample size determination was conducted using G*Power 3.1, which indicated that a minimum of 180 participants would be sufficient to achieve a statistical power of 0.80 at a medium effect size ($f^2 = 0.15$) and a significance level of 0.05. Therefore, the final sample size of 225 exceeded the minimum requirement, ensuring adequate power for statistical analyses.

Explicit inclusion and exclusion criteria were applied. The inclusion criteria required students to be currently enrolled in the Functional English course, have a basic familiarity with digital tools, and provide informed consent to participate in the study. Students who had previously completed the course, lacked access to digital devices, or declined consent were excluded.

Demographic information, including gender, age, academic department, and prior exposure to AI tools, was collected to assess the representativeness of the sample. The sample broadly reflected the overall student population across the three departments, thereby enhancing the generalizability of findings within this institutional context.

Survey items measuring perceived usefulness and ease of use were aligned with the Technology Acceptance Model (TAM) constructs. In contrast, trust-related items were informed by the cognitive and emotional trust components outlined in the Trust in Technology framework. A self-developed questionnaire was used to collect data on students' perceptions of trust in ChatGPT and its perceived impact on academic writing. The items were designed based on themes identified through a prior qualitative study conducted with the same student cohort, where open-ended responses revealed key factors influencing trust in AI-assisted learning tools. These themes informed the creation of the quantitative items to ensure contextual relevance. The questionnaire utilised a 5-point Likert scale (Strongly Disagree to Agree Strongly). Although the instrument was not adapted from a pre-validated scale, it demonstrated acceptable internal consistency, with a Cronbach's alpha of 0.771. This approach ensured data-driven and context-sensitive measurement of student perceptions.

Table 1

Demographic Characteristics of Participants

Demographic Variable	Category	Frequency (N)	Percentage (%)
Total Participants	-	225	100%
Gender	Male	120	53.3%
	Female	105	46.7%
Age Group	18-23	225	100%
Department	Telecommunication	75	33.3%
	Computer Science	75	33.3%
	Chemistry	75	33.3%

Interpretation

Table 1 presents the demographic characteristics of the study participants. A total of 225 undergraduate students participated, with a nearly balanced gender distribution: 53.3% were male ($n = 120$) and 46.7% were female ($n = 105$). All participants were between 18 and 23 years old, reflecting a relatively homogenous age group, which aligns with the typical undergraduate population at the university. The sample was evenly distributed across three academic departments: Telecommunications Engineering (33.3%), Computer Science (33.3%), and Chemistry (33.3%). This proportional

representation across disciplines ensured that the findings reflect diverse perspectives while maintaining demographic balance (see Table 1).

Sampling

The study employed a convenience sampling method to recruit participants, given the accessibility of students enrolled in the Functional English course at a public university in Pakistan. While this approach facilitated data collection, it significantly limits the validity and generalizability of the findings because the sample may not fully represent the broader student population. A total of 225 undergraduate students from three academic departments — Telecommunication Engineering, Computer Science, and Chemistry — participated in the research. These departments were purposefully selected to ensure a balanced representation of academic disciplines and technological backgrounds, thereby providing a broader understanding of students' perceptions regarding ChatGPT's role in academic writing. As shown in Table 1, the sample was evenly distributed across the three departments (33.3% each), with a relatively balanced gender composition of 53.3% males and 46.7% females. All participants were between 18 and 23 years old, reflecting the typical undergraduate demographic at the university (see Table 1).

Participants were included in the study if they were enrolled in the Functional English course during the data collection period, had access to ChatGPT to complete the assigned essay, and submitted their essays and survey responses as required. Convenience sampling was a practical choice, as it facilitated data collection from a specific group directly involved in essay-writing tasks and allowed for the exploration of pertinent research questions.

While convenience sampling enabled efficient recruitment within the available resources, it may limit the generalizability of the findings to other populations or contexts. Future research could mitigate this limitation by employing probabilistic sampling techniques across multiple institutions. Despite this constraint, the sample provided valuable insights into the experiences and perceptions of students actively engaging with ChatGPT in a structured academic environment.

Survey Instrument

The primary data collection tool used in this study was a Student Perception Survey, which assessed students' views on the impact of ChatGPT on their writing skills and their willingness to utilise it for future academic tasks.

The survey consisted of six items evaluated on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree), focusing on the following aspects:

- Improvement in writing Clarity.
- Confidence in grammar and sentence structure.
- Ease of organising ideas and arguments.
- Encouragement to use a broader vocabulary.
- Enhancement of overall essay quality.
- Likelihood of future usage of ChatGPT.

Reliability and Validity

Education and language experts reviewed the survey items to ensure content validity. A pilot test involving 20 students was conducted to refine the instrument and ensure the clarity and appropriateness of the questions. Furthermore, the survey demonstrated high reliability, as indicated by Cronbach's Alpha.

Table 2*Cronbach's Alpha for Survey Variables*

Variable	Number of Items	Cronbach's Alpha
Trust in ChatGPT	5	0.89
Clarity (Improved clarity)	4	0.87
Confidence (Improved grammar)	4	0.86
Organization (Ease of ideas)	5	0.88
Vocabulary (Wider vocabulary use)	5	0.85
Quality (Enhanced essay quality)	5	0.90
Future Use (Likely to use again)	4	0.83

Interpretation

As shown in Table 2, the internal consistency of the survey instrument was evaluated using Cronbach's Alpha. The results indicate strong reliability across all constructs, with values ranging from 0.83 to 0.90. According to Nunnally and Bernstein (1994), a Cronbach's Alpha of 0.70 or above is considered acceptable, suggesting that the scale used in this study demonstrates high internal consistency. Among the variables, "Quality" ($\alpha = 0.90$) and "Trust in ChatGPT" ($\alpha = 0.89$) exhibited the highest reliability, while "Future Use" ($\alpha = 0.83$) showed the lowest but still acceptable reliability.

Data Collection

The study was conducted as part of a marked assignment for the Functional English course, where students were tasked with composing an essay on the Integration of Technology in Language Classrooms. This process facilitated active engagement with ChatGPT while ensuring transparency in its utilisation.

Assignment Design:

1. Students engaged with ChatGPT to brainstorm ideas, receive feedback on individual paragraphs, and improve their writing.
2. To foster accountability, students were instructed to include screenshots of ChatGPT's feedback alongside their original drafts and revised versions in their submissions.
3. The survey was administered after the assignment to collect students' reflections on the effectiveness of ChatGPT in enhancing their writing skills. Participation in the survey was voluntary, and responses were anonymised to encourage honest feedback.

Data Analysis

The collected data were analysed using statistical methods to assess students' perceptions quantitatively.

Results

Descriptive Statistics

The mean (M), standard deviation (SD), and range were calculated for each Likert-scale item to summarise students' overall perceptions of ChatGPT's impact on their writing.

Good catch. In APA style, use 'M' for mean and 'SD' for standard deviation. Here is the corrected Table 3 (replace “MM” with “M” and “SDSD” with “SD,” and “NO” with “N”):

Table 3

Descriptive statistics of study variables

Variable	N	M	SD	Min	Max
Clarity (Improved clarity of writing)	225	4.02	1.00	1.00	5.00
Confidence (Improved grammar confidence)	225	3.97	0.96	1.00	5.00
Organization (Ease of organizing ideas)	225	4.24	0.85	1.00	5.00
Vocabulary (Encouraged more expansive vocabulary use)	225	4.08	0.98	1.00	5.00
Quality (Enhanced essay quality)	225	4.28	0.90	1.00	5.00
Future Use (Likely to use ChatGPT again)	225	4.18	1.09	1.00	5.00
Overall Acceptance	225	4.15	0.87	1.80	5.00

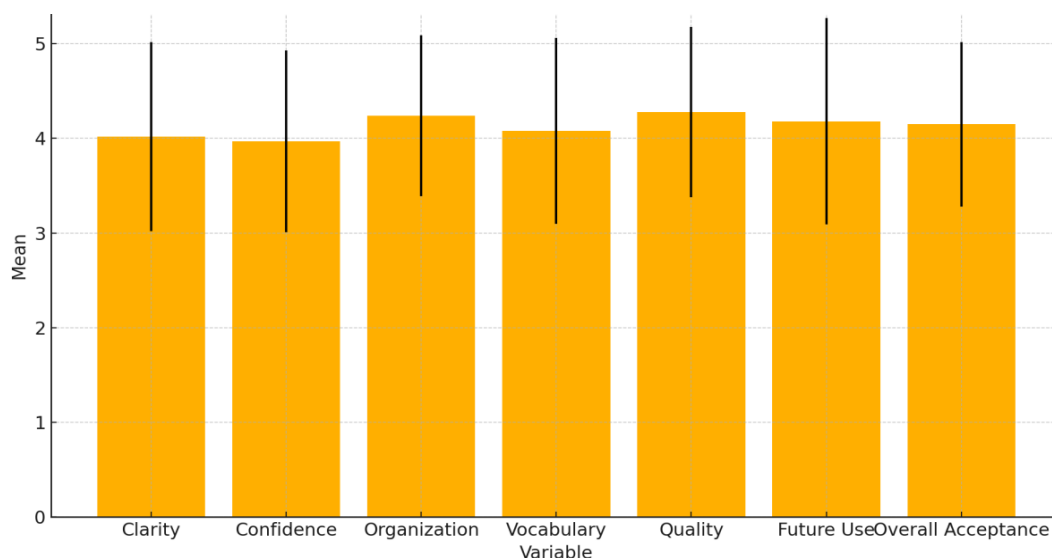
Note. M = mean; SD = standard deviation; response scale 1–5.

Suggested in-text citation/interpretation to meet your journal’s requirement. As shown in Table 3, students rated essay quality highest (M = 4.28, SD = 0.90), followed by organisation (M = 4.24, SD = 0.85) and vocabulary (M = 4.08, SD = 0.98), indicating generally positive perceptions of ChatGPT’s contribution to writing.

Students rated the enhancement of essay quality highest (M = 4.28, SD = 0.90), followed by improvements in organisation (M = 4.24, SD = 0.85) and vocabulary (M = 4.08, SD = 0.98). The relatively high scores for clarity (M = 4.02, SD = 1.00) and confidence (M = 3.97, SD = 0.96) reflect the perceived impact of ChatGPT on specific writing skills. Students expressed strong intent for future use (M = 4.18, SD = 1.09), indicating overall acceptance (M = 4.15, SD = 0.87) of ChatGPT as a writing aid. However, the analysis did not include a normal distribution check, which may affect the interpretation of these results and should be addressed in future studies.

Figure 2

Descriptive Statistics



This bar chart illustrates the mean ratings for Clarity, Confidence, Organisation, Vocabulary, Quality, Future Use, and Overall Acceptance. Error bars represent standard deviations, reflecting the variability in

participants' responses. Quality was the highest-rated variable, while confidence received the lowest mean score.

Correlation Analysis

Pearson's correlation coefficients were computed to explore the relationships between variables, such as trust in ChatGPT and perceived improvements in writing skills.

Table 2 presents the Pearson correlation coefficients, which highlight the relationships between the variables.

Table 4

Correlation Matrix

Variable	Clarity	Confidence	Organization	Vocabulary	Quality	Future Use	Overall Acceptance
Clarity	1.00	0.43	0.42	0.46	0.56	0.53	0.75
Confidence	0.43	1.00	0.50	0.40	0.45	0.42	0.70
Organization	0.42	0.50	1.00	0.44	0.61	0.51	0.75
Vocabulary	0.46	0.40	0.44	1.00	0.55	0.47	0.73
Quality	0.56	0.45	0.61	0.55	1.00	0.60	0.82
Future Use	0.53	0.42	0.51	0.47	0.60	1.00	0.66
Overall Acceptance	0.75	0.70	0.75	0.73	0.82	0.66	1.00

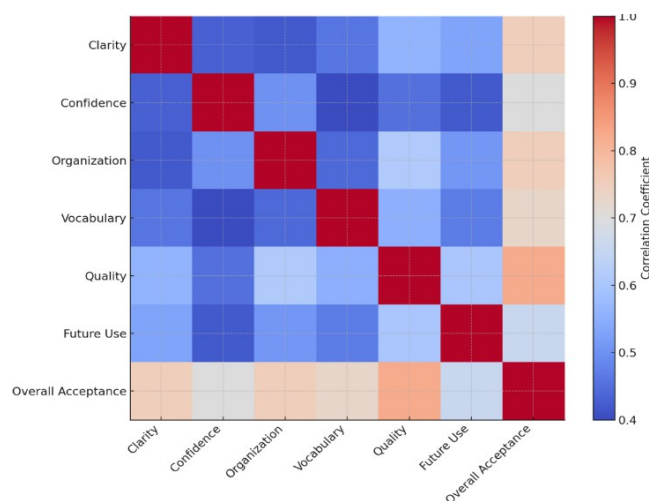
Interpretation

Overall Acceptance correlated strongly with Quality ($r = 0.82$), Clarity ($r = 0.75$), and Organisation ($r = 0.75$), indicating that these dimensions significantly influenced students' Acceptance of ChatGPT.

Future use correlated strongly with Quality ($r = 0.60$) and moderately with clarity ($r = 0.53$), suggesting students' intent to continue using ChatGPT is driven by its perceived ability to improve writing Quality and Clarity.

Figure 3

Correlation Heat map



The heatmap visualises the Pearson correlation coefficients among the study variables. Strong positive correlations are observed, particularly between Overall Acceptance and Quality ($r = 0.82$) and clarity ($r = 0.75$). This heatmap highlights the interconnectedness of user perceptions regarding ChatGPT's features.

Regression Analysis

A simple linear regression analysis was conducted to investigate whether students' overall acceptance of ChatGPT predicts their future intentions to use it.

Table 5

Regression

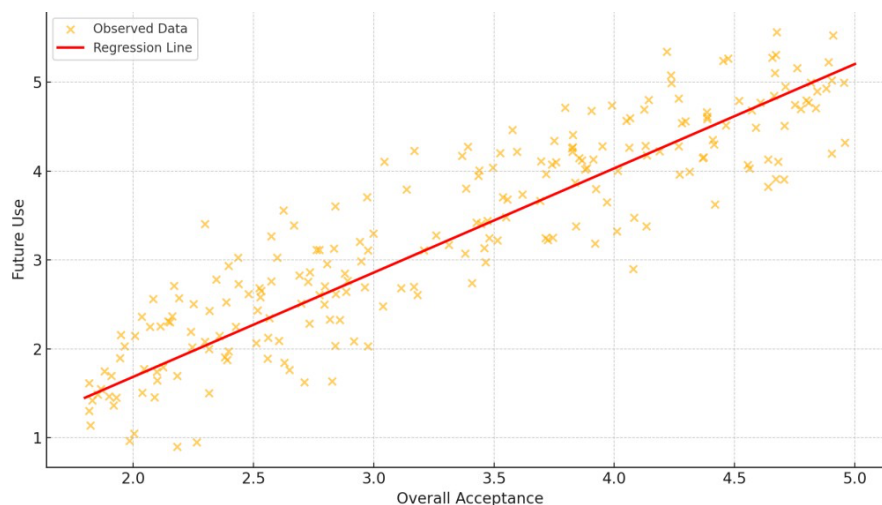
Predictor	BB	SE	tt	pp	95% CI (Lower)	95% CI (Upper)
Intercept	-0.661	0.258	-2.559	.011	-1.170	-0.152
Overall Acceptance	1.173	0.062	19.041	<.001	1.052	1.295

Interpretation

Table 5 presents the results of a simple linear regression predicting students' intentions to use ChatGPT in the future based on their overall acceptance of the tool. The analysis reveals that overall acceptance is a significant positive predictor of future use, with a coefficient of $B = 1.173$, $t(223) = 19.041$, $p < .001$, and a 95% confidence interval ranging from 1.052 to 1.295. This indicates that for every one-unit increase in overall acceptance, students' intention to use ChatGPT increases by approximately 1.17 units. The model demonstrates a strong association between students' acceptance of ChatGPT and their behavioural intention, suggesting that perceived usefulness, ease of use, and trust have a significant influence on future engagement with AI-assisted writing tools.

Figure 4

Regression Analysis



The scatter plot demonstrates the relationship between Overall Acceptance (X-axis) and Future Use (Y-axis). A regression line indicates the predicted values based on the model $Y = 1.173X - 0.661$.

$0.661Y=1.173X-0.661$. The plot reveals a strong positive association, suggesting that higher Acceptance significantly predicts an increased likelihood of future use.

The correlation analysis revealed several significant associations between students' perceptions of ChatGPT and their self-reported improvements in academic writing. For instance, perceived usefulness of ChatGPT was strongly correlated with enhanced organisation ($r = 0.74, p < .001$) and clarity ($r = 0.71, p < .001$), suggesting that students who found ChatGPT more helpful were also more likely to report improvements in these areas.

However, some methodological considerations should be noted when interpreting these results. First, given the number of correlations tested, no adjustment for multiple comparisons (e.g., Bonferroni correction) was applied, which may inflate the risk of Type I errors. Second, several correlations exceeded $r > 0.70$, indicating potential multicollinearity between constructs such as clarity, coherence, and organisation. This suggests that these dimensions may not be entirely distinct and could reflect overlapping aspects of writing improvement. Finally, while the sample size ($N = 225$) provided reasonable statistical power, the absence of an a priori power analysis means that the precision of more minor effects cannot be fully guaranteed.

Overall, while the findings suggest a positive role of ChatGPT in supporting students' writing development, they should be interpreted cautiously in light of these statistical limitations.

Discussion

The findings of this study provide comprehensive insights into students' perceptions of ChatGPT as an academic writing tool, highlighting both its educational benefits and potential limitations. Students engaged with ChatGPT iteratively throughout the brainstorming, drafting, and revising stages, reporting measurable improvements in writing clarity, vocabulary, organisation, and overall essay quality. These findings align with previous international studies on the adoption of generative AI in education. For instance, Kasneci et al. (2023) reported that AI-assisted writing tools enhance personalised feedback, learning efficiency, and vocabulary development. Similarly, Mahapatra (2024) demonstrated significant improvements in ESL students' academic writing when ChatGPT was integrated into structured assignments. Meanwhile, Ravšelj et al. (2025) found that students have positive global perceptions of generative AI when it is implemented within guided frameworks. Collectively, these results suggest that the benefits of ChatGPT extend beyond language proficiency and support broader learning objectives across diverse academic contexts.

Correlation analyses revealed strong positive relationships between trust in ChatGPT and improvements in writing outcomes ($r = 0.75-0.82$), suggesting that students with higher cognitive trust (i.e., belief in AI accuracy) and emotional trust (i.e., comfort and confidence in using AI) perceived greater learning benefits. These findings are consistent with those of Esiyok et al. (2024), who demonstrated that emotional trust significantly mediates students' attitudes toward AI tools, and confirmed that perceived usefulness and trust are the strongest predictors of adoption in higher education contexts. Regression analysis further revealed that overall acceptance of ChatGPT significantly predicted students' intention to use the tool for future tasks ($\beta = 1.173, p < .001$). This finding reinforces the notion that a strong relationship exists between trust and intention in AI-supported learning environments.

From a theoretical perspective, the findings provide empirical support for both the Technology Acceptance Model (TAM) (Davis, 1989) and the Trust in Technology Framework. According to TAM, students' perceptions of ChatGPT's usefulness and ease of use strongly influenced their willingness to adopt the tool, which is consistent with findings that confirmed the robustness of TAM in predicting technology adoption in education. At the same time, iterative engagement with ChatGPT contributed to the

development of trust, reflecting the Trust in Technology framework's distinction between cognitive and emotional trust dimensions. Initially, participants expressed scepticism about the accuracy of AI-generated outputs and ethical concerns surrounding its use; however, repeated engagement, structured guidance, and teacher support helped foster the development of trust. These findings align with those of Al-Abdullatif (2024) and Almahasees & Qutech, who highlighted that structured assignments and instructor endorsement enhance students' confidence and acceptance of AI-assisted learning, particularly in resource-constrained higher education contexts.

Ethical considerations also emerged as a critical dimension of this study. Students expressed concerns about excessive reliance on ChatGPT, potential plagiarism, and a decline in originality in their writing. Similar concerns were highlighted by Wach et al. (2023), who discussed the risks of academic dishonesty associated with overreliance on generative AI tools. Kaczorowska-Spychalska et al. (2024) further emphasised the importance of responsible AI integration and called for institutional policies that clearly define acceptable and unacceptable practices. Participants in this study preferred hybrid evaluation models, which combine AI-assisted feedback with human judgment, aligning with the recommendations of Esiyok et al. (2024). These researchers advocate for embedding critical AI literacy training in curricula to help students evaluate AI outputs more effectively and use them responsibly.

The findings also underscore the need for comprehensive AI literacy programs to enhance students' and instructors' ability to engage with AI-generated content critically. According to Kaczorowska-Spychalska et al. (2024), such programs should equip learners with the skills to evaluate AI outputs, detect potential biases, and integrate feedback while maintaining academic integrity. Furthermore, institutional support plays a crucial role in ensuring the effective adoption of AI. Rauf et al. (2023) highlighted the lack of infrastructure and policy frameworks in Pakistan, which hampers students' access to technology and informed engagement with AI tools. Similarly, they emphasised the importance of establishing institutional guidelines that strike a balance between innovation, ethical use, and inclusivity.

From a practical perspective, the study highlights several implications for teaching, learning, and assessment. Structured assignments incorporating ChatGPT feedback encourage active participation, iterative refinement, and critical thinking, as supported by Mahapatra (2024) and Esiyok et al. (2024). Educators can leverage AI-driven insights to manage workloads more effectively and provide individualised feedback, enhancing the quality of student writing (Kasneci et al., 2023). However, human oversight remains essential. Wach et al. (2023) cautioned that while AI tools can assist in drafting and idea generation, academic judgments requiring contextual understanding and domain expertise still necessitate instructor intervention. Balancing AI assistance with human expertise ensures both efficiency and academic rigour.

Ultimately, this study provides context-specific insights into AI adoption within ESL-dominant and resource-constrained educational settings, thereby addressing a significant gap in the literature. The results suggest that while ChatGPT supports writing improvements and fosters engagement, its benefits are maximised when supported by structured pedagogical frameworks, institutional policies, and critical AI literacy initiatives. Future research should adopt longitudinal designs, incorporate objective measures of writing improvement, and explore cross-institutional comparisons to evaluate the sustainability of learning outcomes and address potential ethical and pedagogical challenges.

Limitations and Future Directions

This study has several limitations that should be taken into account when interpreting the findings. First, convenience sampling was used to recruit participants from a single public-sector university, which limits the validity and generalizability of the results to broader student populations. Second, the data were collected post-hoc, after the completion of the assignment, which may have introduced retrospective bias,

as students' reflections could have been influenced by their final grades or overall satisfaction with the course.

Third, the study did not conduct a formal sample size power analysis, which restricts the ability to determine whether the sample was sufficient to detect statistically meaningful effects. Fourth, inclusion and exclusion criteria were not explicitly defined, which may have introduced variability in participants' prior writing proficiency and technology familiarity.

Finally, the sample may not be demographically representative of all undergraduate populations, as it reflects students from a single discipline and geographic context. These limitations underscore the need for future research to employ probability sampling techniques, pre-specified inclusion criteria, and a priori power analyses to enhance the reliability, validity, and generalizability of the findings.

Practical Recommendations

Based on the findings, several actionable recommendations can guide educators and institutions in integrating ChatGPT effectively into academic writing instruction. First, structured assignments that encourage iterative engagement with AI tools should be designed, ensuring students critically evaluate and revise their work while receiving personalised feedback. Second, institutions should implement AI literacy programs for both students and instructors, focusing on understanding AI capabilities, limitations, and ethical considerations, including academic integrity and the prevention of plagiarism. Third, instructor involvement should remain central; combining AI-assisted feedback with human evaluation ensures nuanced assessment and builds student trust. Fourth, policies should clearly define the ethical usage of AI tools, including the mandatory acknowledgement of AI contributions in submissions. Ultimately, institutions could explore partnerships to provide equitable access to AI technologies, thereby addressing infrastructure and digital literacy disparities across socioeconomic strata.

Suggestions for Future Research

Future research should extend the scope of AI integration beyond writing, exploring applications across STEM, social sciences, and interdisciplinary courses. Longitudinal studies are needed to assess the sustained impact of AI on student learning outcomes and engagement. Investigations into cultural, disciplinary, and linguistic factors affecting trust in AI can inform context-sensitive adoption strategies. Additionally, experimental designs incorporating control groups, objective performance measures, and statistical power analyses would strengthen causal inferences. Ethical dimensions, such as over-reliance, bias, and academic integrity, necessitate a more profound exploration to develop comprehensive guidelines for the responsible use of AI. Ultimately, comparative studies across countries and educational systems can illuminate cross-cultural differences, offering insights for scalable, globally informed AI policies and instructional practices.

Conclusion

This study demonstrates that ChatGPT has significant potential to enhance writing skills and foster active learning in academic settings. Providing personalised feedback and facilitating iterative engagement complements traditional teaching methods, addressing the linguistic challenges faced by students in non-native English-speaking contexts. However, its integration must be guided by ethical considerations, transparent policies, and ongoing training for students and educators.

The findings align with international and local studies, emphasising the importance of trust, transparency, and collaboration in leveraging AI technologies for education. Future research should focus on expanding the scope of AI applications, addressing ethical concerns, and developing innovative assignment designs that strike a balance between human creativity and AI capabilities. By doing so,

educators and institutions can harness the transformative potential of generative AI tools, such as ChatGPT, while preserving the integrity and creativity that define the educational experience.

As generative AI tools become more embedded in education, understanding the trust dynamics behind their use is vital. Educators should design structured writing tasks that guide responsible AI use, ensuring students develop trust and critical literacy.

This study extends existing research on the integration of generative AI in education by quantitatively examining the relationship between students' trust in ChatGPT and their perceived improvements in writing, as well as their future intent to use the tool. Applying the Technology Acceptance Model and Trust in Technology Framework in a low-resource Pakistani ESL context, the findings provide empirical evidence that trust is a key predictor of both writing enhancement and sustained engagement with AI-assisted learning. By providing actionable insights for educators, institutions, and policymakers, the study contributes to the development of effective strategies for the responsible and scalable adoption of AI in academic writing instruction.

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Conflict of Interest

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