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Evaluating the Effectiveness of Artificial Intelligence Applications in Improving Pakistani Students' Academic Writing Proficiency

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ABSTRACT

The growing integration of Artificial Intelligence (AI) in education has transformed English language learning and writing practices in Pakistan. AI-powered writing assistants such as Grammarly, QuillBot, and ChatGPT are increasingly used by students to refine their academic writing through enhanced grammar, vocabulary, and stylistic accuracy. Despite their popularity, concerns remain about their long-term impact on learners' independent writing and critical thinking abilities. This study examines the effectiveness of AI-based writing tools in improving the academic writing proficiency of 100 undergraduate students majoring in English Language and Literature at a public university in Karachi, Pakistan. Using a structured questionnaire, data were collected on students' frequency of AI tool usage, perceived benefits, and challenges encountered. Findings reveal that while AI tools significantly improve grammatical accuracy, coherence, and writing fluency, many students reported excessive dependence on these tools, which may hinder the development of original thought and self-editing skills. The study highlights the dual role of AI in both supporting and potentially limiting writing autonomy and suggests pedagogical strategies for integrating AI tools responsibly in Pakistani higher education to enhance writing proficiency without compromising academic integrity or critical engagement.

Keywords: Artificial Intelligence Applications, Pakistani Students, Academic

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Writing Proficiency

Introduction

The integration of artificial intelligence (AI) into education has transformed how students in Pakistan approach academic writing. AI-powered writing assistants such as Grammarly, QuillBot, and GPT-based tools are increasingly used in Pakistani universities to enhance grammar, vocabulary, coherence, and organization (Zaman, Jawad, & Buriro, 2025). These tools offer instant feedback, allowing students to correct linguistic and structural errors efficiently. According to Smith (2021), AI writing assistants have become especially valuable for non-native English speakers as they provide personalized, real-time feedback that helps users avoid common language errors.

However, while AI tools contribute to surface-level improvement in grammar and sentence structure, concerns have been raised about their long-term impact on students' independent writing abilities (Zaman, Chandio, & Noor, 2025). Adams (2020) argues that over-reliance on such tools may hinder critical thinking, creativity, and self-editing skills, which are central to academic writing competence. This tension between convenience and cognitive engagement is particularly relevant in the Pakistani context, where many ESL learners depend heavily on digital tools due to limited access to one-on-one writing support.

The increasing use of AI applications in Pakistani higher education has sparked debate among educators and linguists. While these tools can reduce cognitive load and increase productivity, they may also encourage a passive approach to composition. Miller (2019) notes that students who depend on AI feedback often fail to engage deeply with the writing process, relying instead on automated corrections rather than developing autonomous editing strategies Similarly, Elbow (1998) emphasizes the significance of individual voice and creativity in writing—qualities that may be diminished when students unquestioningly adopt AI-generated suggestions. Despite such reservations, the use of AI-assisted writing platforms continues to grow, particularly among university students struggling to meet academic writing standards under time pressure (Jones & Brown, 2020).

Although AI tools have demonstrated their potential to enhance grammatical accuracy and writing efficiency, their influence on long-term writing proficiency remains ambiguous. Studies suggest that while students gain immediate improvements, these tools may not foster higher-order skills such as critical thinking and creative problem-solving (Ferris, 2004; Zhou & Xu, 2023). For example, Chun (2020) found that frequent users of Grammarly often struggled to internalize grammar rules, raising concerns about dependency and the lack of self-correction ability.

Despite the growing body of research on AI in writing instruction, most studies have been conducted in Western contexts, leaving a gap in understanding how such tools affect ESL learners in developing countries. In Pakistan, where English is a second or foreign language and writing pedagogy faces challenges like large class sizes and insufficient writing practice, AI tools have become a convenient alternative to traditional feedback. Yet, it remains unclear whether these tools are genuinely improving writing proficiency or fostering superficial learning.

This study is significant for several reasons. First, it addresses a critical gap by

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exploring the use and impact of AI writing assistants among Pakistani university students—a context underrepresented in existing research. As Warschauer and Grimes (2008) highlight, understanding digital tool use across diverse educational environments is essential for designing effective pedagogical interventions. Second, the study examines both the benefits and limitations of AI-based tools, acknowledging their dual role in supporting writing accuracy while potentially discouraging cognitive engagement. This analysis aligns with Vygotsky's (1978) Zone of Proximal Development, emphasizing that learners require balanced scaffolding that promotes independence rather than dependence. Excessive reliance on AI feedback may provide too much scaffolding, ultimately impeding the development of autonomous writing competence.

Problem Statement

In Pakistan's higher education system, English writing proficiency remains a persistent challenge for many students, particularly those studying in English-medium universities where academic writing is essential for success. With the increasing accessibility of artificial intelligence (AI) writing assistants such as Grammarly, QuillBot, and ChatGPT, students now have digital tools that can instantly correct grammar, suggest vocabulary, and improve overall text coherence. While these tools appear to enhance grammatical accuracy and writing fluency, their long-term impact on learners' independent writing abilities remains uncertain.

This study seeks to examine how AI writing assistants influence the academic writing skills of Pakistani university students, focusing on their effects on grammar, productivity, creativity, and critical thinking. It also explores the risks of over-reliance on such tools, which may reduce students' ability to self-edit and engage deeply with the writing process. By investigating these aspects, the study aims to provide educators and policymakers with evidence-based insights on how AI tools can be integrated into writing pedagogy without compromising the development of essential writing skills. The findings will contribute to the growing body of research on AI in education and offer practical recommendations for balancing technological assistance with traditional writing instruction in the Pakistani ESL context.

Research Objectives

The study aims to:

Assess the extent to which AI writing assistants improve Pakistani university students' writing skills, particularly in grammar, vocabulary, and structure.

Explore how AI writing tools influence students' creativity and critical thinking in academic writing.

Determine the potential risks associated with students' over-reliance on AI writing tools in higher education settings.

Research Questions

To what extent do AI writing assistants enhance Pakistani university students' writing accuracy in terms of grammar, vocabulary, and structure?

How do AI writing tools affect students' creativity and critical thinking in the writing process?

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What are the potential risks of over-reliance on AI writing assistants among university students in Pakistan?

Significance of the Study

This study holds significant value for educators, curriculum designers, and policymakers in Pakistan, where English serves as both a medium of instruction and a key academic skill. By investigating the influence of AI writing assistants on students' writing performance, the research offers timely insights into how such technologies can be effectively integrated into ESL writing instruction. The findings will help teachers design balanced pedagogical strategies that leverage AI tools to support grammatical and structural accuracy without diminishing students' independent thinking and creativity. Moreover, the study contributes to the limited body of research on AI-assisted writing in non-Western contexts, particularly in Pakistani higher education, where technology adoption in language learning is rapidly expanding.

Literature Review

The evolution of writing aids reflects a long history of technological advancement that has continuously shaped the way individuals compose and refine written texts. From the use of basic tools like quills and typewriters to the introduction of digital word processors, technology has steadily influenced the writing process. Early electronic aids such as spellcheckers and grammar checkers in the 1980s and 1990s marked a turning point in writing support by allowing users to correct errors quickly and conveniently (Sweller, 1988). However, these earlier systems were limited to surface-level corrections and lacked the ability to understand linguistic context or meaning. The emergence of Artificial Intelligence (AI) and its integration with Natural Language Processing (NLP) and Machine Learning (ML) revolutionized writing technology, enabling the development of intelligent tools capable of analyzing, generating, and refining human-like text. Goodfellow et al. (2014) contributed significantly to this shift through the introduction of Generative Adversarial Networks (GANs), which enhanced AI's ability to produce coherent, contextually relevant text.

AI-powered writing assistants such as Grammarly, QuillBot, and GPT-based applications have become increasingly popular among students for their ability to enhance grammatical accuracy, sentence structure, and vocabulary use. These tools provide instant feedback, helping learners refine their writing more efficiently. Smith (2021) found that AI tools are particularly beneficial for non-native English speakers as they offer real-time, individualized feedback that helps avoid recurrent linguistic errors. In higher education, such as in Pakistani universities, AI writing tools are often used to improve academic writing quality, particularly where traditional writing instruction is limited. Jones and Brown (2020) reported that learners using Grammarly demonstrated notable improvements in grammatical performance; however, they cautioned that these improvements might not result in sustained learning if students rely excessively on automated correction.

Despite these benefits, scholars have expressed concern about the potential drawbacks of over-reliance on AI writing tools. Miller (2019) argued that constant dependence on AI can reduce students' ability to self-edit and think critically, as they may come to

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depend on automated suggestions rather than engaging cognitively with the writing process. Similarly, Adams (2020) warned that while AI tools enhance productivity, they may also limit originality and creativity by promoting repetitive, formulaic patterns in writing. These issues are particularly relevant in contexts like Pakistan, where ESL learners often struggle with confidence and accuracy in writing and may be more tempted to depend on technological tools rather than developing independent competence.

The integration of AI into educational contexts has been studied through frameworks such as intelligent tutoring systems (Luckin et al., 2016), which provide adaptive feedback tailored to learner needs. Although initially used in mathematics and science, such systems paved the way for AI-assisted writing, offering automated, personalized responses. Warschauer and Grimes (2008) emphasized that while digital tools enhance engagement and motivation in writing, they also necessitate a balance between technological assistance and the cultivation of independent writing skills. This balance remains a pressing issue in contemporary writing instruction, especially as AI continues to evolve rapidly.

AI writing assistants have been shown to improve grammatical accuracy significantly, particularly among second-language learners. Bitchener and Ferris (2012) highlighted that timely corrective feedback is a vital component of second-language writing development, and AI tools provide such feedback instantly. Chun (2020) found that ESL learners who regularly used Grammarly exhibited greater improvement in grammatical accuracy compared to those relying solely on traditional instruction. Nonetheless, Ferris (2004) cautioned that continuous external correction can lead to "error fossilization," where learners depend on feedback rather than internalizing grammatical rules. Similarly, Nunan (1999) emphasized that true language learning occurs when students are cognitively challenged to resolve linguistic problems themselves. Thus, while AI tools reduce errors and enhance fluency, they may also lower the cognitive engagement necessary for deep language learning.

Beyond grammar, AI tools also contribute to coherence and organization in writing. Grammarly and ProWritingAid, for instance, provide feedback on paragraph structure, transitions, and logical flow. Liu (2022) found that professional writers who used AI tools reported improvements in textual clarity and coherence. However, scholars such as Flower and Hayes (1981) and Sommers (1980) stressed that meaningful revision requires deeper reflection, not mere surface-level correction. Over-reliance on AI's "quick fixes" may discourage students from engaging in iterative revision, a process essential for developing analytical and reflective writing abilities.

The issue of creativity presents another dimension of concern. Modern AI systems, particularly those based on GPT-3 and GPT-4, can generate text that mimics human language, helping writers overcome writer's block or rephrase ideas creatively (McWilliams, 2021). Yet, critics argue that such AI-generated writing often lacks depth, authenticity, and emotional nuance. Elbow (1998) underscored the importance of an author's unique voice, which may be compromised when AI-generated phrasing replaces original expression. Amabile's (1996) componential theory of creativity posits that creative output depends on intrinsic motivation and deep engagement with the writing process. Over-dependence on AI-generated text can reduce cognitive

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effort and intrinsic motivation, leading to formulaic and uninspired writing (Zhou & Xu, 2023).

Cognitive Load Theory provides an important framework for understanding these dynamics. Sweller (1988) explained that reducing cognitive load can facilitate learning by freeing mental resources for complex tasks. AI writing tools, by automating grammatical and structural corrections, reduce the mental burden of low-level writing tasks, enabling learners to focus on content and ideas. However, Kirschner et al. (2006) and Vygotsky (1978) cautioned that excessive reduction of cognitive effort may hinder meaningful learning. According to Vygotsky's Zone of Proximal Development, learners grow most effectively when they engage with challenging tasks supported by appropriate scaffolding. When AI tools provide too much assistance, students may fail to develop independent problem-solving and critical writing skills.

Ethical considerations also arise in the use of AI for writing. Howard (1995) introduced the concept of "patchwriting," where students rephrase content without true comprehension, a behavior that AI tools can unintentionally encourage. Lanier (2014) and Carr (2010) further warned that heavy reliance on AI could diminish authorship and originality, raising concerns about academic integrity and intellectual ownership. In academic settings like Pakistan, where plagiarism and paraphrasing are already sensitive issues, the misuse of AI tools may exacerbate these challenges.

Overall, the literature reveals a dual-sided impact of AI writing assistants: while they enhance grammatical precision, coherence, and writing efficiency, they may also weaken higher-order thinking, creativity, and independent learning if used uncritically. Most existing studies focus on Western educational contexts, leaving a gap in understanding their implications in non-Western and developing regions. This study addresses this gap by exploring how AI writing assistants influence the writing development of English Language and Literature students in Pakistani universities. Drawing on Cognitive Load Theory and Vygotsky's Zone of Proximal Development, it seeks to understand whether these tools serve as productive scaffolds or counterproductive crutches, and how educators can integrate them effectively into writing pedagogy without compromising learners' autonomy and creativity.

Methodology

Research Design

This study employed a quantitative research design to investigate the impact of AI writing assistants on Pakistani university students' academic writing proficiency. A structured questionnaire was used as the primary data collection tool to gather quantifiable data on students' usage patterns, perceptions, and experiences with AI writing tools such as Grammarly, QuillBot, and ChatGPT. The design was chosen to allow for systematic analysis of numerical data and to identify trends and relationships between variables such as tool usage, perceived writing improvement, and dependency concerns.

Target Population

The target population for this study comprised undergraduate students enrolled in the Department of English Language and Literature at a public-sector university in

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Pakistan. These students were selected because they were actively engaged in academic writing tasks and were familiar with AI-based writing tools commonly used in higher education settings.

Sampling Technique

A stratified random sampling technique was used to ensure fair representation of students from different academic levels. The total population of approximately 250 students enrolled in second- and third-year writing courses was divided into two strata based on academic year. From each stratum, a proportionate number of students were randomly selected to participate in the study. This method ensured that both groups were adequately represented while minimizing sampling bias.

Sample Size

The final sample consisted of 100 participants; including 60 second-year and 40 third-year students. This sample size was considered sufficient to ensure statistical reliability and representativeness of the overall student population in the department.

Data Collection Tool

A structured questionnaire was developed to collect data from the participants. It consisted of four sections:

Demographic Information: age, gender, academic year, and frequency of AI tool usage.

Usage of AI Writing Assistants: types of AI tools used (e.g., Grammarly, QuillBot, ChatGPT), frequency of use, and primary purposes (e.g., grammar correction, paraphrasing, or content enhancement).

Perceived Impact on Writing Skills: A five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) was used to measure perceptions regarding improvements in grammar, vocabulary, organization, and creativity.

Concerns about over Reliance: included open-ended questions exploring students' views on dependency, authenticity, and reduced critical thinking due to AI tool usage

The questionnaires were distributed during regular class sessions by the researcher, who explained the study's purpose and assured the participants of confidentiality and anonymity. Students were given approximately **20 minutes** to complete the forms, which were collected immediately afterward.

Data Analysis Tools

The collected data were analyzed using both descriptive and inferential statistical methods. Descriptive statistics, including frequencies, percentages, means, and standard deviationswere used to summarize demographic variables and students' usage patterns. Pearson correlation coefficients were applied to examine relationships between the frequency of AI tool usage and perceived improvement in writing skills.

Additionally, qualitative data obtained from open-ended responses were analyzed through thematic analysis to identify common concerns and patterns regarding over-reliance on AI writing tools among students.

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Results

Demographic Profile of Participants

The study collected responses from 100 undergraduate students enrolled in the Department of English Language and Literature at a public-sector university in Pakistan. Among the participants, 56% were female and 44% were male, indicating a relatively balanced gender representation. The age range of most respondents was 19 to 22 years, typical of undergraduate English majors. In terms of academic distribution, 60% were second-year students and 40% were third-year students, ensuring input from learners at different levels of academic and linguistic maturity.

This demographic diversity provided a comprehensive understanding of how AI writing tools are used and perceived by English learners at varying stages of writing proficiency.

Usage Patterns of AI Writing Assistants

Analysis revealed that AI writing assistants have become an integral component of students' writing routines. Among the tools mentioned, Grammarly was the most commonly used, reported by 40% of the participants, followed by QuillBot (30%), GPT-based tools such as ChatGPT (15%), and other platforms like ProWritingAid or Writefull (15%).

Regarding usage frequency, 70% of students indicated they used AI writing assistants at least once a week, while 30% reported using them occasionally or only before assignment submissions. Several students commented that AI tools had become part of their daily academic practice, with one noting, "I open Grammarly every time I write an essay or report—it saves me time and reduces my anxiety about grammar." Another student added, "I use QuillBot almost daily to rephrase my sentences; it helps me make my writing more formal."

These findings indicate that AI tools have gained significant acceptance among Pakistani university students, primarily as digital aids for error correction and fluency enhancement.

Purpose of Using AI Writing Tools

Students' purposes for using AI tools varied but leaned heavily toward mechanical and linguistic accuracy rather than higher-order writing skills. The majority (65%) used AI assistants for grammar correction, while 20% focused on sentence restructuring and stylistic improvement. Only 15% reported using AI tools for content generation or idea development.

This suggests that students view AI primarily as a support mechanism rather than a creative partner. One student shared, "I mostly use Grammarly to fix small mistakes; I don't really trust it for generating ideas." Another respondent explained, "AI helps me organize my writing better, but I still have to think about what to write myself."

Such responses underscore that AI writing assistants are seen more as technical enhancers than cognitive collaborators in the writing process.

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Perceived Impact on Writing Skills

Students generally perceived AI writing assistants as beneficial for improving technical writing skills, particularly grammar, vocabulary, and sentence structure. The mean score for grammar improvement was 4.3 on a five-point Likert scale, suggesting a strong belief in the tools' effectiveness in identifying and correcting grammatical errors. Similarly, the mean scores for vocabulary enhancement (4.0) and sentence organization (3.9) also reflected positive perceptions.

However, the perception of AI tools' contribution to creativity and critical thinking was significantly lower, with a mean score of 2.8, indicating limited perceived influence on the development of original thought and creative expression.

A Pearson correlation analysis demonstrated a moderate positive relationship between the frequency of AI tool usage and perceived grammar improvement ($r = 0.58$, $p < 0.01$). In contrast, there was no significant correlation between AI usage and improvement in creativity ($r = 0.12$, $p > 0.05$).

These results indicate that while AI tools effectively enhance surface-level writing skills, they do little to promote deep cognitive engagement or creative writing development. One respondent summarized this view: "AI helps me correct my grammar, but it doesn't make my writing more interesting or original."

Concerns about Over-Reliance on AI Writing Assistants

Thematic analysis of open-ended responses revealed three major themes related to students' concerns about their dependency on AI writing tools:

Reduced Self-Editing and Learning Capacity

Approximately 45% of participants expressed concern that frequent use of AI writing assistants might diminish their ability to self-correct and learn from mistakes. Many admitted that they rarely reviewed grammatical feedback, simply accepting AI corrections automatically. As one student stated, "I just click on Grammarly's suggestions without checking why it's wrong. I feel like I'm not learning anything new." Another participant confessed, "I rely too much on Grammarly to fix my mistakes, and I'm afraid I'm not learning from them."

This recurring theme indicates that students may become passive learners, depending heavily on automated systems rather than engaging with the underlying rules of English grammar.

Loss of Personal Voice and Authenticity

Several respondents expressed that AI-generated suggestions often made their writing sound impersonal or artificial. A student explained, "The suggestions from AI sometimes make my writing feel too formal or robotic. I feel like I'm losing my personal voice." Another remarked, "QuillBot changes my sentences in a way that doesn't sound like me anymore."

Such reflections reveal a growing concern that excessive dependence on AI might standardize student writing, diminishing individual expression and stylistic diversity.

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Overconfidence in AI Accuracy

A smaller but notable number of students reported blind trust in AI-generated corrections, assuming that all suggestions were accurate. One respondent noted, "I don't usually double-check what AI changes. I just assume it's right." This overconfidence could lead to uncritical acceptance of incorrect or contextually inappropriate suggestions, potentially reinforcing errors rather than eliminating them.

This theme highlights the need for AI literacy training to help students evaluate AI outputs critically and use them as supportive tools rather than absolute authorities.

The findings demonstrate that AI writing tools significantly aid Pakistani university students in improving grammar, vocabulary, and writing accuracy, confirming their potential as valuable language-learning aids. However, their influence on creativity, critical thinking, and independent learning remains limited. Moreover, a portion of respondents expressed concerns about dependency, diminished self-editing skills, and loss of personal expression, indicating the need for pedagogical balance in AI integration.

Overall, the results emphasize that while AI tools serve as effective linguistic scaffolds, educators must guide students in using them strategically to enhance—not replace—their cognitive and creative engagement in academic writing.

DISCUSSION

The findings of this study align with previous research highlighting both the advantages and challenges of integrating Artificial Intelligence (AI) writing assistants in academic writing. While Pakistani university students clearly benefit from AI tools like Grammarly, QuillBot, and ChatGPT for improving grammar, vocabulary, and productivity, there are serious concerns about over-reliance and the potential decline in independent writing skills. These results mirror earlier studies by Miller (2019) and Jones and Brown (2020), who found that students tend to rely on AI-generated corrections at the expense of creativity and analytical engagement.

One of the major findings from this study revealed that students perceived AI tools as "extremely helpful for grammar correction and sentence clarity," reflected in a mean score of 4.4 on the Likert scale. This aligns with research conducted by Smith (2021) and Khan and Raza (2023), who reported that AI tools significantly improve grammatical accuracy and reduce surface-level writing errors among Pakistani ESL learners. These findings support Sweller's (1988) Cognitive Load Theory, suggesting that AI tools help students manage cognitive effort by automating error detection, thereby allowing them to focus more on content development and idea organization.

However, this cognitive relief appears to have drawbacks. Students expressed that while AI tools save time, they "don't help much with thinking creatively or expressing original ideas," as indicated by a mean creativity score of 2.7. This outcome echoes the concerns raised by Miller (2019) and Adams (2020), who warned that heavy reliance on AI may limit deeper engagement with the writing process and critical reflection. Many participants in this study also admitted that they "often accept AI suggestions without questioning their accuracy," which raises issues related to passive learning.

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A significant portion of students (47%) acknowledged that "using AI frequently makes it hard to write independently later." This finding corresponds with Howard's (1995) concept of patch writing, where writers borrow phrasing or structure without full comprehension. In the Pakistani ESL context, this phenomenon is particularly concerning because students are still developing foundational writing and linguistic competence. Moreover, applying Vygotsky's (1978) Zone of Proximal Development (ZPD), AI tools can serve as valuable scaffolds, but excessive dependence on them may hinder learners' ability to progress toward independent skill mastery.

The study further observed that while AI tools improve surface-level accuracy, their influence on deeper cognitive processes such as revision, argument construction, and idea development remains limited. This supports Flower and Hayes' (1981) Cognitive Process Theory of Writing, which emphasizes that active engagement in revision is essential for producing well-developed writing. Students often reported that they "skip the revision process because AI already makes the text look polished," which may reduce meaningful learning. Similarly, Amabile's (1996) Componential Theory of Creativity suggests that intrinsic motivation is crucial for creative output—something that may decline when students rely too heavily on AI-generated phrasing.

Overall, these findings contribute to the ongoing discussion about AI's role in education within the Pakistani context. The results affirm that AI writing assistants significantly enhance grammatical accuracy and writing fluency but also raise pedagogical concerns about creativity, critical thinking, and academic integrity. Teachers and policymakers in Pakistan must therefore strike a balance: integrating AI tools as complementary supports rather than complete replacements for writing instruction. Educators should encourage students to engage critically with AI feedback, fostering self-awareness and reflective writing practices.

In conclusion, this study underscores the dual nature of AI writing assistants in Pakistani higher education. While these tools enhance efficiency and accuracy, they risk undermining independent thought if used uncritically. To promote sustainable skill development, universities should incorporate AI literacy into writing curricula, training students to use AI intelligently, not dependently. This balanced approach will ensure that AI remains a facilitator of learning rather than a substitute for human intellect and creativity.

Conclusion

The study found that AI-based writing assistants such as Grammarly, QuillBot, and ChatGPT significantly improved university students' grammatical accuracy, sentence structure, and overall writing fluency. However, their influence on creativity and critical thinking remained limited. Many students in the Pakistani context tended to depend on these tools for surface-level corrections rather than engaging in deeper writing processes. This suggests that while AI tools enhance writing efficiency and accuracy, they may inadvertently discourage independent editing and creative expression if used excessively.

Recommendations

Educators should encourage students to use AI tools as supportive aids rather than complete substitutes for their own writing efforts. Teachers must integrate AI literacy

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into writing instruction, helping students understand both the strengths and limitations of these technologies. Training programs should focus on developing students' ability to critically evaluate AI feedback, maintain originality, and refine self-editing skills. Institutions may also consider policies promoting ethical AI use and fostering a balance between technological assistance and human creativity. Future research should investigate the long-term impact of AI-assisted writing on students' autonomy and higher-order thinking skills across various Pakistani universities.

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