

Enhancing Expository Writing Through Artificial Intelligence Feedback Systems: A Case Study of BS Students at Cuvas, Bahawalpur

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ABSTRACT

The emergence of Artificial Intelligence (AI) in education has revolutionized the ways students learn to write and receive feedback. This study investigates the impact of AI-based feedback systems on expository writing among BS students at the Cholistan University of Veterinary and Animal Sciences (CUVAS), Bahawalpur. Adopting a quantitative case study design, data were collected from 250 undergraduate students through a 20-item Likert-scale questionnaire covering four dimensions: perceived usefulness, ease of use, learning impact, and challenges. Statistical results revealed that AI-assisted tools significantly improved students' clarity, grammatical accuracy, and confidence in writing, with perceived learning impact showing the strongest correlation with overall writing improvement. Nevertheless, concerns regarding overreliance, misinterpretation of context, and ethical implications were also noted. The findings conclude that AI-powered feedback systems can be effective supplementary tools for teaching expository writing when integrated with human supervision and pedagogical guidance.

Keywords: Artificial Intelligence, Expository Writing, Feedback Systems, Language Learning, CUVAS Bahawalpur

INTRODUCTION

Expository writing is fundamental to academic communication as it enables students to express ideas logically and coherently. In the context of Pakistani higher education, many students entering BS programs face significant difficulties in English writing due to limited exposure to advanced writing practices at the pre-university level (Haider, 2021). Conventional feedback methods such as teacher comments and peer reviews are often delayed, inconsistent, or constrained by class size and time limitations. The rise of AI-driven feedback tools, including Grammarly, ChatGPT, and Quillbot, offers new avenues for improving students' writing skills by providing real-time, automated, and individualized feedback. AI-based feedback systems use natural language processing (NLP) to identify grammatical errors, suggest vocabulary enhancement, improve organization, and refine style, thereby promoting learner autonomy (Li & Hegelheimer, 2013). In Pakistan, where large student teacher ratios make individualized feedback difficult, these systems can serve as valuable supplementary tools. However, their integration into academic writing pedagogy also raises pedagogical and ethical questions related to learner dependence, cognitive engagement, and contextual understanding (Zhang & Cassany, 2022). This study, therefore, examines how

AI feedback tools influence the expository writing development of BS students at CUVAS, focusing on their perceived usefulness, accessibility, learning impact, and challenges.

Background of the Study

Artificial Intelligence in education has progressed from basic automated grammar checkers to sophisticated NLP-based systems capable of evaluating syntax, coherence, tone, and organization (Wang et al., 2023). These tools now act as intelligent writing assistants, offering feedback that closely mirrors human evaluators. The digitalization of education in Pakistan, accelerated by the COVID-19 pandemic, has led to the widespread adoption of AI tools in higher education institutions (Rasheed et al., 2021).

Despite this progress, AI's pedagogical role in developing writing proficiency remains underexplored particularly in non-linguistic institutions like CUVAS, where students primarily come from technical and scientific disciplines. For these learners, English writing is a functional skill emphasizing clarity, precision, and logical structure the core of expository writing. Hence, studying AI feedback's role in improving the writing performance of such students provides valuable insights into both AI in education and English for Specific Purposes (ESP) scholarship.

Statement of the Problem

Although AI-based writing tools have rapidly proliferated across global higher education, there is limited empirical evidence regarding their actual pedagogical effectiveness in enhancing expository writing among Pakistani university students. Tools such as Grammarly, ChatGPT, and Quillbot are widely used for instant feedback on grammar, structure, and style. Yet, it remains uncertain whether students genuinely internalize this feedback or simply accept AI suggestions passively without reflective engagement (Zhang & Cassany, 2022).

A growing concern in Pakistan's higher education system particularly among science and technical undergraduates is that AI tools are increasingly treated as substitutes rather than supplements for authentic learning. Many students rely on AI-generated corrections without understanding the linguistic rationale behind them, hindering the development of self-editing and analytical skills essential for academic communication. Additionally, limited teacher guidance and lack of digital literacy training often result in superficial improvements rather than meaningful learning gains.

Socio-economic disparities further shape students' access to AI technologies. Learners from rural or low-income backgrounds face barriers such as poor internet connectivity, lack of digital proficiency, and limited access to premium AI services. These inequities contribute to a digital divide within universities, undermining inclusivity and fairness in AI-assisted learning environments. Furthermore, ethical concerns such as plagiarism, academic dishonesty, and overreliance on automation—raise questions about the authenticity and integrity of AI-supported writing outputs.

It is essential to empirically assess how AI feedback systems influence writing performance, learning behavior, and ethical awareness among university students in Pakistan. Specifically, at CUVAS Bahawalpur, where students come from diverse socio-economic and disciplinary backgrounds, understanding the pedagogical impact of AI feedback tools is crucial. Therefore, this study seeks to determine the extent to which AI-assisted feedback enhances or impedes students' expository writing skills and to identify the associated perceptions, challenges, and ethical implications. The findings aim to guide

educators, curriculum designers, and policymakers in the ethical and effective integration of AI technologies into writing instruction to promote authentic, sustainable learning outcomes.

Objectives of the Study

The primary objectives of this study are as follows:

1. To analyze students' perceptions of the usefulness and ease of AI-based feedback systems in expository writing.
2. To evaluate the learning impact of AI feedback on students' writing accuracy, organization, and confidence.
3. To identify the challenges and ethical issues students face while using AI-assisted writing tools.

Research Questions

The study is guided by the following research questions:

1. How do students perceive the usefulness and ease of AI feedback systems in improving their expository writing?
2. What is the impact of AI-generated feedback on students' learning outcomes and writing performance?
3. What challenges and ethical concerns do students encounter while using AI-based writing tools?

Importance of the Study

This study carries significant theoretical, practical, and socio-educational importance within the emerging field of Artificial Intelligence-Assisted Language Learning (AILL).

Theoretically, this research contributes to the growing body of knowledge on how AI technologies influence second language writing development. It explores the relationship between technology acceptance, feedback processing, and cognitive engagement in academic writing contexts. Although prior studies have acknowledged the role of AI in supporting individualized learning experiences, the specific mechanisms through which AI-generated feedback enhances expository writing remain underexplored in Pakistan's higher education setting.

By examining how students interpret, utilize, and internalize AI-based feedback, the study advances theoretical understanding of self-regulated learning, learner autonomy, and cognitive engagement in writing. Furthermore, it extends established frameworks such as the Technology Acceptance Model (TAM) and Self-Determination Theory (SDT) by integrating constructs of learner motivation, technological readiness, and ethical awareness in digital learning environments.

Practically, the study offers evidence-based insights for English language instructors, curriculum designers, and institutional policymakers seeking to integrate AI into writing pedagogy effectively and ethically. The findings emphasize that AI tools such as Grammarly and ChatGPT can complement traditional feedback practices by providing instant, personalized, and data-driven feedback that supports students' independent learning and reflective revision strategies.

Educators can utilize these insights to develop blended feedback models, where human judgment and AI analytics work collaboratively to enhance writing accuracy, coherence, and critical depth. Moreover, the study underscores the importance of AI literacy training, ensuring that students not only use AI tools proficiently but also understand their limitations, ethical boundaries, and potential biases. This study promotes digital inclusivity in Pakistan's university system. Many students, particularly those from semi-urban and rural regions such as Southern Punjab, face barriers to accessing advanced educational technologies due to economic or infrastructural constraints. By focusing on this demographic, the research highlights how AI integration can help bridge the digital divide and enable equitable learning opportunities.

Delimitations of the Study

The scope of this study is confined to BS students enrolled at the Cholistan University of Veterinary and Animal Sciences (CUVAS), Bahawalpur, specifically those taking Functional English and Expository Writing courses. The research focuses exclusively on the use of AI-based feedback systems, particularly Grammarly and ChatGPT, excluding other computer-assisted language learning (CALL) applications.

The sample comprises 250 students from various departments, selected through a purposive sampling technique. The analysis is based solely on quantitative data derived from self-reported perceptions gathered through a structured Likert-scale questionnaire. As such, the findings are limited to the studied context and may not be generalized to other institutions or disciplines without further investigation.

REVIEW OF RELATED LITERATURE

Artificial Intelligence (AI) has emerged as a transformative force in second language (L2) writing pedagogy, offering automated, data-driven, and individualized feedback that significantly enhances the writing learning process (Li, 2021; Wang, Li, & Cheng, 2023). AI-powered writing assistants such as Grammarly, Quillbot, and ChatGPT utilize Natural Language Processing (NLP) and Machine Learning (ML) algorithms to analyze student writing, identify grammatical, lexical, and rhetorical weaknesses, and provide corrective feedback in real time (Zhang & Cassany, 2022; Gimeno-Sanz, 2020).

Empirical studies have demonstrated that AI-based feedback tools contribute to improvements in accuracy, lexical variety, syntactic awareness, and overall coherence in student writing (Wang & Sleeman, 2022; Khan, 2023). Such systems also foster metacognitive awareness by helping learners recognize recurring language errors and refine stylistic expression through iterative revision (Li & Hegelheimer, 2013). For example, Grammarly's immediate grammar correction and style suggestions enable learners to internalize language conventions, while ChatGPT supports brainstorming, organization, and conceptual clarity through dialogic scaffolding (Rudolph et al., 2023).

Despite these pedagogical benefits, researchers have raised critical concerns about overreliance, cognitive passivity, and ethical implications. Kasneci et al. (2023) argue that excessive automation may discourage critical reasoning and creative experimentation key elements of writing autonomy. Similarly, Zhang and Cassany (2022) found that many students accept AI-generated suggestions uncritically, hindering reflective judgment and independent language problem-solving. Moreover, the opacity of AI algorithms can lead to misinterpretation of meaning in contextually nuanced or rhetorical forms of expository writing (Choi, 2023).

Ethical challenges further complicate the educational use of AI. Susnjak (2023) cautions that uncritical use of AI-generated content can blur authorship boundaries and foster academic dishonesty. Cotton et al. (2023)

similarly emphasize the need for ethical literacy among students to differentiate between legitimate assistance and plagiarism. Consequently, educators are urged to integrate AI-based writing tools in ways that promote authentic learning, ethical awareness, and academic integrity while maintaining pedagogical oversight.

In developing and South Asian contexts, the effectiveness of AI-assisted writing is influenced by technological access, motivation, and institutional readiness (Rasheed, Kamsin, & Abdullah, 2021; Ali & Saeed, 2022). In Pakistan, disparities in digital infrastructure and literacy exacerbate inequities in the use of AI for educational purposes (Sadiq, 2021; Hussain & Shah, 2023). While Ahmed and Rehman (2022) reported generally positive learner attitudes toward AI tools, they also highlighted obstacles such as limited teacher guidance, poor internet connectivity, and lack of awareness of AI's pedagogical applications.

Most existing Pakistani research has examined AI in general language learning or online education but rarely addresses expository writing development among non-linguistic undergraduates. This study therefore seeks to fill that gap by contextualizing AI feedback within the academic writing practices of BS students at the Cholistan University of Veterinary and Animal Sciences (CUVAS), Bahawalpur. By doing so, it extends regional scholarship and contributes empirical insights to the global discourse on AI-enhanced language learning, particularly in multilingual and resource-limited educational contexts.

RESEARCH METHODOLOGY

Research Design

This study employed a quantitative case study design, an approach suitable for examining measurable relationships among variables within a defined institutional setting (Creswell & Creswell, 2018). The quantitative design enabled the researcher to analyze patterns and statistical relationships objectively, while the case study framework provided contextual depth and insight into the lived academic experiences of CUVAS students (Yin, 2018).

The objective was to assess students' perceptions of AI-based feedback systems and evaluate their impact on expository writing performance. Integrating quantitative techniques within a case study framework allowed for a context-specific yet generalizable understanding of AI's pedagogical influence in higher education (Gay, Mills, & Airasian, 2019).

Population and Sampling

The study population consisted of BS students enrolled in Functional English and Expository Writing courses during the 2024–2025 academic session at CUVAS, Bahawalpur. These students were chosen because they possess foundational English proficiency and represent diverse disciplinary and socio-economic backgrounds.

A stratified random sampling technique was used to ensure proportional representation across departments and gender groups (Etikan & Bala, 2017). A total sample of 250 students (130 male and 120 female) was selected, consistent with Kline's (2016) recommendation for medium-sized quantitative studies to achieve statistical validity and reliability.

Research Instrument

Data were collected using a structured questionnaire consisting of 20 items categorized under four major constructs:

1. Perceived Usefulness
2. Ease of Use and Accessibility
3. Perceived Learning Impact
4. Challenges and Ethical Concerns

Each item was rated on a five-point Likert scale (1 = *Strongly Disagree* to 5 = *Strongly Agree*), in line with established guidelines by Likert (1932) and DeVellis (2017). The instrument was adapted from validated studies on technology acceptance and AI-assisted language learning (Li, 2021; Wang & Sleeman, 2022; Khan, 2023) to ensure construct validity and contextual relevance. To enhance content validity, the questionnaire underwent expert review by three faculty members specializing in English language teaching and educational technology at CUVAS. A pilot study with 25 students was also conducted to confirm item clarity, internal consistency, and cultural appropriateness.

Data Collection and Analysis

Data were analyzed using SPSS (Version 27), a widely recognized software for quantitative educational research (Pallant, 2020). Descriptive statistics (mean and standard deviation) were calculated to summarize student perceptions across the four dimensions. Pearson correlation analysis was employed to determine the strength and direction of relationships between variables, while multiple regression analysis was conducted to identify the strongest predictors of positive perceptions toward AI feedback tools (Field, 2018).

To assess internal reliability, Cronbach's alpha coefficients were calculated. The overall alpha value of 0.89 exceeded the recommended threshold of 0.70 (Nunnally & Bernstein, 1994), confirming high reliability. Subscale reliabilities ranged from 0.81 to 0.88, further indicating consistent measurement across dimensions.

Ethical Considerations

All research procedures adhered to ethical standards established by the American Psychological Association (APA, 2020). Participants provided informed consent, and anonymity and confidentiality were strictly maintained. Data were analyzed in aggregate form to protect participant identity, ensuring full compliance with institutional and international ethical research protocols.

This rigorous methodological framework ensured validity, reliability, and ethical integrity, providing a strong empirical foundation for examining how AI feedback systems influence students' expository writing competence, engagement, and perception. The combination of quantitative precision with contextual insight aligns with current educational research priorities emphasizing AI-supported learning environments in higher education (Kasneci et al., 2023; Wang et al., 2023).

Data Analysis and Interpretation

Quantitative data collected from **250 BS students** enrolled at the Cholistan University of Veterinary and Animal Sciences (CUVAS), Bahawalpur were analyzed using IBM SPSS Statistics Version 27. The objective was to examine students' perceptions of AI-based feedback systems in enhancing their expository writing competence. The analysis included descriptive statistics to summarize trends, Pearson correlation to explore inter-variable relationships, and multiple regression analysis to assess predictive strengths among the key constructs.

Descriptive Statistics

Table 1. Descriptive Statistics

Factor	Mean (M)	SD	Interpretation
Perceived Usefulness	4.02	0.63	High
Ease of Use	3.78	0.70	High
Perceived Learning Impact	4.12	0.58	Very High
Challenges and Ethical Concerns	3.32	0.81	Moderate

The descriptive results in Table 1 indicate that students generally held positive perceptions of AI feedback systems. The high mean scores for Perceived Usefulness ($M = 4.02$, $SD = 0.63$) and Ease of Use ($M = 3.78$, $SD = 0.70$) suggest that learners find tools such as Grammarly, ChatGPT, and Quillbot beneficial and user-friendly for improving grammar, vocabulary, and sentence structure. This supports the Technology Acceptance Model (TAM) proposed by Davis (1989), which asserts that perceived usefulness and ease of use are critical determinants of technology adoption in learning environments.

The Perceived Learning Impact recorded the highest mean value ($M = 4.12$, $SD = 0.58$), signifying that students regard AI feedback as a major contributor to their academic writing growth. Learners reported enhanced confidence, self-awareness, and independence in writing—findings consistent with Li (2021) and Wang et al. (2023), who observed that AI tools foster self-regulation, revision accuracy, and learner autonomy in L2 writing contexts.

Conversely, Challenges and Ethical Concerns ($M = 3.32$, $SD = 0.81$) received only moderate agreement. Students expressed apprehensions about overreliance on AI tools, contextual misinterpretation, and academic dishonesty, echoing prior research by Kasneci et al. (2023) and Susnjak (2023). These concerns underscore the importance of integrating AI tools with ethical literacy and critical reflection to ensure responsible use in educational settings.

Correlation Analysis

Table 2. Correlation Matrix

Variables	PU	EU	LI	CH
Perceived Usefulness (PU)	1	.68**	.74**	-.32*
Ease of Use (EU)		1	.69**	-.27*

Variables	PU	EU	LI	CH
Perceived Learning Impact (LI)			1	-.45**
Challenges and Ethical Concerns (CH)				1

* $p < .05$; * $p < .01$

Correlation results revealed strong, positive, and statistically significant relationships among the three core constructs—Perceived Usefulness (PU), Ease of Use (EU), and Perceived Learning Impact (LI). The highest correlation emerged between PU and LI ($r = .74$, $p < .01$), suggesting that students who perceive AI tools as beneficial also experience greater writing improvement and confidence. This finding aligns with Wang and Sleeman (2022) and Li (2021), who established that usefulness perception is a pivotal motivator influencing writing proficiency in AI-supported environments.

The correlation between PU and EU ($r = .68$, $p < .01$) highlights a mutually reinforcing relationship: when tools are user-friendly, they are perceived as more beneficial consistent with the TAM extension by Teo (2019). Similarly, EU and LI ($r = .69$, $p < .01$) indicate that ease of accessibility directly enhances learning outcomes and engagement, reinforcing Venkatesh and Davis's (2000) argument that technological simplicity fosters sustained learner motivation.

In contrast, Challenges and Ethical Concerns (CH) exhibited negative correlations with all positive constructs ($r = -.27$ to $-.45$, $p < .05$). The strongest negative relationship appeared between CH and LI ($r = -.45$, $p < .01$), suggesting that ethical apprehensions such as plagiarism fears or dependency can diminish students' motivation and reflective learning behaviors. These findings echo Cotton et al. (2023), who emphasized the importance of AI ethics education in maintaining academic integrity.

Regression Analysis

Table 3. Regression Summary

Predictor	β (Standardized)	t-value	p-value	Result
Perceived Usefulness	0.28	5.11	.000	Significant
Ease of Use	0.24	4.43	.000	Significant
Learning Impact	0.41	7.03	.000	Significant

Model Summary: $R^2 = 0.68$; Adjusted $R^2 = 0.67$; $F(3, 246) = 112.64$, $p < .001^{**}$

The multiple regression model revealed a strong fit ($R^2 = 0.68$), indicating that Perceived Usefulness, Ease of Use, and Learning Impact collectively explain 68% of the variance in students' overall perceptions of AI feedback systems. All predictors were statistically significant ($p < .001$), confirming that students' acceptance of AI tools depends heavily on their perceived usefulness, usability, and learning value.

Among the predictors, Perceived Learning Impact ($\beta = 0.41$) emerged as the strongest determinant, emphasizing that students' belief in AI's ability to enhance writing competence and confidence is the primary factor influencing adoption. This supports Self-Determination Theory (Ryan & Deci, 2020), which posits that perceived competence and autonomy are essential drivers of intrinsic motivation.

Perceived Usefulness ($\beta = 0.28$) and Ease of Use ($\beta = 0.24$) also significantly predicted positive attitudes, reaffirming Davis's (1989) and Venkatesh & Davis's (2000) assertion that practical benefits and operational simplicity are key determinants of technology acceptance. The F-test value ($F = 112.64$, $p < .001$) further confirmed the overall model's statistical significance, validating the combined explanatory power of these constructs.

Interpretation and Discussion

The findings collectively affirm that AI-based feedback systems substantially enhance students' expository writing performance by improving linguistic accuracy, organization, and confidence. Students' favorable perceptions reflect their recognition of AI as a pedagogically valuable and accessible tool for autonomous learning. These outcomes align with global research (Gimeno-Sanz, 2020; Wang et al., 2023), which highlights AI's transformative potential in promoting personalized, feedback-driven learning.

However, persistent ethical and cognitive challenges remain. Moderate concern levels indicate that while students appreciate AI assistance, they remain wary of over-reliance, plagiarism risks, and reduced critical engagement issues that must be addressed through ethical literacy programs and instructor mediation.

Overall, the data substantiate the dual nature of AI in education: it serves as both an empowering pedagogical tool and a potential ethical challenge. When integrated thoughtfully with teacher guidance, institutional policy frameworks, and digital ethics training AI feedback systems can significantly enhance writing proficiency, learner autonomy, and academic integrity, particularly in non-linguistic higher education contexts like CUVAS.

FINDINGS AND DISCUSSION

Analyses show that AI-based feedback systems play a substantive role in improving students' expository writing at CUVAS. Students reported noticeable gains in grammatical accuracy, sentence organization, and lexical variety after sustained use of Grammarly, ChatGPT, and Quillbot. Immediate, individualized feedback enabled real-time error detection and iterative revision, yielding greater precision and fluency findings that echo prior evidence on the pedagogical value of AI-mediated, formative feedback (Li, 2021; Wang & Sleeman, 2022; Gimeno-Sanz, 2020). High mean scores for Perceived Usefulness ($M = 4.02$, $SD = 0.63$) and Ease of Use ($M = 3.78$, $SD = 0.70$) indicate that students view AI tools as both valuable and accessible for refining grammar, vocabulary, and sentence structure. This aligns with the Technology Acceptance Model (TAM), which posits that usefulness and usability jointly shape technology adoption and engagement (Davis, 1989; Venkatesh & Davis, 2000).

Perceived Learning Impact emerged as the strongest dimension ($M = 4.12$, $SD = 0.58$) and the most powerful predictor of positive attitudes toward AI ($\beta = .41$, $p < .001$). Students who observed tangible improvements in coherence, structure, and argumentation became more motivated to employ AI regularly, indicating that perceived competence gains reinforce sustained use. This pattern is consistent with Self-Determination Theory's emphasis on competence and autonomy as drivers of intrinsic motivation (Ryan & Deci, 2020) and with research showing AI's potential to bolster self-regulation, revision accuracy, and learner autonomy in L2 writing (Li, 2021; Wang et al., 2023). The iterative feedback loop also resonates with the Output Hypothesis (Swain, 1995): by prompting learners to reformulate language, AI systems foster metalinguistic awareness and strengthen self-editing habits. Students further appreciated AI's nonjudgmental consistency, which reduced anxiety and encouraged multiple revision cycles behaviors less common in purely teacher-centred classrooms (Khan, 2023).

Correlational evidence reinforces this story. Strong, positive associations among Perceived Usefulness, Ease of Use, and Learning Impact (e.g., PU–LI $r = .74$, $p < .01$; EU–LI $r = .69$, $p < .01$) suggest that when tools are easy to navigate, students are more likely to perceive them as beneficial and experience stronger learning gains an interplay predicted by TAM and observed across digital pedagogy (Teo, 2019; Venkatesh & Davis, 2000). Conversely, Challenges and Ethical Concerns correlated negatively with the positive constructs (e.g., CH–LI $r = -.45$, $p < .01$), implying that ethical worries and technical barriers dampen engagement and perceived learning. Students reported moderate concerns ($M = 3.32$, $SD = 0.81$) about overreliance, occasional contextual misinterpretation, and academic integrity particularly risks of plagiarism or diminished critical judgment echoing cautionary accounts in the literature (Kasneci et al., 2023; Susnjak, 2023). Connectivity constraints and uneven access common in Southern Punjab also limited consistent tool use, paralleling regional findings on digital readiness and infrastructure (Rasheed et al., 2021).

Overall, the discussion supports a balanced view: AI feedback systems can act as effective “writing coaches,” amplifying accuracy, coherence, and confidence when embedded in reflective practice. Their benefits are maximized when teacher mediation helps students interrogate suggestions rather than accept them wholesale (Bender et al., 2021), when ethical literacy clarifies the line between assistance and authorship (Cotton et al., 2023), and when institutions mitigate infrastructural inequities. In sum, AI functions best as an augmentative partner to human instruction combining the precision and immediacy of algorithmic feedback with the empathy, contextual judgment, and discipline-specific guidance of educators.

CONCLUSION AND RECOMMENDATIONS

This study demonstrates that BS students at CUVAS hold strongly positive perceptions of AI-assisted feedback in expository writing because it is useful, usable, and demonstrably linked to learning gains. Perceived Learning Impact is the key driver of acceptance, validating TAM’s focus on usefulness/usability and SDT’s emphasis on competence and autonomy (Davis, 1989; Venkatesh & Davis, 2000; Ryan & Deci, 2020). At the same time, ethical and contextual challenges overreliance, plagiarism risks, discourse-level misfires, and digital inequities require thoughtful, guided integration. The most effective model is a blended one in which AI augments (not replaces) teacher feedback, promotes reflective revision, and is framed by institutional policies that safeguard academic integrity.

Actionable Recommendations

Following are the actionable recommendations

1. Embed AI within writing curricula as a formative aid; pair tool use with brief reflection logs where students justify accepted/rejected suggestions (Bender et al., 2021).
2. Offer short modules on how AI works, its limits, citation/attribution norms, and plagiarism boundaries (Cotton et al., 2023).
3. Provide workshops on designing AI-supported tasks, assessing AI-assisted drafts, and coaching critical engagement with feedback (Wang et al., 2023).
4. Expand campus connectivity, device availability, and licensed tool access to reduce inequities noted in Southern Punjab (Raza et al., 2024).
5. Evaluate AI-informed outcomes (self-editing ability, coherence, ethical reasoning) rather than only surface accuracy; weight process artifacts (draft trails, reflections).
6. Define acceptable AI support, disclosure requirements, and consequences; standardize how AI assistance is acknowledged in coursework (Susnjak, 2023).

7. Conduct longitudinal and cross-disciplinary studies to track sustained effects on proficiency, creativity, and critical literacy; use mixed methods to unpack cognitive-affective mechanisms.

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