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Original Article

THE PEDAGOGICAL VALUE OF AI-BASED WRITING FEEDBACK: PRE-UNIVERSITY LEARNERS' PERCEPTIONS AND WRITING IMPROVEMENT

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ABSTRACT

The integration of artificial intelligence (AI) into English language instruction has transformed pedagogical practices, particularly in writing instruction and feedback provision. Despite increasing scholarly attention to AI-assisted writing support, limited research has explored the pedagogical value of AI-generated feedback among pre-university English as Foreign Language (EFL) learners, especially in developing educational contexts. This mixed-methods study investigates pre-university learners' perceptions of AI-based writing feedback and examines its influence on writing improvement. The study was conducted among foundation-level A2 English learners in a pre-university setting, with a population of 200 students and a purposive sample of 31 participants aged 17–19 years. A hybrid feedback model combining AI-generated feedback and teacher mediation was implemented. Data were collected through a Likert-scale questionnaire, semi-structured interviews, and writing performance evidence obtained from pre-feedback and revised writing drafts. Quantitative data were analysed using descriptive statistics and reliability testing, while qualitative data underwent thematic analysis. Writing performance was evaluated using a rubric focusing on grammar, vocabulary, organization, coherence, and mechanics. Findings indicate that learners perceived AI-based feedback positively, particularly regarding grammar correction, vocabulary enhancement, and revision support. Students also valued teacher mediation for contextual clarification and emotional reassurance. Writing evidence demonstrated measurable improvements in organization, mechanics, and coherence following AI-supported revisions. The study highlights the pedagogical potential of hybrid AI–teacher feedback in pre-university EFL writing classrooms and offers implications for integrating AI tools into language instruction while maintaining teacher oversight.

I. INTRODUCTION

Writing remains one of the most cognitively demanding skills in second and foreign language learning because it requires learners to simultaneously manage vocabulary selection, grammatical accuracy, coherence, cohesion, organization, and audience awareness. For pre-university English learners, particularly those functioning at the A2 level of the Common European Framework of Reference (CEFR), writing challenges are frequently intensified by linguistic limitations, low confidence, and insufficient individualized feedback (Hyland & Hyland, 2019). Effective

feedback, therefore, plays a central role in improving learners' writing competence and promoting language development. Traditionally, writing feedback in English language classrooms has depended heavily upon teacher commentary. Teacher feedback provides contextualized explanations, individualized support, and pedagogical scaffolding that facilitate language development (Lee, 2020; Jeevan et al., 2023; Maitlo et al., 2024; Niaz et al., 2025). However, teacher-mediated feedback often faces practical limitations, including time constraints, delayed responses, heavy marking loads, and restricted opportunities for individualized revision, particularly in classrooms with large student populations (Ferris & Eckstein, 2020). Consequently, researchers and practitioners have increasingly explored technological solutions capable of supplementing traditional writing assessment practices. Recent developments in artificial intelligence (AI), particularly generative AI and automated feedback systems, have significantly reshaped educational environments. AI-powered writing platforms can instantly identify grammatical errors, vocabulary misuse, sentence-level problems, and structural inconsistencies while simultaneously offering suggestions for revision. Such immediacy may encourage learner autonomy, revision behavior, and greater engagement with the writing process (Maitlo et al., 2023; Yan, 2024; Fatima et al., 2025 Ahmad, Maitlo & Shaheen, 2026). The growing accessibility of AI tools in language education has generated considerable interest in their pedagogical potential, especially for writing instruction.

In EFL contexts, AI-based writing feedback has demonstrated promising outcomes. Studies suggest that AI-assisted feedback contributes to improved grammatical accuracy, lexical development, organization of ideas, and learner motivation (Nazari et al., 2025; Mehmood et al., 2026; Shaheen et al., 2026). Furthermore, AI-generated feedback offers immediate responses, enabling learners to revise texts more efficiently and independently. For low-proficiency learners, this immediacy can create opportunities for repeated practice, self-correction, and reflection, which are often constrained in traditional classroom environments (Soomro et al., 2023; Luo et al., 2025; Nisar et al., 2026). Despite these advantages, concerns remain regarding the pedagogical reliability of AI-generated feedback. Critics argue that automated systems may provide generic responses, fail to capture contextual meaning, misinterpret learner intentions, or overemphasize surface-level linguistic accuracy at the expense of content quality and critical thinking (Nasim et al., 2023; Bühler et al., 2026). Additionally, learners may struggle to determine whether AI feedback is trustworthy or sufficiently accurate for meaningful revision. Such concerns suggest that AI should function as a supplementary pedagogical resource rather than a replacement for teacher expertise. Recent scholarship increasingly advocates for hybrid feedback models that integrate AI-generated suggestions with teacher mediation. In such models, AI offers immediate corrective feedback while teachers contextualize, validate, and personalize the feedback according to learner needs (Zhai et al., 2026; Fatima et al., 2026; Yousaf et al., 2026). This collaborative approach may provide pedagogical advantages by balancing efficiency with human judgment, especially among lower-level language learners requiring scaffold instruction.

Although AI integration in writing instruction has attracted growing scholarly attention, much of the existing research remains concentrated in higher education contexts, university populations, and technologically advanced settings. Comparatively little attention has been directed toward pre-university EFL learners, particularly those operating at lower proficiency levels such as A2. Moreover, existing research often focuses exclusively on learner attitudes toward AI rather than examining whether positive perceptions correspond with actual improvements in writing performance (Maitlo, Soomro, & Lashari, 2023; Almelhes, 2024). Such limitations indicate a need for more classroom-based empirical studies that combine learner perceptions with observable writing outcomes. The present study addresses this gap by investigating the pedagogical value of AI-based writing feedback among pre-university English learners in a foundation-level EFL context. Unlike studies that solely examine perceptions, this research triangulates questionnaire responses, interview data, and writing performance evidence derived from students' pre-feedback and revised writing drafts. Furthermore, the study employs a hybrid feedback model combining AI-generated assessment with teacher mediation, reflecting authentic classroom practice rather than experimental isolation. This research is significant for several reasons. First, it contributes to emerging scholarship on AI-assisted language learning in underexplored pre-university settings. Second, it provides empirical insights into how lower-proficiency learners interpret and utilize AI-generated feedback. Third, by examining writing improvement alongside learner perceptions, the study advances understanding of whether AI-supported feedback demonstrates measurable pedagogical value beyond learner satisfaction. Finally, the findings may inform educators, curriculum designers, and policymakers seeking effective strategies for integrating AI technologies into EFL writing instruction without undermining teacher agency.

Problem Statement

A problem statement is a clear, concise summary of a specific issue, gap, or challenge that needs to be addressed. It bridges the gap between the current reality and a desired future state without prematurely prescribing a specific solution (Ahmad, Maitlo & Soomro; 2026; Yousaf et al., 2026). Writing instruction in pre-university English classrooms frequently presents considerable challenges due to learners' limited proficiency, restricted vocabulary range, grammatical inaccuracies, and insufficient opportunities for individualized feedback. Although teacher feedback remains essential in developing writing competence, practical classroom realities such as time limitations, large student populations, and extensive marking responsibilities often hinder teachers' ability to provide immediate and detailed responses to every learner's writing attempt. Consequently, students may receive delayed feedback or limited opportunities for meaningful revision. The emergence of AI-powered writing feedback tools offers potential solutions to these pedagogical limitations by providing immediate, individualized, and accessible responses to learner writing. However, despite increasing institutional and educational interest in AI-assisted learning, empirical understanding of its pedagogical effectiveness in pre-university EFL contexts remains limited. Existing studies have predominantly focused on university students, technologically advanced learning environments, or general perceptions of AI without examining how learners actually utilize feedback to improve writing performance. Moreover, limited research has explored the effectiveness of combining AI-generated feedback with teacher mediation among lower-proficiency learners, particularly at the foundation A2 level. It remains unclear whether learners perceive AI-generated writing feedback as pedagogically valuable and whether such feedback contributes to measurable writing improvement when combined with teacher guidance. Therefore, this study seeks to address this gap by exploring pre-university learners' perceptions of AI-based writing feedback and examining evidence of writing improvement within a hybrid teacher–AI feedback model.

Research Gap

Although the literature on AI-assisted language learning has expanded rapidly, several gaps remain evident. First, much of the available research has focused on higher education learners, leaving pre-university EFL learners comparatively underrepresented. The experiences and perceptions of lower-level language learners, particularly A2-level students, remain insufficiently explored. Second, many studies emphasize students' attitudes and acceptance of AI technologies rather than evaluating whether AI-generated feedback contributes to actual writing development. Perception-based findings alone provide limited pedagogical insight into whether learners improve after receiving AI feedback. Third, studies examining hybrid feedback systems combining AI-generated suggestions with teacher mediation remain relatively scarce. Existing scholarship frequently investigates AI and teacher feedback independently rather than exploring their pedagogical complementarity. Finally, empirical evidence from developing educational contexts, particularly within pre-university EFL classrooms, remains limited. This contextual gap necessitates classroom-based studies capable of demonstrating how AI feedback functions in authentic instructional settings. The present study addresses these gaps by investigating learner perceptions and writing improvement simultaneously through a mixed-methods approach within a pre-university A2-level EFL classroom utilizing hybrid teacher–AI feedback.

Research Objectives

The study aims to investigate the pedagogical value of AI-based writing feedback among pre-university English learners. Specifically, the study seeks:

1. To examine pre-university learners' perceptions of AI-based writing feedback.
2. To investigate learners' perceived usefulness of AI-generated feedback in improving writing skills.
3. To explore students' trust and acceptance of AI-supported writing assessment.
4. To identify the perceived strengths and limitations of AI-based writing feedback.
5. To examine the extent to which AI-supported feedback contributes to measurable improvement in students' writing performance.

Research Questions

The study addresses the following research questions:

RQ: 1 How do pre-university English learners perceive AI-based writing feedback?
RQ: 2 To what extent do students perceive AI-generated feedback as useful for improving writing skills?
RQ: 3 How do learners perceive the trustworthiness and usefulness of AI-supported feedback?

RQ: 4 What strengths and limitations do students identify regarding AI-based writing feedback?
RQ: 5 To what extent does AI-supported feedback contribute to improvement in learners' writing performance?

II. LITERATURE REVIEW

Literature review is a critical, structured evaluation and synthesis of existing published research on a specific topic, rather than a simple summary or list of sources (Rao et al., 2023; Ahmad et al., 2026).

AI-Based Writing Feedback in Language Learning

The integration of artificial intelligence into language education has accelerated significantly over recent years, particularly in writing pedagogy. AI-based feedback systems are increasingly capable of identifying grammatical inaccuracies, syntactic errors, vocabulary misuse, and organizational weaknesses while providing immediate revision suggestions. Such technologies have transformed writing from a teacher-dependent activity into a more interactive and self-regulated process (Luo et al., 2025). Contemporary theories of second language acquisition suggest that immediate and repeated feedback facilitates language development by encouraging noticing, revision, and metalinguistic awareness. AI systems can support these processes by providing timely responses unavailable in many traditional classroom settings (Hyland & Hyland, 2019). This immediacy is particularly beneficial for lower-level EFL learners who require consistent corrective input and opportunities for repeated practice.

Learners' Perceptions of AI-Generated Feedback

Research concerning student perceptions of AI feedback demonstrates generally positive attitudes. Students frequently report that AI feedback improves confidence, reduces anxiety, and encourages revision (Yan, 2024). Immediate correction often motivates learners to identify weaknesses independently and revise texts multiple times. However, learner trust in AI remains mixed. Some studies report skepticism concerning accuracy and contextual understanding, particularly among language learners who prefer teacher explanations for nuanced linguistic problems (Almelhes, 2024). Consequently, researchers increasingly argue that AI feedback should complement rather than replace teacher feedback.

Hybrid Teacher–AI Feedback Models

Emerging research emphasizes the pedagogical value of hybrid teacher–AI feedback approaches. According to Zhai et al. (2025), teacher mediation remains essential because instructors contextualize AI suggestions, explain misunderstandings, and provide emotional encouragement. Hybrid models combine the efficiency of AI with pedagogical expertise, thereby improving both feedback immediacy and instructional quality. Similarly, Xu and Warschauer (2025) report that students demonstrate stronger revision quality when teacher clarification accompanies automated feedback. Such findings suggest that human oversight remains indispensable for effective AI-supported language instruction.

Writing Improvement through AI Feedback

Several studies indicate that AI-assisted feedback contributes positively to measurable writing outcomes, including grammar accuracy, coherence, organization, and lexical variety (Wiboolyasarin, K., & Jinowat, N., 2025). Nevertheless, researchers caution that improvements are more substantial when learners actively engage with revision rather than passively accepting automated corrections. The present study therefore extends previous scholarship by examining whether positive learner perceptions correspond with measurable writing improvement in a pre-university EFL context.

III. METHOD

This study employed an explanatory sequential mixed-methods design, integrating quantitative and qualitative approaches to examine the pedagogical value of AI-based writing feedback among pre-university English learners. The rationale for adopting a mixed-methods approach was to develop a more comprehensive understanding of students' perceptions while simultaneously examining observable writing improvement following AI-supported

feedback. Mixed-methods research is particularly useful when quantitative findings require further explanation through qualitative inquiry (Creswell & Plano Clark, 2023). In the present study, quantitative data obtained through questionnaires and writing performance scores were complemented by qualitative interview responses to provide deeper insight into learners' experiences, trust, and perceived usefulness of AI-based feedback. The study will adopt a pragmatic research paradigm, recognizing that educational realities require the integration of multiple methodological approaches to answer complex pedagogical questions (Morgan, 2014). Specifically, quantitative methods facilitated the measurement of perception trends and writing improvement, whereas qualitative methods enable a nuanced understanding of learners' experiences with AI-supported feedback. The study followed a hybrid teacher–AI feedback model in which students first completed an initial writing task, received AI-generated feedback on linguistic and organizational issues, and subsequently obtained teacher-mediated clarification and support. Students then revised and resubmitted their writing. This process enabled the investigation of both perceived pedagogical value and measurable writing development.

The study was conducted in a pre-university foundation English classroom where English was taught as a foreign language (EFL). Participants were enrolled in an A2-level foundation English program**,** corresponding to the Common European Framework of Reference (CEFR) proficiency descriptors. At this level, students generally demonstrate basic communicative abilities but continue to experience challenges related to grammar, sentence formation, vocabulary range, organization of ideas, and writing coherence. Reflective paragraph writing formed part of routine classroom assessment, making the classroom context appropriate for examining AI-assisted feedback within authentic pedagogical practice. The intervention was embedded within normal classroom instruction to maintain ecological validity and avoid artificial experimental conditions. Rather than introducing unfamiliar assessment procedures, the study utilized the same writing assessment practices regularly implemented within the classroom.

Participants

The study population consisted of 200 pre-university foundation-level English learners enrolled in the institution's English language program. From this population, a sample of 31 students was selected using purposive convenience sampling. This sampling strategy was appropriate because the selected class had direct exposure to AI-supported writing feedback and participated consistently in writing-based classroom activities. The participant profile included:

Demographic Variable	Frequency
Total Participants	31
Male Students	21
Female Students	10
Age Range	17–19 Years
Proficiency Level	A2 CEFR
Educational Context	Pre-University Foundation

Purposive convenience sampling is commonly employed in classroom-based educational research where intervention exposure is restricted to naturally occurring groups (Dörnyei, 2007). Since the study sought to investigate learners who have direct experience with AI-assisted feedback, selecting a naturally existing classroom enhanced contextual relevance. Although the sample size is relatively small, it remained appropriate for mixed-methods classroom research, particularly in exploratory studies examining learner perceptions and instructional interventions (Cohen et al., 2002).

Instructional Procedure and Intervention

The intervention lasted across multiple classrooms writing sessions and involved a structured teacher–AI hybrid feedback process.

Stage 1: Initial Writing Task

Students were required to produce reflective paragraphs and classroom-based writing responses linked to English learning activities. Writing tasks emphasized personal reflection, organization of ideas, grammar accuracy,

sentence formation, and coherence. Students initially completed writing tasks independently without external support. These drafts constituted the pre-feedback writing sample**.**

1) Stage 2: AI-Based Writing Feedback

Following the initial submission, students received AI-generated writing feedback. The AI system focused primarily on: Grammatical accuracy, spelling errors, sentence structure, vocabulary use, paragraph organization, sequencing of ideas, coherence, and mechanics. The AI-generated feedback highlighted errors and suggested improvements to enhance clarity and readability.

Stage 3: Teacher Mediation

Following AI feedback, the teacher reviewed students' writing and mediated the feedback process by clarifying misunderstood corrections, contextualizing linguistic suggestions, explaining grammatical concepts, addressing coherence and organization issues, and validating or refining AI recommendations. Teacher mediation ensured that learners did not rely exclusively on automated suggestions and helped students understand the pedagogical rationale behind revisions.

Stage 4: Revised Draft Submission

Students revised their writing based on combined AI and teacher feedback. The revised drafts constituted the post-feedback writing sample**,** enabling comparison of writing performance before and after intervention. This feedback cycle reflected authentic classroom practice and aligns with pedagogical recommendations emphasizing teacher oversight in AI-supported writing instruction (Garzón et al., 2025).

Research Instruments

The study employed three instruments for triangulation purposes:

1. Questionnaire
2. Semi-Structured Interviews
3. Writing Performance Assessment Rubric

Methodological triangulation enhanced validity by allowing multiple sources of evidence to address the same research questions (Flick, 2018).

Questionnaire

A five-point Likert-scale questionnaire was developed to examine students' perceptions of AI-based writing feedback. The responses comprised strongly agree, agree, neutral, strongly disagree, and disagree. The questionnaire consisted of 24 items divided into five constructs, as shown in the table:

Construct	Number of Items
Perceived Usefulness	6
Trust in AI Feedback	5
Ease of Use	4
Motivation and Confidence	5
Preference for Feedback Type	4

The questionnaire items were adapted from previous studies investigating learner perceptions of AI-assisted language learning and automated writing evaluation (Ranalli, 2021; Wang & Han, 2025).

Semi-Structured Interviews

To complement quantitative findings, semi-structured interviews were conducted with a subset of participants selected purposively from the sample. A total of eight students participated in interviews to ensure representation of varied experiences and attitudes toward AI feedback.

Writing Performance Assessment Rubric

To assess writing improvement, students' pre-feedback and revised drafts were evaluated using an analytic writing rubric adapted from commonly used EFL writing assessment frameworks (Hyland, 2019). Writing performance was assessed across five criteria:

Criterion	Marks
Grammar Accuracy	5
Vocabulary Use	5
Organization	5
Coherence and Cohesion	5
Mechanics (Spelling & Punctuation)	5
Total	25

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The rubric facilitated objective comparison between pre-feedback and revised writing performance. To ensure instrument reliability, the questionnaire underwent internal consistency reliability testing using Cronbach's Alpha coefficient. According to George and Mallery (2024):

- α ≥ .90 = Excellent
- α ≥ .80 = Good
- α ≥ .70 = Acceptable

A reliability threshold of 0.70 or higher was considered acceptable for this study. Content validity was established through expert review by English language instructors familiar with writing pedagogy and classroom assessment practices. Questionnaire items were refined to ensure clarity, relevance, and alignment with research objectives. Triangulation of questionnaire findings, interview data, and writing performance evidence further strengthened the trustworthiness of the study (Lincoln & Guba, 2003).

Data Collection Procedure

Data collection occurred in four phases.

Phase 1: Baseline Writing Collection: Students completed initial paragraph-writing tasks independently.

Phase 2: AI and Teacher Feedback: Students received AI-generated feedback followed by teacher-mediated explanations and guidance.

Phase 3: Revised Writing Submission: Students revised and resubmitted writing drafts.

Phase 4: Perception Data Collection: Students completed questionnaires, followed by interviews with selected participants.

This sequencing enabled the examination of perceptions after direct engagement with AI-supported writing feedback.

Data Analysis

2) Quantitative Analysis

Questionnaire responses were analyzed using descriptive statistics**,** including frequencies, percentages, means, and standard deviations. Reliability was measured through Cronbach's Alpha**.** While writing performance evidence was analyzed using pre- and post-feedback comparison scores across rubric categories. Where appropriate, paired sample t-tests were employed to determine whether differences between pre-feedback and revised writing scores were statistically significant. Moreover, quantitative analysis was conducted using IBM SPSS Statistics.

Qualitative Analysis

Interview data were analyzed using thematic analysis following Braun and Clarke's (2021) six-step framework:

1. Familiarization with data
2. Initial coding
3. Searching for themes
4. Reviewing themes
5. Naming themes
6. Report writing

Thematic analysis enabled the identification of recurring perceptions regarding usefulness, trust, motivation, limitations, and teacher mediation.

Ethical Considerations

Ethical procedures were observed throughout the study. Participants were informed about the purpose of the research and assured that participation was voluntary. Confidentiality and anonymity were maintained by replacing student names with coded identifiers. Students were informed that questionnaire responses and interview comments would be used solely for research purposes and would not influence academic grading. Consent was obtained before interviews and data recording. The study also maintained pedagogical transparency regarding the role of AI feedback to ensure students understood that AI functioned as a supplementary educational tool rather than a replacement for teacher judgment.

IV. RESULTS

This section presents the quantitative and qualitative findings regarding learners' perceptions of AI-based writing feedback and evidence of writing improvement following a hybrid teacher–AI intervention. Findings are organized into four sections: (1) reliability analysis, (2) questionnaire findings, (3) writing performance evidence, and (4) interview findings.

Reliability Analysis of the Questionnaire

Before conducting descriptive statistical analysis, internal consistency reliability of the questionnaire was examined using Cronbach's Alpha coefficient to determine the extent to which items within the instrument measured similar constructs.

Table I: Reliability Statistics of the Questionnaire

Variable	Cronbach's Alpha	Number of Items
Overall Questionnaire	.87	24
Perceived Usefulness	.84	6
Trust in AI Feedback	.79	5
Ease of Use	.82	4
Motivation and Confidence	.85	5
Feedback Preference	.77	4

The overall reliability coefficient (α = .87) demonstrated good internal consistency, indicating that questionnaire items reliably measured students' perceptions regarding AI-supported writing feedback. According to (George, D., & Mallery, P. 2024) values above .80 indicate strong reliability, while coefficients above .70 are considered acceptable. The findings suggest that the questionnaire possessed adequate psychometric reliability for classroom-based educational research.

Learners' Perceptions of AI-Based Writing Feedback

Questionnaire findings indicate that learners generally held positive perceptions regarding AI-based writing feedback. Students particularly valued AI support for grammar correction, spelling accuracy, vocabulary enhancement, and organization of ideas.

Table II: Descriptive Statistics of Learners' Perceptions of AI-Based Writing Feedback (n = 31)

Construct	*M*	*SD*	Interpretation
Perceived Usefulness	4.28	0.53	High
Ease of Use	4.16	0.61	High
Motivation and Confidence	4.11	0.58	High
Trust in AI Feedback	3.82	0.66	Moderate–High
Preference for Hybrid Feedback	4.42	0.47	Very High

The highest mean score emerged for preference for hybrid feedback (M = 4.42, SD = 0.47), suggesting that students strongly favored the combination of teacher and AI feedback rather than relying on either source independently. Similarly, perceived usefulness (M = 4.28, SD = 0.53) received a high rating, indicating that students believed AI feedback meaningfully contributed to writing improvement. Students frequently reported that AI-assisted feedback helped them identify grammatical mistakes, spelling errors, and sentence-level problems more effectively. The relatively strong rating for ease of use (M = 4.16, SD = 0.61) indicates that most learners found AI feedback accessible and understandable despite operating at an A2 language proficiency level. However, trust in AI feedback (M = 3.82, SD = 0.66) received comparatively lower scores, indicating moderate skepticism among learners. Students occasionally questioned the contextual appropriateness of AI suggestions and often sought teacher confirmation before applying revisions. These findings align with recent scholarship indicating that learners appreciate the immediacy and convenience of AI-generated feedback but continue to value teacher guidance for contextual clarification and accuracy verification (Wang & Han, 2025).

Table III: Selected Questionnaire Item Responses

Questionnaire Item	*M*	Interpretation
AI feedback helped improve my grammar.	4.45	Very High
AI feedback improved my paragraph organization.	4.19	High
AI feedback motivated me to revise my writing.	4.26	High
I trust AI feedback completely.	3.58	Moderate
Teacher explanation helped me understand AI suggestions.	4.61	Very High
AI feedback should be used in English classes.	4.33	High

The strongest agreement was observed for teacher mediation (M = 4.61), indicating that learners considered teacher clarification essential to understanding AI-generated feedback. This finding reinforces arguments in recent educational technology literature suggesting that AI functions most effectively as a supplementary pedagogical tool rather than an autonomous instructional replacement (Zhai et al., 2025).

Writing Performance Evidence

To examine whether AI-supported feedback contributed to measurable writing improvement, students' pre-feedback writing samples were compared with revised drafts using the analytic writing rubric assessing grammar, vocabulary, organization, coherence, and mechanics.

Table IV: Pre- and Post-Feedback Writing Performance Scores (n = 31)

Criterion	Pre-Test Mean	Post-Test Mean	Mean Difference
Grammar Accuracy	2.71	3.89	+1.18
Vocabulary Use	2.84	3.76	+0.92
Organization	2.58	3.94	+1.36
Coherence and Cohesion	2.49	3.81	+1.32
Mechanics	2.67	4.02	+1.35
Overall Score (25)	13.29	19.42	+6.13

Results demonstrate substantial improvement across all rubric categories following AI-supported revision. The largest improvements were observed in organization (+1.36), mechanics (+1.35), and coherence (+1.32). These findings indicate that AI-generated feedback, supplemented through teacher mediation, significantly enhanced students' ability to sequence ideas, improve sentence clarity, and correct mechanical errors. Grammar also improved considerably (+1.18), suggesting that students benefited from immediate corrective feedback regarding sentence structure and linguistic accuracy. The findings are consistent with recent research showing that AI feedback can facilitate revision behavior and improve writing quality, particularly in areas involving surface-level linguistic correction and organizational clarity (Nazari et al., 2025).

Inferential Analysis of Writing Improvement

To determine whether observed differences between pre-feedback and revised writing performance were statistically significant, a paired sample t-test was conducted.

Table V: Paired Sample t-Test for Writing Improvement

Variable	Mean Difference	t-value	p-value
Overall Writing Score	6.13	8.72	.000

Results indicate a statistically significant improvement in writing performance following AI-supported feedback **(**$t = 8.72$, $p < .001$**).** The findings suggest that the hybrid teacher–AI feedback intervention had a substantial positive effect on learners' writing performance. The observed gains are consistent with studies reporting that immediate AI-generated feedback encourages repeated revision and facilitates language noticing, especially among lower-proficiency EFL learners (Yan, 2024; Xu & Warschauer, 2025). Importantly, the statistical improvement observed in this study strengthens claims regarding the pedagogical value of AI-assisted writing feedback when implemented alongside teacher mediation.

Interview Findings

To complement quantitative findings, semi-structured interviews were conducted with eight students representing diverse learner experiences. Thematic analysis generated four major themes**:** improvement in writing accuracy, motivation and confidence, need for teacher clarification, and concerns regarding AI reliability.

Theme I: Improvement in Writing Accuracy

Most participants perceived AI feedback as beneficial for correcting grammatical and spelling errors. One student commented: "Before AI feedback, I made many grammar mistakes. After correction, I could understand where I was wrong." (Participant 4). Another participant stated: "AI helped me improve sentence making because it showed mistakes quickly." (Participant 7). Students consistently emphasized the immediacy of AI-generated corrections and their usefulness for identifying writing weaknesses. This finding corresponds with recent studies showing that automated feedback promotes metalinguistic awareness and self-correction in EFL writing (Almelhes, 2024).

Theme II: Increased Motivation and Confidence

Several participants reported increased confidence after receiving AI-assisted feedback. One participant explained: "When I corrected mistakes using AI feedback, I felt more confident in writing." (Participant 2). Another student noted: "I liked revising because I wanted my paragraph to become better." (Participant 5). Learners frequently associated feedback with a sense of progress and writing improvement. Recent scholarship similarly suggests that AI-supported feedback positively influences learner confidence and revision engagement (Wang & Han, 2025).

Theme III: Need for Teacher Clarification

Although students valued AI feedback, participants consistently emphasized the importance of teacher mediation. One student explained: "Sometimes AI feedback was difficult. Teacher explained it better." (Participant 1). Another participant stated: "I trusted feedback more when the teacher checked it." (Participant 6). These findings reinforce growing scholarly arguments that teacher oversight remains essential in AI-supported language learning (Kasneci et al., 2024).

Theme IV: Concerns Regarding AI Reliability

Some students expressed concerns about the accuracy or contextual appropriateness of AI-generated suggestions. One participant commented: "Sometimes AI changed sentences that were already okay." (Participant 8). Another learner stated: "I checked with teacher before accepting difficult suggestions." (Participant 3). These concerns indicate that students maintained critical engagement with AI-generated recommendations rather than accepting feedback unquestioningly. Such findings align with emerging literature cautioning educators against overreliance on generative AI systems in writing assessment (Zhai et al., 2025).

Summary of Findings

Overall findings suggest that students perceived AI-supported feedback positively and considered it pedagogically valuable for improving writing performance. Three major findings emerged:

1. Students perceived AI-generated writing feedback as useful, motivating, and easy to use.

2. Learners strongly preferred hybrid teacher–AI feedback**,** indicating that teacher mediation remained pedagogically essential.
3. Writing performance improved significantly following AI-supported revision, particularly regarding grammar, mechanics, coherence, and organization.

These findings provide evidence supporting the pedagogical integration of AI into pre-university EFL writing classrooms while simultaneously emphasizing the continuing importance of teacher expertise in contextualizing automated feedback.

V. DISCUSSION

The present study investigated the pedagogical value of AI-based writing feedback among pre-university A2-level English learners through a hybrid teacher–AI feedback model. Findings indicate that learners generally perceived AI-supported feedback positively and demonstrated measurable improvement in writing performance following AI-assisted revision and teacher mediation. The discussion interprets these findings in relation to existing scholarship and the study's research questions.

Learners' Positive Perceptions of AI-Based Writing Feedback

The first research question examined how pre-university learners perceived AI-based writing feedback. Findings revealed generally positive learner perceptions regarding the usefulness, accessibility, and motivational value of AI-generated feedback. Students particularly valued AI assistance in correcting grammatical errors, improving sentence structure, enhancing paragraph organization, and supporting revision. These findings support recent research suggesting that AI-based feedback facilitates learner engagement and improves perceptions toward writing revision. Students in the present study reported that immediate feedback enabled them to recognize mistakes quickly and revise texts more confidently. This aligns with evidence showing that generative AI systems can enhance writing awareness by supporting error noticing and repeated revision practices among EFL learners (Yan, 2024). The high-perceived usefulness score further supports claims that AI can function as an effective supplementary pedagogical resource in writing classrooms. Previous studies have similarly reported that learners value automated feedback because of its immediacy, accessibility, and individualized responses (Wang & Han, 2025). For lower-proficiency learners, such immediacy appears especially important because delayed teacher feedback often limits opportunities for sustained revision. Importantly, the findings suggest that even A2-level learners—often assumed to possess limited linguistic autonomy—can engage meaningfully with AI-supported writing feedback when adequate instructional support is provided. This contributes to existing literature by extending AI-feedback research beyond university populations into pre-university language learning contexts.

Trust in AI Feedback and the Continuing Role of Teacher Mediation

Although students generally viewed AI positively, trust scores remained comparatively lower than usefulness ratings. Interview findings further demonstrated that learners occasionally questioned the contextual accuracy of AI-generated suggestions and frequently sought teacher validation before revising their writing. This finding aligns with contemporary research arguing that learners may appreciate AI-generated feedback while remaining cautious regarding reliability and contextual appropriateness (Kasneci et al., 2024). Generative AI tools sometimes provide linguistically correct but contextually unsuitable revisions, especially when interpreting nuanced learner intentions or low-proficiency writing. The relatively moderate trust score observed in this study reinforces concerns regarding overreliance on automated feedback systems. Students' preference for teacher clarification suggests that AI-generated feedback alone may not sufficiently address learners' pedagogical needs, particularly among foundation-level students requiring explicit explanation and scaffolding. The findings therefore strongly support recent scholarship advocating hybrid teacher–AI pedagogical models**.** Students in this study demonstrated a clear preference for combined feedback, reporting that teacher mediation helped them interpret AI suggestions and understand grammatical explanations more effectively. Similar conclusions have been reported by recent studies emphasizing that teachers remain indispensable for contextualizing AI feedback, resolving misunderstandings, and providing emotional and motivational support (Zhai et al., 2025). Rather than replacing teachers, AI appears to function most effectively as a pedagogical augmentation tool capable of enhancing instructional efficiency while preserving human expertise.

Writing Improvement Following AI-Supported Revision

The third major finding concerned measurable writing improvement following AI-assisted revision. Results demonstrated statistically significant gains in students' revised writing across grammar, organization, coherence, vocabulary, and mechanics. The greatest improvements emerged in organization**,** mechanics, and coherence**,** suggesting that AI feedback was particularly effective in helping learners sequence ideas, structure paragraphs, and correct technical writing issues. These findings correspond with emerging evidence showing that AI-generated feedback is especially effective in addressing surface-level writing concerns, including grammar, punctuation, spelling, and textual organization (Nazari et al., 2025). The improvement in coherence and organization is particularly noteworthy because lower-level learners frequently struggle to structure ideas logically in extended writing. AI-generated suggestions may have scaffolded students' ability to reorganize sentences and improve paragraph flow, while teacher mediation likely reinforced understanding of coherence and sequencing principles. Similarly, substantial improvement in grammar accuracy supports findings from automated writing evaluation research demonstrating that repeated exposure to immediate corrective feedback can strengthen learners' metalinguistic awareness and reduce language errors over time (Ranalli et al., 2021). The statistically significant increase in overall writing performance **(**$p < .001$**)** suggests that the intervention yielded measurable pedagogical value rather than merely generating positive learner perceptions. This distinction is important because much prior research concerning AI in language education has focused primarily on attitudes and technology acceptance rather than actual language outcomes. Consequently, the present study contributes empirical evidence supporting claims that AI-supported writing feedback can improve writing quality when integrated within pedagogically structured revision cycles.

The Pedagogical Value of Hybrid AI–Teacher Feedback

One of the most important contributions of this study lies in its support for hybrid feedback pedagogy**.** Students strongly preferred combined teacher and AI feedback rather than either system independently. This finding suggests that pedagogical effectiveness does not necessarily emerge from technological replacement but rather from complementary instructional integration. AI contributed speed, consistency, and immediate corrective feedback, while teachers contributed contextual understanding, emotional reassurance, and individualized explanation. Together, these components appear to have created a more supportive revision environment. This finding resonates with sociocultural perspectives of learning, which emphasize scaffolding, guided mediation, and interaction in language development (Lantolf & Thorne, 2006). From this perspective, AI may serve as an instructional scaffold, but teacher mediation remains necessary to transform feedback into meaningful learning. Recent scholarship increasingly argues that the most pedagogically sustainable future of AI in education lies in human–AI collaboration rather than substitution (Luckin, 2025). The present findings provide classroom-level evidence supporting this argument.

Pedagogical Implications

The findings of this study offer several implications for English language teaching, curriculum development, and educational policy.

Integration of AI into Writing Pedagogy

English language instructors may benefit from integrating AI-supported feedback into writing instruction to supplement teacher commentary. AI tools can provide immediate corrective feedback, enabling students to revise writing more efficiently and independently. However, implementation should remain pedagogically guided rather than technologically driven. Teachers should explicitly teach students how to critically evaluate AI-generated suggestions rather than accepting them uncritically.

Teacher Mediation as a Pedagogical Necessity

The study strongly indicates that teacher mediation remains indispensable, particularly among lower-proficiency learners. Educational institutions should therefore avoid framing AI as a replacement for teachers and instead position it as a complementary instructional resource. Professional development initiatives should prepare teachers to integrate AI pedagogically while maintaining instructional oversight.

Curriculum-Level Integration

Pre-university language programs may consider incorporating structured AI-supported revision activities into writing curricula. Such activities may strengthen grammar awareness, learner autonomy, and revision habits while reducing delays associated with traditional feedback cycles.

Digital Literacy Development

Because students occasionally expressed uncertainty regarding AI reliability, educational institutions should prioritize AI literacy and critical digital evaluation skills. Learners should understand both the benefits and limitations of AI-generated feedback.

Limitations of the Study

Several limitations should be acknowledged. First, the study involved a relatively small sample size (n = 31) from a single pre-university classroom, which may limit generalizability. Second, participants represented A2-level learners, and findings may not transfer directly to learners at higher proficiency levels. Third, the study examined short-term writing improvement rather than longitudinal language development. Future studies should investigate whether improvements persist over extended periods. Fourth, the study focused specifically on paragraph-level writing tasks. Further research may examine longer forms of writing, including essays, reports, and argumentative texts. Finally, although triangulation strengthened trustworthiness, learner perceptions may still be influenced by novelty effects associated with AI technologies.

VI. CONCLUSION

This study investigated the pedagogical value of AI-based writing feedback among pre-university A2-level English learners through a hybrid teacher–AI feedback model. Findings indicate that learners generally perceived AI-supported feedback positively and viewed it as useful for improving grammar, organization, sentence structure, and writing confidence. Importantly, measurable writing improvement was observed following AI-assisted revision, particularly in organization, coherence, grammar, and mechanics. These improvements suggest that AI-supported feedback possesses genuine pedagogical value beyond learner satisfaction. However, findings also emphasize that students did not perceive AI as a substitute for teacher expertise. Instead, learners strongly preferred a hybrid feedback model in which teachers contextualized AI-generated suggestions and clarified misunderstandings. The study therefore concludes that AI-based writing feedback demonstrates considerable pedagogical promise when implemented responsibly within teacher-guided instructional environments. Rather than replacing teachers, AI may best function as a complementary educational tool capable of enhancing revision practices, learner autonomy, and writing development in EFL classrooms.

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