



Exploring the Influence of AI-Assisted Feedback on EFL Students' Writing Performance and Self-Editing Skills

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Abstract

This study explores the influence of AI-assisted feedback tools, specifically Grammarly, on EFL students' writing performance and self-editing skills in a university context. Grounded in Cognitive Process Theory of Writing (CPTW), this research adopts a mixed-method design. It combines both a quantitative analysis of pre- and post-tests and qualitative data from surveys and interviews. Sixty contributors were split into two cohorts: a traditional one receiving teacher feedback, and an experimental one using Grammarly during drafting and revision. Results indicate that the AI feedback students substantially outperformed their counterparts in the control group in writing quality, particularly in grammar, lexical range, and content organization. Additionally, students using AI-assisted tools demonstrated more frequent and strategic self-editing behaviors and reported increased autonomy and confidence. This study empirically bridges AI feedback tools with CPTW, revealing how they foster iterative self-editing and autonomy, a gap in EFL writing research. While teacher feedback remains essential for higher-order concerns, the integration of AI tools supports iterative revision and independent learning. This investigation emphasizes the educational value of mixing AI with conventional instruction and suggests implications for designing curriculum and developing instructional tools.

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INTRODUCTION

Background, Purpose and Importance of the Study

The quick expansion of artificial intelligence (AI) has influenced many qualities of learning in general, English as a Foreign Language (EFL) acquisition in particular, and writing instruction is not an exception. AI's ability to present real-time, individualized feedback on students' writing is one of its most promising applications. Grammarly has been considered as an accessible solution that offers immediate and targeted suggestions for language intelligibility and accurateness. Such tools can help EFL learners practice and refine writing independently, and as a result support the improvement of self-governing skills (Ghufron & Rosyida, 2018). This could remarkably be implemented in big classrooms where individualized teaching is restricted by time or resources (Dinçay & Erdemir, 2023; Merkviladze, 2024).

AI feedback tools strongly support recent developments like individualized learning and learner autonomy. According to (Dinçay & Erdemir, 2023) current studies reveal that AI-assisted feedback can increase metacognitive perception, boost learners' writing autonomy, and support iterative revision activities. However, inquiries continue about the possible pedagogical value of AI feedback compared to conventional feedback in developing writing abilities, especially in EFL contexts. Based on Flower & Hayes's (1981) Cognitive Process Theory of Writing (CPTW), which considers writing as an iterative cycle of planning, drafting, and revising, this research discovers the role of AI-assisted feedback in promoting self-editing activities and developing writing performance, a gap in EFL writing research. To deeply understand how emerging educational technologies can simplify language development, this study explores the effect of Grammarly Premium (version 16.5) on Saudi EFL undergraduates. To leverage AI tools in global educational settings, the results of this study offer practical suggestions for incorporating AI into writing instruction and emphasize future directions.

Research Questions

To address the aims of this study and align with the broader goals of technology-enhanced language learning research, these questions steered the investigation:

1. How does the effectiveness/pedagogical value of AI-generated feedback compare to that of conventional teacher feedback in improving EFL undergraduates' writing performance?
2. How does AI-assisted feedback affect EFL undergraduates' self-editing behaviors throughout the writing process?
3. What are EFL undergraduates' perceptions of AI-assisted tools in supporting writing independence and enhancing overall writing skills?

In conclusion, this article tries to address substantial pauses in the existing research by evaluating the effectiveness/pedagogical value of AI-assisted feedback in developing EFL students writing performance in a Saudi university context. By examining the influence of AI tools on self-editing behaviors, comparing their effectiveness with traditional teacher feedback, and exploring students' perceptions of these technologies, this research offers treasured understandings into the potential of AI-assisted writing instruction. Furthermore, by grounding the study in CPTW, it provides a deeper thoughtfulness of how AI-driven feedback can support the iterative, self-regulatory nature of writing, and how it can contribute to the development of greater writing autonomy.

Literature review

Recent research shows that automated writing evaluation tools like *Grammarly* provide immediate feedback that improves accuracy and supports self-editing, but more evidence is needed on their influence in EFL university contexts.

A Theoretical Framework

CPTW is adopted by this study. According to Flower & Hayes (1981) this theory considers writing as an iterative process implying several stages: prewriting, drafting, reviewing, and editing. To improve their work through cycles of review and refinement, writers go through iterative self-reflection feedback. This CPTW's central process is often supported by teacher guidance in traditional classrooms. Though, students can receive direct, personalized input at each writing stage with the appearance of AI-assisted feedback tools. The alignment between AI-assisted writing and CPTW values is supported by recent research (Yu et al., 2025). AI tools offer continuous and

formative feedback that prompts students to improve their drafts and eventually recognize surface-level errors and address them quickly, allowing more time and cognitive resources to focus on higher-order concerns. However, Kim & Tan (2023) cautions that while AI tools promote iterative self-revision, they may not fully address deeper elements of argument development without teacher scaffolding. By leveraging real-time, automated guidance, AI tools support CPTW's recursive process and empower learners to take greater responsibility for their writing progress. Adopting AI-assisted tools can thus enhance learners' metacognitive awareness, improve self-regulation, and support the development of writing independence, core goals of writing instruction in technology-enhanced language learning contexts.

While CPTW (Flower & Hayes, 1981) offers a principal understanding of writing as a recursive process, contemporary L2 writing academics underscore its critical, technological, and social dimensions. Genre scholars (Bhatia, 1993; Hyland, 2015; Tardy, 2016; Swales, 1990) claim that writing is a social practice ruled by discourse-community norms. This suggests that AI tools must evolve to offer genre-specific feedback (for example, discipline-specific conventions in professional writing or rhetorical moves in academic abstracts). Sociocultural academics (Ferris, 2014; Lantolf & Thorne, 2006; Vygotsky, 1978) highlight writing progress through social interaction. This puts AI as one possible scaffold among many but emphasizes the exceptional role of human teachers in adapting to learners' changing needs and dealing with higher-order worries. Translingual and critical viewpoints (Canagarajah, 2013; Horner et al., 2011; Matsuda, 2003) challenge main language ideologies in writing assessment, calling for AI systems that accommodate multilingual practices rather than enforcing monolingual norms. Meanwhile, technology researchers (Kessler, 2020; Reinders, 2020; Ware & Kessler, 2016; Warschauer, 2010) highlight how digital tools convert writing into an autonomous, multimodal, and collaborative process, a shift CPTW does not address. Functional Linguistics (Halliday, 1994; Schleppegrell, 2004) further makes the picture complicated by dealing with language as a context-dependent meaning-making system. This suggests that AI tools should develop lexical suggestions. This theoretical synthesis reveals that while AI feedback aligns well with CPTW's emphasis on iterative drafting (particularly for lower-order concerns), its effective incorporation requires dealing with sociocultural mediation, genre conventions, linguistic diversity, contextual meaning-making, and digital collaboration, aspects where human instruction remains essential and current tools remain limited.

AI-Assisted Feedback in Writing Instruction

Writing is a complex skill that integrates both linguistic knowledge and higher-order cognitive processes, including planning, drafting, revising, and editing (Flower & Hayes, 1981). Traditional feedback often highlights superficial-level errors like spelling and grammar. While valuable, this focus can limit opportunities for engagement with rhetorical structure, coherence, and style, especially in large classes where personalized feedback may be constrained (Hyland & Hyland, 2006). In this context, AI feedback tools have emerged as promising solutions for supporting writing development. Recent research (Abu Qub'a et al, 2024; Hoang & Van, 2025) indicates that contemporary tools like Grammarly can deliver type-specific feedback and help students identify recurring errors in vocabulary, syntax, and mechanics. Additionally, AI tools motivate autonomous learning by providing constant chances for self-correction and revision (Song & Song, 2023). These tools can accelerate more sustained practice and help learners build metacognitive skills that are significant for developing writing accuracy and fluency.

AI Tools and Self-editing Behavior

According to Merkviladze (2024) self-editing is a crucial writing process element; it helps learners reconsider their writing and make practical developments. The ability to revise drafts is thoroughly tied to the progress of writing independence and long-term writing expertise. She states that AI feedback tools have revealed significant promise in developing students' self-editing attempts. According to Dinçay & Erdemir (2023) and Merkviladze (2024) emerging proof indicates that AI tools can considerably encourage systematic error recognition and raise learners' metacognitive awareness. Targeted learning prompts and personalized error-tracking dashboards are two examples that can help students identify recurring language issues in their drafts and enable them to plan and implement more individual revisions. By providing continuous, real-time support, AI tools encourage iterative improvement and help students develop the confidence and autonomy needed to take greater ownership of their writing development.

Comparing AI Feedback with Teacher Feedback

Teacher feedback remains a cornerstone of writing instruction and has been shown to enhance student writing when it is timely, specific, and constructive. However, teacher feedback can be limited by practical constraints such as large class sizes, time-intensive grading, and variability in the depth of comments provided (Ferris, 2012). In contrast, AI tools offer immediate, consistent feedback on a broad range of language features. AI systems can quickly highlight surface-level punctuation, grammar, and spelling mistakes and encourage more frequent, low-stakes revision cycles that might otherwise be difficult to implement. However, while AI tools excel in delivering accurate linguistic corrections, they often lack the capacity for nuanced feedback on content and argument development that experienced teachers can provide (Ferris, 2012; Merkviladze, 2024). A recent meta-analysis by Shi & Aryadoust (2024) supports this distinction, showing that AI feedback significantly improved grammatical accuracy, while teacher feedback was more effective in enhancing discourse-level features, such as coherence and content organization. Recent comparative studies on human writing feedback versus AI reveal both the potential and limitations of automated tools in FL instruction. Research demonstrates AI's clear advantages in dealing with lower-order concerns like grammar and mechanics (Alnemrat et al., 2025; Sanosi, 2022) and providing immediate and scalable feedback (Steiss et al., 2024; Zhang & Zhang, 2025). However, these studies constantly show AI's shortcomings in handling higher-order writing skills such as coherence, argument development, and audience awareness (Alnemrat et al., 2025; Steiss et al., 2024), as well as its incapability to adapt to individual learner needs (Sanosi, 2022; Zhang & Zhang, 2025). This has led researchers to suggest hybrid feedback models where AI handles initial drafting stages before teacher intervention (Zhang et al., 2025), coupled with explicit student training on critically evaluating AI suggestions (Zhang & Zhang, 2025). The collective findings caution against over-reliance on AI while advocating for its strategic integration as a complement to, rather than replacement for, human feedback, particularly in dealing with the complex and contextual nature of FL writing growth. Given these findings, this study aims to build on existing research by comparing AI-assisted (Grammarly Premium, version 16.5) and teacher-led feedback in an EFL university context, with a particular focus on their influence on writing quality and self-editing behavior.

Perceptions of AI Feedback

Both evaluating the AI-assisted feedback influence on writing performance and understanding students' perceptions of these tools are important. Students' readiness to use such tools and, by extension, the effectiveness/pedagogical value of the learning process can strongly be influenced by their attitudes toward educational technology (Wang & Fan, 2025). Current research (AlHusaini & Qutub, 2025; Alsofyani & Barzanji, 2025; Alqaed, 2024) discovers that Saudi EFL students favor a mixed feedback approach and cite the consistency and speed of AI-generated corrections as especially appreciated. Studying EFL students' attitudes about AI tools and their role in backing writing development is thus central to understanding how such technologies can stimulate deeper writing autonomy and skill development. This study seeks to contribute to a more accurate view of AI-assisted writing instruction and to update the effective integration of these tools into learning settings by capturing students' subjective preferences and experiences.

Novelty and Contribution of the Study

To address a diagnostic pause in current research, this research article tries to analytically explore the comparative effect of AI-generated feedback versus teacher feedback on EFL students' writing ability. Though former research has examined the benefits of AI tools in isolation, few research articles have investigated their effectiveness alongside conventional practices within a process-writing framework. Explicitly, this investigation advances writing pedagogy by demonstrating that AI-assisted feedback tools can support recursive revision and drafting and helps students build convincing metacognitive understanding and wider writing autonomy. Moreover, the findings contribute to the design of AI-assisted language learning tools by identifying which features most effectively support EFL writers. These insights can inform future tool development to better address higher-order concerns like argument structure, coherence, and discourse style. Finally, this study offers practical guidelines for teachers by suggesting how AI tools can be incorporated into writing instruction.

METHODS

A comparative mixed-methods design was adopted. The study combined qualitative data on students' experiences with AI feedback with quantitative measures of writing quality. This allowed for a more comprehensive evaluation of both subjective perceptions and objective outcomes. To reach these aims, the methodology was structured around five essential components: participant selection, research design, data collection tools, data collection tools' validity and reliability, and data analysis methods.

Participant Selection

Participants comprised 60 Saudi undergraduates randomly selected from a cohort of 300 students registered in an EFL writing program at King Abdulaziz University. Those participants were evenly split into an experimental group (n=30) that used AI-assisted feedback (Grammarly Premium, version 16.5) and a control group (n=30) that used teacher feedback. Participation was voluntary, and all students had demonstrated intermediate-level English proficiency, as determined by the university's standardized language placement test. A subgroup of 15 students from the experimental group were randomly designated for follow-up semi-structured interviews and all experimental group members (30) were designated for the surveys at the end of the investigation. (Experimental group students are more capable of comparing AI feedback with teacher feedback; this is why the latter was excluded from interviews and surveys.)

Research Design

To answer the research questions, a quantitative and qualitative mixed-methods design was used. This technique enabled a more comprehensive assessment of writing performance and self-editing behaviors, and at the same time capturing students' subjective experiences with different forms of feedback.

Quantitative Factor

To quantitatively assess developments in writing performance across one university semester (14 weeks), a **pre- and post-tests** quasi-experimental design was followed (See Appendix A.). During the semester, both groups finished multiple drafts. Their final drafts served as the main data for post-intervention analysis.

The conventional group received traditional feedback provided on each draft, along with personalized recommendations for enhancement. They received comprehensive teacher feedback consisting of **Direct corrective feedback** (explicit corrections of errors, underlined/coded and reformulated sentences where needed), **Marginal comments** addressing local issues (e.g., "Unclear reference, specify which theory") and global issues (for example, "This paragraph needs a stronger topic sentence."), **End comments** summarizing 3 key strengths and 3 priority areas for improvement, and **Rubric-based scoring** using Appendix D criteria. Feedback was delivered within 72 hours of submission, provided on both paper and digital copies, followed by 15-minute individual conferences for 50% of submissions, and focused on both form (accuracy) and content (ideas, organization).

In contrast, the experimental group utilized AI-assisted feedback (Grammarly) to revise their drafts. This feedback provided automated recommendations and corrections, addressing not only surface-level errors but also stylistic and structural features. They used Grammarly Premium (version 16.5) for all drafting and revision stages. The tool provided: **Real-time automated feedback** displayed as underlined suggestions in the text, **Direct corrections** for grammar errors (verb tense, article usage), mechanical issues (spelling, punctuation), word choice (vocabulary suggestions) and sentence structure (conciseness, clarity), **Explanations** for each suggestion (available via hover-over), and **Tone/style adjustments** (formality level, readability scores). Students were instructed to review all suggestions systematically, accept/reject changes based on the tool's explanations and their understanding of the writing context, document revisions made in response to Grammarly, and consult instructors when uncertain about suggestions. **Example:** For the error "She go to school", Grammarly would underline "go", suggest "goes" with grammar rule explanation, and allow instant acceptance with one click.

Qualitative Factor

To explore students' opinions this study used two qualitative data collection instruments: semi-structured interviews (See Appendix C.) and surveys (See Appendix B.) to achieve in-depth perceptions into how students were involved in both types of feedback. At the end of the intervention, an experimental sub-sample of 15 students participated in the interviews. The interview protocol was designed to discover students' opinions on the AI tools, the writing revision process, and the perceived effect of feedback on their writing improvement. Students were encouraged to compare AI feedback with teacher feedback. The semi-structured format enabled flexibility and follow-up questions, facilitating accurate insights of students' perceptions. In addition, all undergraduates in the experimental group (30) finished a survey at the end of the term. This survey comprised 9 closed-ended questions designed to evaluate participants' views on the effectiveness/pedagogical value, usability, and practical influence of AI-assisted tools. Combining both quantitative and qualitative items allowed for triangulation of results across multiple data sources and enabled a more holistic investigation of student perceptions.

Data Collection Tools

Data was gathered using both quantitative and qualitative tools. These tools were designed to discover undergraduates' perceptions of the feedback process, track self-editing behaviors, and measure changes in writing performance.

Writing Performance Assessment

Pre-Test

In the beginning, both groups finished a baseline writing task on a familiar topic (See Appendix A.) to determine their primary level of writing proficiency. This pre-test was scored using a standardized rubric (See Appendix D.).

Post-Test

Contributors finished a comparable writing task on a similar topic (See Appendix A.) at the end of the investigation. The post-test was assessed with the same rubric to allow for direct comparisons of performance before and after the intervention.

Rubric-Based Assessment

Writing tasks were scored against five criteria: lexical range, sentence structure, grammar & punctuation accuracy, content organization, and coherence & cohesion. Each area was graded on a scale of 1 to 5 (See Appendix D.). These scores enabled a quantitative comparison of performance between the two groups.

Self-Editing Behavior Tracking

Students' self-editing behaviors were tracked across multiple drafts. For the control group, teacher feedback was documented, and any subsequent student revisions were noted. In the experimental group, all suggested corrections and automated feedback provided by Grammarly Premium (version 16.5) were logged by the system. Analysis focused on the frequency of changes, allowing the study to assess the role of AI-assisted feedback in encouraging active self-editing.

Students' Perceptions

Interviews

To gain deeper insight into students' perceptions of AI feedback tools, an experimental subgroup of 15 students were randomly designated to participate in semi-structured interviews (See Appendix C.). The interviews explored their opinions on ideas like how AI tools influenced their self-editing process and their experiences with feedback types.

Surveys

All contributors in the experimental group (30 students) finished a survey (See Appendix B.) which included 9 closed-ended items (5-point Likert scale). The survey was designed to capture students'

attitudes toward the AI feedback tools, their perceived ease of use, effectiveness, and the influence on their writing progress and self-editing habits.

Data Collection Tools' Reliability and Validity

Ensuring all data collection tools reliability and validity included creating the content and construct validity and assessing the reliability of the tests, surveys, and interviews.

Test Validity and Reliability

The post-test and pre-test were calculated for content and construct validity. Construct validity was established by confirming that the tests measured the intended constructs, specifically, self-editing behaviors and writing performance, based on well-established academic frameworks such as prior research and GPTW (Flower & Hayes, 1981). Content validity was established by supporting the tests with documented writing skills stated in the Saudi EFL syllabus and national learning outcomes. In addition, a diagnostic scoring rubric (See Appendix D.) was established and revised by EFL writing experts to confirm it sufficiently covered all critical writing components.

Test reliability was created through pilot administration of the pre- and post-tests with a comparable group of students. To evaluate the scoring rubric internal consistency Cronbach's alpha was considered. This ensured stable evaluation across criteria such as grammar, vocabulary, and coherence. Inter-rater reliability was also scrutinized by having two trained raters independently score a subset of student writing samples. Then to verify consistency between raters the correlation coefficient calculation was done. Finally, to maintain uniformity in the assessment process, scoring procedures and clear guidelines were provided to all raters.

Semi-Structured Interview and Survey Validity and Reliability

Content and construct validity for the interview and survey tools were confirmed through a rigorous design process grounded in the literature on self-editing behavior and AI-aided writing. Interview questions were revised by language learning and AI-feedback experts to ensure that they targeted all related features of students' perceptions with AI feedback. Participant validation (member-checking) was also employed by consenting interviewees to revise and confirm their responses to develop credibility. Equally, survey content validity was established by consulting experts to verify the clarity and completeness of items related to perceived effectiveness, ease of use, and influence on self-editing. Reaching potential results from both interviews and surveys further reinforced construct validity by consenting cross-verification between quantitative and qualitative data.

The reliability of the qualitative tools was improved through the standardization of procedures. To ensure consistency in question delivery across all participants, the interviews followed a fixed procedure. Moreover, to minimize variability all interviews were carried out by the same interviewer. Pilot-testing the survey allowed the researcher to revise ambiguous items. This enhanced clarity and consistency. To consider the survey scales internal consistency, Cronbach's alpha was used. This confirmed that related items measured the same underlying constructs.

Data Analysis Methods

To give answers to the research questions and reach the potential findings both qualitative and quantitative analyses were used.

Quantitative Analysis

To examine the frequency of self-editing behaviors across both groups, descriptive calculations such as means were computed. To find out whether changes in revision patterns between the two groups had statistical significance, a chi-square test was done. To assess changes in writing performance and to compare the post- and pre-test scores of each group paired-sample t-tests were used. Additionally, evaluating whether the experimental group achieved significantly greater gains in writing performance compared to the control group t-tests were carried out.

Qualitative Analysis

Interview Data

All interviews (See Appendix C.) were transcribed verbatim and subjected to content analysis. Responses were coded iteratively to identify recurring themes and key perceptions related to the perceived effectiveness of AI feedback, its role in supporting self-editing behaviors, and its influence on writing independence and development.

Survey Data

Closed-ended responses from the post-intervention surveys (See Appendix B.) were investigated using thematic analysis to capture common patterns and variations in students' reflections. The survey data was systematically coded to identify shared attitudes and experiences with AI feedback, focusing on its usability and perceived contributions to the writing process. These qualitative findings complemented the quantitative results by providing more accurate understanding of how students perceived their role in writing progress and how they engaged with AI tools.

FINDINGS AND DISCUSSION

This section introduces the results of the comparative investigation, which examined the effectiveness/pedagogical value of Grammarly Premium (version 16.5) in developing the self-editing behaviors and writing performance. To examine that both quantitative and qualitative data were explored.

Writing Performance Development

To quantitatively measure students' writing performance, pre- and post-tests scored against standardized rubric were used. Both groups finished the writing tasks before and after the investigation.

Pre-Test Analysis

No significant changes between the two groups were revealed by the pre-investigation scores. Mean scores across all rubric components were closely matched, confirming the groups were homogeneous in writing proficiency (See Table 1 below.).

Post-Test Analysis

Post-intervention results indicated improvements in both groups' writing performance. However, the experimental group revealed notably greater gains across all rubric categories (See Tables 2 & 3 below.).

Table 1. Independent t-Test for Pre-Test Scores

Group	N	M	SD	t-value	p-value	Effect Size (Cohen's d)
Exp.	30	65.4	6.8	0.28	0.78	0.07 (Insignificant)
Con.	30	64.9	7.2	---	---	---

Result

A statistically insignificant change between the two groups ($p < 0.05$) was revealed by the independent sample t-test, confirming that the two groups were homogeneous in writing proficiency before intervention.

Table 2. Paired Sample t-Test for Pre- and Post-Test Scores

Group	Test	M	SD	t-value	p-value	Effect Size (Cohen's d)
Exp.	Pre-Test	65.4	6.8	-7.89	< 0.05	1.25 (Large)
	Post-Test	78.2	7.1	---	---	---
Con.	Pre-Test	64.9	7.2	-1.89	0.07(Not Sig.)	0.30 (Small)
	Post-Test	68.5	6.9	---	---	---

Result

The paired sample t-test indicates meaningful progress in the experimental group ($p < 0.05$), with a big influence size ($d = 1.25$), saying that AI feedback had a substantial influence on writing performance. The control group displayed no statistically significant development ($p = 0.07$).

Table 3. Independent t-Test for Post-Test Scores

Group	N	M	SD	t-value	p-value	Effect Size (Cohen's d)
Exp.	30	78.2	7.1	3.65	<0.01	0.92 (Large)
Con.	30	68.5	6.9	---	---	---

Result

A statistically important change between the two groups ($p < 0.01$) was revealed by the independent sample t-test, confirming that AI feedback was more influential in developing students' writing performance than teacher feedback.

Self-Editing Behaviors

Students' self-editing behaviors were quantitatively evaluated by tracking the frequency of revisions made during the writing process. Students in the experimental group displayed substantially more self-editing activities (over twice as many) (See Table 4 below).

Table 4. Chi-Square Test for Self-Editing Frequency

Group	N	High Revisions (≥ 5)	Low Revisions (< 5)	Average Revisions/Draft
Exp.	30	18	12	7.3
Con.	30	6	24	3.2
Test Statistic	$\chi^2 = 10.24, p < 0.01$			

Result

On average, the control group completed 3.2 revisions per version, compared to 7.3 revisions per version in the experimental group. In terms of revision frequency ($\chi^2 = 10.24, p < 0.01$) a chi-square test exposed a significant difference between the two groups which indicates that AI feedback was correlated with more systematic and sustained self-editing behaviors. Additionally, as extracted from the surveys and interviews, many experimental group students stated that the explicit and direct nature of AI feedback enabled them to realize recurrent error patterns and noted that they revisited AI feedback several times through the drafting process. They described it as accessible and continuous guidance that encouraged deeper engagement with their writing. By contrast, control group students exposed a narrower concentration in their revisions. Teacher feedback was generally viewed as helpful, but it tended to encourage less substantial and iterative modifications. Those students made a few meaningful revisions at the level of content or structure, suggesting that teacher feedback alone was less effective than AI tools in fostering continuous self-editing practice.

Students Perceptions of AI Feedback

Students' perceptions were investigated through post-intervention surveys and interviews to explore clearer insight into their experiences.

Survey's Main Results

These results could be sorted into the following categories:

Ease of Use

Most experimental group students (85%) reported that the AI tools were easy to use (Survey, Item 1) and appreciated the immediate, automated feedback process (Survey, Item 6). Furthermore, 78% indicated that AI feedback enabled them to recognize and correct errors (Survey, Item 5) they might otherwise have overlooked.

Effectiveness

Seventy-two percent of AI feedback group agreed that this feedback helped improve their writing (Survey, Items 9 & 2). By comparison, only (54%) of the control group participants supposed that teacher feedback resulted in notable advances in their writing quality (Survey, Item 7).

Writing Autonomy and Confidence

Sixty-eight percent of the experimental group reported that AI tools increased their sense of writing independence and self-confidence (Survey, Items 3 & 4). Seventy-one noted that instant and continuous feedback encouraged them to adopt a more effective responsibility in their self-editing process (Survey, Item 3), allowing them to make improvements without waiting for teacher intervention (73%) (Survey, Item 2 & 9).

Comparison between AI and Teacher Feedback

Finally, when comparing the two feedback types, the majority (65%) considered AI feedback more helpful (Survey, Item 7), and 83% preferred to receive AI feedback on their writing in the future (Survey, Item 8)

Interview's Main Insights

Extracting main themes from the verbatim interview transcriptions and subjecting them to content analysis was difficult and required considerable effort. Responses were coded iteratively to identify recurring themes and key perceptions related to the perceived effectiveness of AI feedback on writing performance and its role in supporting self-editing behaviors.

The interviews supported the survey results particularly concerning word and phrase level elements, but not so much concerning organization and logic:

AI-assisted feedback tools enabled more meaningful and frequent self-correction and enhanced writing performance. One contributor commented, “Grammarly can help me catch a lot of mistakes and useful corrections by myself. It really helped me progress faster.”

Some participants appreciated the self-confidence and independence they gained through their AI feedback experience. Another contributor said, “After getting the AI feedback, I actually felt more confident about my writing because it showed me my mistakes clearly. Also, I feel more independent now, I can check my work myself and learn from it.”

Several students also realized the immediacy and accessibility of AI feedback, which they felt supported more sustained engagement with the writing process. A third student stated “I liked that the AI gave me feedback instantly, at any time. It made me want to keep working on my essay instead of waiting for the teacher's comments.”

In contrast, however, other interviewees noted that AI tools had restrictions, especially in supplying accurate supervision on advanced issues such as argument development and subject organization. One more participant said, “The AI was helpful for grammar and vocabulary, but when it came to organizing my ideas or building strong arguments, it didn't really guide me like a teacher would.”

Contributors admitted that human feedback continued helpful for addressing these more complex writing features. An additional contributor stated, “Teacher feedback is more personal and goes deeper into my ideas, but sometimes it doesn't cover everything and takes too long.” These perceptions highlight the complementary roles of AI tools and human teachers.

Comparative Effectiveness/Pedagogical Value of AI Feedback vs. Teacher Feedback

Generally, the results revealed that both feedback types reinforced corrections in students' writing performance; yet AI tools were more efficient in stimulating sustained revision and direct self-editing. Students who received AI feedback demonstrated remarkable increases in writing scores, as well as more frequent revisions across drafts. AI tools also suggested consistent and instant feedback that was available on demand. In contrast, while teacher feedback was appreciated for its depth on discourse-level and content elements, students often had to wait for replies and this limited their capability to make frequent modifications. In summary, this study showed that AI-assisted feedback tools significantly supported EFL students' writing performance, specifically in areas such as grammatical accuracy, sentence structure, and vocabulary range. Furthermore, AI tools encouraged greater writing self-regulation and independence compared to teacher feedback.

Discussion

The study examined the effectiveness/pedagogical value of Grammarly Premium (version 16.5) in helping EFL undergraduates develop self-editing behaviors and writing performance. The results propose advanced understandings to improve AI tools in the writing process compared to teacher feedback. This chapter discusses the results in the light of current literature, searches their educational implications, and summarizes upcoming research pathways.

AI Feedback Influence on Writing Performance

The results show that AI feedback formed significant progress in EFL students' performance, mainly in grammatical accuracy, sentence structure, and content organization. These results indicate that automated writing supporters can provide detailed and immediate feedback that helps students recognize mistakes and do informative reviews (Hoang & Van, 2025; Li et al., 2015). AI tools enabled more incremental growth throughout the writing process compared to conventional feedback. While teacher supervision is helpful for supporting discourse-level skills such as content depth and argument progress (Ferris, 2012; Merkviladze, 2024), the consistency and immediacy of AI feedback helped students revise their drafts more autonomously, collaboratively and continuously (Kessler, 2020; Reinders, 2020; Ware & Kessler, 2016; Warschauer, 2010). This continuing and real-time support seems to increase a more iterative writing process and encourage better self-regulation and independence. These results support Ranalli et al., (2016) argument that constant feedback boosts sustained engagement and metacognitive awareness and eventually encouraging skill development and writing autonomy.

Self-Editing Behavior and AI Feedback

Investigation into students' self-editing behaviors uncovered that the experimental group engaged in more frequent review strategies than the control group. AI tools encouraged learners to address not only superficial mistakes but also deeper structural and verbal issues. These results support prior research, they demonstrate that AI tools encourage more reflective and sustained engagement in the writing process by delivering actionable and timely feedback (Hoang & Van, 2025; Ranalli et al., 2016). The increased frequency of revisions emphasizes the capacity of AI tools to promote greater learner independence, metacognitive reflection, and self-supervising. By contrast, control group students revised less often and concentrated predominantly on superficial errors such as punctuation and spelling. Although teacher feedback was perceived as constructive, its restrictions (e.g. time limits, teacher workload, and class size) may have limited the level of self-regulation and constant assessment students could achieve (Ferris, 2012; Hyland & Hyland, 2006; Shintani et al., 2014). These results emphasize the capacity of AI-assisted tools to support deeper engagement in the iterative process of writing and more sustained self-editing behaviors.

AI Feedback Students' Perceptions

Students' perceptions of AI feedback tools were optimistic. The survey and interview data showed that most participants valued the tools' direct, non-judgmental nature. The majority distinguished that AI feedback enabled them to recognize mistakes they might have overlooked and improved their confidence in self-editing. These results align with previous research; they suggest that AI tools enhance learner motivation and autonomy by offering accessible and continuous guidance (Song & Song, 2023). Students also indicated that AI feedback promoted a stronger sense of control over the writing process. Though, some acknowledged the boundaries of AI tools, particularly their incapacity to address advanced writing issues such as stylistic nuance, subject depth, and argument coherence (Alnemrat et al., 2025; Steiss et al., 2024). Some interviewees noted that teacher input continued dynamic for developing these discourse-level features of writing. This underlines the requirement for a mixed feedback model that integrates AI tools with teacher knowledge to support all sides of writing instruction (Zhang et al., 2025).

Writing Instruction Implications

The results have valuable suggestions for teaching writing in EFL classrooms. In large classes where personalized guidance may be limited AI tools can complement teacher feedback. They assist students to recognize and correct superficial mistakes by providing them with consistent and immediate feedback. This allows teachers to concentrate on advanced writing issues such as

discourse coherence, subject depth, and argument coherence. These findings suggest that AI tools can alleviate teacher workload while promoting student engagement. Moreover, AI tools support the principles of CPTW (Flower & Hayes, 1981) by fostering an ongoing cycle of drafting, revision, and reflection. Their ease of access and interactive features (Hyland, 2015; Tardy, 2016) help students give more attention to their writing, practice self-regulation, and develop greater long-term autonomy. Implementing a blended feedback approach can therefore optimize feedback effectiveness/pedagogical value, enhance student engagement, and promote sustained writing progress.

Student-Centered Instruction and 21st-Century Competencies

AI tools can help generate flexible learning atmospheres that assist learners in developing their peculiar ability and reevaluate writing tasks depending on personalized and real-time supervision. This process supports a student-centered instructional model, where students build practical skills in self-regulated learning and take energetic responsibility for their writing. Drawing on social constructivism (Vygotsky, 1978) and principles of educational psychology (Zimmerman, 2010), the interactive and timely nature of AI feedback empowers students to plan, monitor, and assess their writing purposefully, and develops metacognitive awareness. These tools also assist EFL learners in building competencies for the 21st-century by encouraging reflection and iterative practice which are central for success in both professional and academic settings. Therefore, AI tools not only facilitate writing development but also support the improvement of transferable skills that contribute to permanent learning.

Novel Contributions to Writing Research

This study advances writing research in three significant ways: **Bridging AI and CPTW:** This study is among the first to empirically validate how AI feedback aligns with CPTW's recursive revision process, particularly in EFL contexts. Unlike prior work focusing on isolated tool efficacy, the findings demonstrate that AI tools scaffold iterative self-editing, a core CPTW principle, by providing real-time, low-stakes feedback. **Pedagogical innovation:** The results advance writing instruction by proposing a blended feedback model (Zhang et al., 2025); AI tools handle surface-level errors, freeing teachers to address higher-order concerns. This addresses a critical gap in large-class settings where individualized teacher feedback is impractical (Hyland & Hyland, 2006). **Learner autonomy:** The study uniquely links AI feedback to metacognitive growth; students reported increased confidence in self-editing and error recognition, a finding underexplored in prior AI-writing research (Wang & Fan, 2025). This underscores AI's role in fostering long-term writing independence beyond grammatical accuracy.

Research Limitations and Future Directions

This research has some constraints. First, its findings may have limited generalizability as the research was conducted exclusively with Saudi EFL university students. Future research could replicate this study with more diverse participant groups across different educational contexts, proficiency levels, and cultural settings to strengthen the results generalizability. Second, the AI tools investigated in this study primarily targeted superficial language features and did not fully support advanced writing skills. Future research might explore more advanced AI tools equipped with rhetorical structure modeling and argument-feedback capabilities. Third, since this study considered only short-term influences, additional longitudinal research is needed to measure the permanent influence of AI feedback on students' skill retention and writing development. Lastly, while this study used Grammarly Premium (version 16.5), it is important to note that the tool's features and algorithms are regularly updated. Following versions may produce different feedback capabilities or patterns, specifically in dealing with higher-order writing issues (e.g., argument structure, coherence).

CONCLUSION

By providing accessible and real-time support, particularly for surface-level errors, this study proves that AI tools considerably improve students' autonomy, self-editing behaviors, and writing performance. Although these tools complement conventional feedback by reducing teacher workload and enabling more frequent revisions, they show limitations related to advanced writing

skills like coherence and argument development. The results highlight the potential of AI-assisted writing instruction to generate more effective learning atmospheres where teachers can concentrate on multifaceted writing features while students develop autonomous editing skills. Future studies should examine long-term influences on critical thinking and writing retention and explore advanced AI capabilities for holistic writing support. This can pave the way for more scalable and sophisticated solutions in EFL education.

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