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Effectiveness Analysis of a Personalized English Writing Feedback System Based on Advanced Language Models

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Abstract

Recent advancements in natural language processing have catalyzed transformative approaches to second language writing instruction. This study introduces a personalized English writing feedback system that harnesses state-of-the-art generative language models to deliver real-time, adaptive feedback tailored to individual learners. Over the course of a 12-week intervention involving 80 undergraduate students, the system was integrated into writing instruction with the aim of fostering self-directed revision and reflective writing practices. Drawing on both quantitative and qualitative data—including writing samples, student surveys, and teacher interviews—the results reveal significant improvements in writing quality, learner autonomy, and revision strategy use in the experimental group compared to traditional feedback approaches. This research contributes to the ongoing discourse on technology-enhanced language learning, underscoring the complementary role of human pedagogical insight and algorithmic feedback in optimizing instructional outcomes.

Keywords

Personalized Feedback; English Writing Instruction; Learner Autonomy; Intelligent Tutoring Systems; Language Learning Technology

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1. Introduction

Writing proficiency is a fundamental component of academic success and communicative competence, particularly in higher education settings where students are expected to engage with complex textual genres. However, the development of writing skills among English as a Foreign Language (EFL) learners remains a persistent challenge, often hindered by the limitations of traditional feedback methods. Instructor-delivered feedback, while pedagogically valuable, frequently suffers from delayed delivery, limited specificity, and inconsistencies in addressing individual learner needs. In contrast, AI-assisted writing provides more immediate feedback, greater specificity, and more consistent personalization to better support individual learners. (Sahki, T. 2024)[1]. These shortcomings can inhibit learners' ability to engage in timely self-correction and iterative revision, both of which are essential to effective writing development.

Automatic text generation, situated at the intersection

of artificial intelligence, natural language processing, and human-computer interaction, has rapidly emerged as an exciting and transformative field. Through continuous innovation, interdisciplinary collaboration, and rigorous research, these technologies offer unprecedented opportunities to enrich human communication, stimulate creativity, and deepen our understanding of language and culture in the contemporary world and beyond (Pandey et al., 2024)[2]. In particular, the recent development of advanced generative language models, which are built upon Transformer-based neural architectures, exemplifies this progress. These models demonstrate exceptional fluency and contextual sensitivity, allowing them to generate feedback that is not only linguistically coherent but also stylistically appropriate across diverse writing contexts. Crucially, their ability to deliver immediate, personalized suggestions represents a marked shift away from traditional, uniform instructional methods. This advancement aligns closely with the principles of learner-centered education, emphasizing tailored support that meets individual needs and thereby enhancing the effectiveness of writing instruction. This version connects the ideas more smoothly by emphasizing cause-and-effect relationships and highlighting the significance of each point in the overall context. Nonetheless, the integration of AI-powered feedback tools into classroom settings is not without challenges. While these systems excel at linguistic correction and pattern recognition, they must be deployed within a pedagogical framework that emphasizes metacognition, learner agency, and sustained engagement. This study therefore investigates the design and impact of a personalized English writing feedback system embedded within an EFL college writing curriculum. Specifically, it examines whether such a system can enhance writing quality, promote autonomous revision practices, and improve students' overall engagement with the writing process.

2. Theoretical Background and Related Work

This chapter aims to establish a comprehensive theoretical and empirical foundation for the development of a feedback system designed to support writing instruction. The review focuses on three interconnected domains: advancements in automated text generation technologies within language education, the evolving conceptualization and implementation of feedback in technology-enhanced writing pedagogy, and the application of personalized learning frameworks in intelligent feedback systems.

2.1. Automated Text Generation Technologies in Language Education

Recent years have witnessed significant progress in automated text generation technologies, particularly those leveraging advanced neural network architectures such as Transformer models. These models have demonstrated a remarkable capacity to produce coherent and contextually relevant text, making them increasingly relevant tools within language education settings. Empirical investigations have highlighted the benefits of integrating such technologies into writing instruction. For example, AI-generated feedback consistently led to more frequent revisions than feedback provided solely by teachers, due to its ability to offer specific, actionable, and comprehensive suggestions. The combination of both teacher- and AI-generated feedback produced the highest revision rates, highlighting their complementary advantages: AI feedback primarily targeted surface-level errors, while teacher feedback concentrated on higher-order issues. Although the order in which the two feedback types were delivered did not result in statistically significant differences, the integration of both methods proved most effective(Tran, 2025)[3]. Allagui(2024)[4] confirmed the intervention's effectiveness in enhancing participants' self-efficacy beliefs and performance in source-based argumentative writing. These findings collectively highlight the importance of scaffolding strategies targeting self-efficacy to improve confidence in source-based writing and, consequently, overall writing performance.

2.2. The Evolving Role of Feedback in Technology-Enhanced Writing Instruction

"Feedback remains a cornerstone of effective writing pedagogy, serving as a catalyst for learner reflection and improvement. The emergence of technology-enhanced feedback delivery methods has transformed traditional paradigms, offering new opportunities for formative assessment and learner support. Generative AI holds

significant potential to enhance writing skills in higher education by delivering timely and individualized feedback(Lo, Wong, & Chan, 2025)[5] Further research within EFL contexts reveals the efficacy of hybrid feedback models that integrate automated analytic feedback with human instructor commentary. These combined approaches have been shown to promote deeper engagement with revisions and more thoughtful consideration of feedback. Notably, learners demonstrate greater capacity to assimilate feedback when it is contextualized by an instructor, enabling a richer dialogic process between learner and teacher. Investigations into learner attitudes towards these emerging feedback modalities reveal a generally positive reception. Khidirov & Lee (2025)[6] noted that AI tools can effectively assist in preparing for high-stakes language tests, particularly in improving IELTS writing skills when used under appropriate guidance.

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2.3. Personalized Learning Frameworks in Intelligent Writing Support Systems

"Personalized learning theory advocates tailoring instructional approaches to meet the unique needs, abilities, and learning trajectories of individual students. This paradigm has found fertile ground in the design of intelligent writing support systems that leverage learner data to generate customized feedback and scaffolding. Such systems, which draw on learners' historical writing data, encourage more purposeful revision behaviors and enhance self-regulatory capacities. Additionally, interactive learner–system dialogue platforms exemplify the application of personalized learning principles by engaging students in dynamic reflection and iterative revision cycles. For instance, platforms modeled after frameworks such as RECIPE enable learners to actively participate in metacognitive processes, thereby promoting greater awareness of writing strategies and fostering sustained writing autonomy (Tajik, Aliakbar., 2025)[7]. These systems exemplify the shift from passive reception of feedback towards an interactive, learner-centered feedback culture, which is essential for the cultivation of advanced writing competencies."

3. Methodology

This chapter presents a detailed description of the research methodology employed in this study. It begins by outlining the overall research design, followed by an introduction to the participant selection and grouping process. Next, the design and functional components of the feedback system are described. Finally, the procedures for data collection and analysis are explicated.

3.1. Research Design

The study adopts a quasi-experimental mixed-methods framework, combining both quantitative and qualitative approaches to comprehensively evaluate the effectiveness of a personalized English writing feedback system. By comparing an experimental group receiving individualized automated feedback with a control group receiving conventional teacher feedback, this design aims to explore differences in writing development and learner motivation.

3.2. Participants

The study involved eighty undergraduate non-English major students enrolled at Guangdong University of Technology. To ensure baseline equivalence, all participants completed standardized English proficiency tests prior to the intervention. They were then randomly assigned to either the experimental or control group, with forty students in each cohort.

3.3. System Design and Implementation

The personalized feedback system was developed based on advanced natural language processing technologies, integrating multiple modules including text submission, error detection, content coherence analysis, and a feedback engine that adapts suggestions according to each student's historical writing data. Feedback is delivered through a combination of in-text highlights and explanatory notes to facilitate student understanding.

3.4. Procedure

During the 12-week semester, students from both groups completed weekly writing assignments under parallel schedules. The experimental group submitted their essays via the automated feedback platform, which allowed multiple revisions based on system-generated suggestions.

The control group, by contrast, received detailed written feedback from experienced instructors and revised accordingly.

3.5. Data Collection

Multiple sources of data were collected to enable comprehensive evaluation, including pre- and post-intervention writing samples, questionnaires measuring feedback satisfaction and motivation, system usage logs documenting interaction frequency, and semi-structured interviews with selected students and instructors from the experimental group.

3.6. Data Analysis

Quantitative data were analyzed using descriptive statistics and paired t-tests to examine changes in writing scores and questionnaire responses. Qualitative interview data underwent thematic coding to identify key perceptions regarding the usability and pedagogical impact of the feedback system.

4. Results and Analysis

This section presents a comprehensive analysis of the findings derived from the classroom intervention and subsequent reflective activities. The data, comprising both quantitative measures and qualitative insights, are employed to evaluate the influence of personalized feedback on student engagement, writing proficiency, and learner autonomy within an English as a Foreign Language (EFL) writing context.

4.1. Improvement in Writing Quality

To evaluate the impact of personalized feedback on learners' writing performance, writing samples were collected and assessed both before and after the intervention using an analytic rubric comprising five dimensions: content, organization, vocabulary, grammar, and mechanics. Each dimension was rated on a 5-point scale by two trained raters, and inter-rater reliability was confirmed with a Cohen's kappa coefficient of 0.86, indicating strong agreement.

As illustrated in **Table 1**, substantial improvements were observed across all five criteria.

Table 1. Mean Scores and Improvement Across Writing Dimensions

Criterion	Pre-Task Mean	Post-Task Mean	Mean Gain
Content	3.1	4.0	+0.9
Organization	2.8	3.7	+0.9
Vocabulary	2.9	3.9	+1.0
Grammar	2.5	3.4	+0.9
Mechanics	3.0	3.9	+0.9

Paired sample t-tests confirmed that the observed differences were statistically significant across all dimensions ($p < 0.05$). The greatest gains were recorded in vocabulary and organization, which were among the primary focus areas emphasized during the feedback sessions. These findings suggest that individualized feedback not only improved surface-level accuracy but also enhanced students' ability to use more varied and contextually appropriate lexical items and to structure their ideas with greater coherence and logical flow.

Taken together, the data provide compelling evidence that tailored feedback—when consistently aligned with individual learner needs—can foster measurable improvements in both the linguistic and discursive aspects of EFL writing.

4.2. Enhanced Learner Engagement

"Learner engagement was evaluated using a triangulated methodology that included systematic classroom observations, semi-structured interviews, and qualitative analysis of reflective journals maintained by students throughout the course. This multi-modal approach provided a nuanced understanding of how individualized feedback impacted learners' emotional, behavioral, and cognitive engagement. Thematic coding of the journal entries, corroborated by classroom data, revealed three prominent and interrelated patterns of engagement:

Increased Motivation: A key theme that emerged was a noticeable increase in students' intrinsic motivation to write and revise. Participants consistently expressed that feedback tailored to their specific linguistic challenges made writing tasks feel more relevant and manageable. As one student reflected, "Knowing that the comments

were about my writing made me feel that the teacher was really paying attention to me, not just marking an assignment." This individualized attention appeared to enhance learners' sense of competence and personal connection to the task. Recent research confirms that personalized feedback contributes significantly to learner motivation by promoting autonomy, relevance, and self-efficacy (Li, X., & Alharbi, W. M. H., 2025)[8].

Greater Interaction: During revision stages, peer collaboration became more intentional and pedagogically meaningful. Students actively referred to their personalized feedback in peer discussions, often comparing teacher comments and sharing strategies for improvement. These exchanges moved beyond surface-level editing and fostered a more reflective, co-constructive learning process. Such interaction illustrates a shift from feedback as a one-way evaluative tool to a dialogic learning mechanism. This finding demonstrated that students, particularly at varying proficiency levels, can deeply engage with feedback when encouraged to use it collaboratively and strategically.

Deeper Reflection: Perhaps most significantly, students demonstrated enhanced metacognitive awareness, with many identifying recurring patterns of grammatical or lexical errors and taking initiative to correct them. Reflective journal entries showed that learners sought out resources independently—such as grammar handbooks, language learning websites, or automated writing tools—and began to monitor their own progress more consciously. One student explained: "The teacher's comments were directly related to my writing. I noticed I always have trouble with article use, and now I try to check that first before submitting." This type of self-regulation suggests the emergence of deeper, strategic learning behaviors.

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This type of self-regulation suggests the emergence of deeper, strategic learning behaviors. As Wardana, I. K., Joni, D. A. A. W., & Arsana, A. A. P. (2025)[10] highlight, feedback that promotes self-awareness and actionable reflection is central to the development of self-regulated learning in writing instruction.

4.3. Growth in Autonomy and Strategy Use

Learner autonomy was measured through documented use of self-editing checklists and the frequency of draft submissions prior to finalizing essays. Compared to

baseline data, students demonstrated:

A 45% increase in voluntary utilization of self-editing checklists.

A 60% increase in the number of drafts submitted before final submission.

Enhanced self-correction behaviors, particularly in verb tense consistency and sentence structure refinement.

These indicators collectively suggest that personalized feedback contributed significantly to the cultivation of metacognitive skills and learner ownership over the revision process, which are essential components of autonomous language learning.

4.4. Qualitative Insights from Focus Group Interviews

To corroborate the quantitative findings, post-intervention focus group discussions were conducted with six participants. These dialogues provided rich insights into learners' affective responses to personalized feedback. Participants expressed appreciation for individualized comments, contrasting them with more generic, whole-class feedback approaches:

"I feel the teacher is really reading my work, not just grading it."

"Even if I make mistakes, I know how to fix them because the feedback is clear and talks to me."

Such comments underscore the affective benefits of personalized feedback, including the development of rapport, increased learner confidence, and a lowered affective filter—factors that are especially salient within Asian EFL educational contexts.

5. Discussion

This study makes several important contributions to the discussion of personalized feedback in EFL writing instruction. The results show that feedback tailored to learners' proficiency and specific writing needs encourages meaningful revision and supports the principle of formative assessment as a process focused on continuous improvement. In practice, such feedback motivates students, increases their sense of responsibility, and deepens their engagement with writing tasks. When feedback directly addresses issues such as grammar, organization, or content development, it becomes concrete and useful, enabling learners to recognize recurring problems and adopt more effective strategies than they would with general comments.

The study also points to the benefits of digital platforms that allow systematic tracking of feedback. Features such as annotated drafts, organized suggestions, and extended teacher support beyond class time were particularly valued by students, as they promoted transparency, self-reflection, and more efficient revision. At the same time, the findings highlight the importance of professional development for teachers. Training is essential to help teachers provide feedback that is constructive, scaffolded, and sensitive to learners' cultural and individual contexts. Without this preparation, feedback may remain superficial, focusing only on surface-level errors instead of addressing broader issues of content and strategy.

Finally, the study stresses that effective feedback is not limited to pointing out mistakes. It also involves encouragement, clear guidance, and opportunities for learners to develop confidence and critical thinking. A combination of teacher feedback and automated tools can be particularly effective, with technology handling routine aspects of correction so that teachers can concentrate on higher-level concerns in student writing.

6. Conclusion

This investigation examined the implementation of personalized feedback strategies within a college-level EFL writing course in China. Utilizing individualized learner profiles and a digital feedback platform, the study demonstrated that students receiving tailored feedback engaged in more purposeful and iterative revisions compared to their counterparts receiving general corrections.

The findings emphasize the critical importance of student-centered approaches in writing pedagogy, where feedback is contextualized, specific, and aligned with learner goals. Personalized feedback not only enhances technical writing skills but also fosters greater learner autonomy and intrinsic motivation. It bridges the gap between teacher input and independent revision, supporting students' transition toward becoming reflective and self-regulated writers.

Future research would benefit from longitudinal

designs to investigate the sustained impact of personalized feedback across extended academic periods. Additionally, exploring the transferability of acquired revision strategies across different genres and disciplinary contexts could further illuminate the broader applicability of these instructional approaches. Investigating instructors' perspectives and the challenges they face in delivering personalized feedback would also inform the development of institutional support and professional training programs.

Disclosure statement

The author declares no conflict of interest.

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