Using AI to Enhance English Writing Skills in Multilingual Transnational Higher Education

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Abstract

In multilingual transnational higher education, academic writing is a persistent challenge for many students, particularly in English-medium instruction (EMI) environments where linguistic and cultural diversity often amplifies barriers to success. Leveraging cooperative learning and generative Artificial Intelligence (GenAI) is vital to enhance the writing proficiency of undergraduate students in EMI contexts, bringing them on par with academic writing standards. The presentation explores a quasi-experimental mixed-method study addressing a significant technology-mediated language education gap in EMI settings. 100 undergraduate Chinese students aged 18-19 participated. The study combined cooperative learning strategies with GenAI tools for brainstorming, outlining, grammar, and vocabulary checks, using pre- and post-intervention assessments, observations, and engagement logs to show how these variables affect students' writing quality and engagement. The findings revealed a high correlation between the pre-post tests for overall writing quality at 0.707 ($p < 0.001$) and a t-value of -47.357 ($p < 0.001$), indicating substantial improvements in overall writing quality. The pre-test mean for engagement was 3.77 (SD = 1.004), while the post-test mean was 3.98 (SD = 0.864), indicating a modest increase in engagement over time. The improvements from pre- to post-intervention predict the benefit of using GenAI to improve coherence, grammar, vocabulary, and argumentation skills, revealing AI as a potential personalized writing tool for L2, enabling real-time feedback and fostering self-directed learning while alleviating common writing-related challenges of multilingual learners.

Keywords: cooperative learning, feedback mechanism, learning engagement, learning motivation, EFL students, generative AI

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Introduction

Students in Chinese English-Medium Instruction (EMI) universities face considerable challenges in mastering academic writing, an essential skill for academic and professional success. As globalization reshapes Chinese higher education, the demand for English proficiency has intensified. However, academic writing remains a significant barrier for many English as a Foreign Language (EFL) learners (McKinley et al., 2021; Sang, 2017). Despite recent progress in English education in China, many students continue to struggle with fluency, clarity, and coherence in English writing. These challenges often restrict their participation in academic discourse and hinder their academic and career development (Liu & Wu, 2020; Marzuki et al., 2023).

This study explores alternative instructional support mechanisms for Chinese EFL students by examining the combined effects of cooperative learning strategies and Generative Artificial Intelligence (GenAI) tools. These innovative approaches aim to bridge the academic writing gap and foster greater writing proficiency among students. By enhancing students' abilities in grammar, structure, and clarity, such interventions can strengthen their academic performance and future opportunities in EMI environments. The complexity of academic writing in EMI contexts is heightened by linguistic barriers, cultural differences, and the need to conform to specific academic conventions. Students often struggle with syntax, vocabulary, discourse organization, and disciplinary writing norms, making targeted instructional support essential (Liu & Wu, 2020; McKinley et al., 2021). Additionally, the pressure to excel in EMI environments amplifies these challenges, emphasizing the need for culturally responsive and context-specific teaching strategies that empower EFL students. Collaborative learning has been shown to enhance language acquisition, particularly in settings where learners may face high levels of anxiety or unfamiliarity. Research highlights the value of student interaction, peer feedback, and shared learning experiences in improving both writing skills and learner engagement (Li & Lalani, 2020; Sang, 2017; Wang & Xie, 2017). However, despite growing interest in pedagogical innovation, the integration of advanced digital tools—especially GenAI—into EFL Instruction remains limited in Chinese EMI universities.

Figure 1
Innovative EFL Instructional Strategies
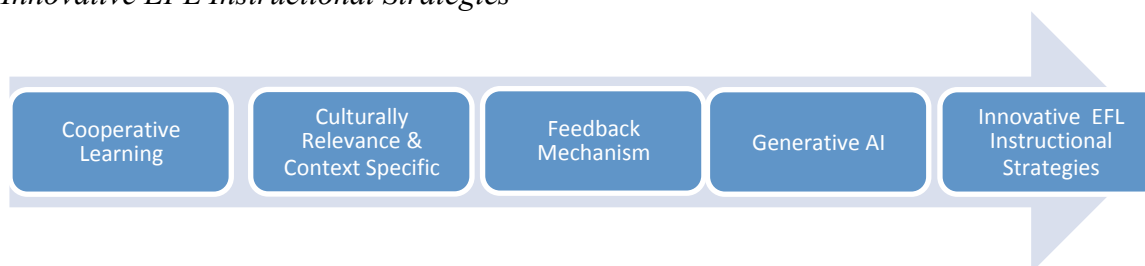
Purpose of the Study

The study makes a unique contribution to technology-enhanced language learning by addressing key gaps in current research. It investigates how combining cooperative learning with GenAI tools can address the specific writing challenges of EFL students in EMI settings. Prior studies have demonstrated the potential of technology to enhance language proficiency and engagement (Hill et al., 2023; Hong, 2023; Su et al., 2023; Tiandem-Adamou, 2024). However, this research goes further by examining how multiple strategies—peer

collaboration, AI-driven feedback, and traditional instruction—interact to improve writing outcomes. Moreover, the theoretical framework revisits constructivist learning theories in the context of AI-enhanced pedagogy, offering a revised model that integrates collaborative learning with GenAI technologies. This blended approach provides new insights into how learners construct knowledge through interactive and tech-mediated experiences. From a methodological standpoint, the study adopts a quasi-experimental design, comparing an experimental group using GenAI-supported instruction with a control group relying on traditional methods. It employs mixed-methods analysis, integrating quantitative data (such as writing scores and engagement metrics) with qualitative findings (like student perceptions of AI feedback). This robust design allows for a nuanced understanding of the intervention's effectiveness.

The technical innovation in this research lies in the integration of various AI platforms, such as ChatGPT, Grammarly, and Quillbot, for real-time feedback, and collaborative tools like Google Docs. Together, they form a hybrid feedback system that complements traditional teacher responses and enhances student learning. Unlike earlier studies that treat engagement as a single concept, this research dissects its components—peer collaboration, feedback participation, and AI interaction—to determine their individual effects on writing development. Ultimately, the study aims to produce adaptable and scalable instructional models for diverse educational contexts. It expands the dialogue on technology-enhanced writing instruction in EMI environments by addressing the following core questions: How do cooperative learning and GenAI affect ESL students' writing in terms of grammar, structure, and coherence? In what ways does GenAI enhance clarity and cohesion? How does it influence peer collaboration? And how do students perceive the integration of GenAI with cooperative learning in supporting their academic writing?

Method

This study employed a mixed-methods research design to examine the effectiveness of integrating Generative AI (GenAI) into cooperative learning activities for academic writing instruction in English-medium instruction (EMI) university settings in China. The combination of quantitative and qualitative approaches ensured a comprehensive and systematic evaluation of GenAI's impact on EFL (English as a Foreign Language) students' writing proficiency.

Participants

The participants consisted of 100 Chinese undergraduate students, with the majority (89%) aged 18–19 and the remainder aged 20–21. Students were randomly assigned to either an experimental group that used AI tools or a control group that did not, minimizing potential bias related to prior writing proficiency or familiarity with technology. Both groups were exposed to identical writing prompts, instructional materials, and learning goals. Lesson delivery was standardized through detailed lesson plans to ensure instructor consistency. Students in the experimental group received a structured orientation session to familiarize them with GenAI tools like ChatGPT, Quillbot, and Grammarly. This six-week quasi-experimental intervention integrated cooperative learning with rhetorical strategies and AI-assisted writing support. Each lesson progressively built upon the last, fostering an environment that emphasized collaboration, critical thinking, and technological fluency. The researcher observed student development in writing ability and confidence, reinforcing the importance of blending innovative technology with pedagogy in EMI contexts.

Data Collection and Analysis

Quantitative data were collected via pre- and post-intervention writing assessments, which measured overall writing quality, including grammar, vocabulary, coherence, and cohesion. Student engagement was also recorded through participation logs.

Analysis using SPSS revealed a significant improvement in writing proficiency among students in the experimental group. The mean writing quality increased from 1.98 (SD = 0.635) pre-intervention to 4.30 (SD = 0.644) post-intervention. Engagement levels also rose slightly over time, with means of 3.77 (SD = 1.004) and 3.98 (SD = 0.864) for the two observed dates, respectively. The findings revealed a high correlation between the pre-post tests for overall writing quality at 0.707 ($p < 0.001$) and a t-value of -47.357 ($p < 0.001$), indicating substantial improvements in overall writing quality. The pre-test mean for engagement was 3.77 (SD = 1.004), while the post-test mean was 3.98 (SD = 0.864), indicating a modest increase in engagement over time.

The improvements from pre- to post-intervention predict the benefit of using GenAI to improve coherence, grammar, vocabulary, and argumentation skills, revealing AI as a potential personalized writing tool for L2, enabling real-time feedback and fostering self-directed learning while alleviating common writing-related challenges multilingual learners face. These findings suggest that the integration of GenAI positively influenced both writing performance and student engagement.

Qualitative data was gathered through interviews and open-ended survey responses, and analyzed thematically using NVivo. The findings showed that most students perceived GenAI as highly beneficial for improving grammar, vocabulary, and writing structure. Many described GenAI tools as "useful" or "very useful," with particular appreciation for their immediate and comprehensive feedback. Students noted that GenAI helped them identify grammatical issues and improve sentence structure, making it especially valuable during self-study or while drafting assignments.

However, students were also clear in expressing that AI feedback, while useful, could not replace the teacher or peer feedback. They valued the more personalized, explanatory nature of human feedback, which helped them understand writing conventions more deeply. Students emphasized that GenAI feedback tended to be more general and corrective, while teacher feedback was tailored, interpretive, and developmental. Additionally, students highlighted that GenAI increased their motivation to engage in writing. The real-time feedback made learning more interactive and encouraged them to revise their work proactively. Many said that GenAI helped them recognize weaknesses in their academic writing, pushing them toward continuous improvement. This supports the idea that AI tools can play a key role in increasing engagement and motivation in ESL learners. Participants also offered suggestions for future AI-supported instruction. They recommended that GenAI be used as an assistive tool rather than a replacement for writing tasks. Emphasis was placed on ethical use, guided by instructors, to avoid overreliance and plagiarism while enhancing writing competence. The consensus among students was that GenAI, when integrated thoughtfully, could complement traditional writing instruction and support language development effectively.

By triangulating quantitative and qualitative data, this study demonstrates that integrating GenAI into cooperative learning activities in EMI classrooms can significantly enhance ESL

students' writing proficiency and engagement. It also highlights the importance of maintaining a balance between AI-assisted learning and human-centered feedback to promote effective and ethical academic writing development.

The Scale

To ensure validity and reliability in this study investigating the impact of cooperative learning strategies integrated with GenAI tools (for brainstorming, outlining, grammar, and vocabulary support) on students' writing quality and engagement in EFL (English as a Foreign Language) classrooms, specific procedures were designed and implemented during both data collection and analysis phases.

Instrument validity included pre- and post-assessments. Writing tasks aligned with the course syllabus rubrics ensure content validity and represent authentic writing scenarios relevant to learners' levels. The use of validated rubrics measuring writing quality (e.g., idea organization, coherence, grammatical accuracy, lexical resource). Peer-reviewed or expert-validated rubrics increase construct validity. The engagement logs define engagement through observable behaviors (e.g., participation, tool usage frequency) and are triangulated with self-reports and observational data for criterion-related validity.

Cooperative learning was clearly operationalized (e.g., roles, group structures, task sharing) and GenAI tool usage (e.g., ChatGPT for idea generation, grammar correction), and the intervention was piloted to refine procedures and ensure that observed effects can be attributed to the intervention itself. Structured observation protocols with defined indicators of engagement were used (e.g., time-on-task, peer collaboration). Combine multiple data sources (writing samples, engagement logs, observations, surveys/interviews) to strengthen construct and ecological validity.

Reliability processes ensure that the measurement tools and procedures yield consistent results over time and across raters or instruments involved. Multiple raters evaluated pre- and post-intervention writing using a common rubric, rater training was offered, and a calibration session was conducted, using statistical measures like Cohen's kappa to assess consistency among raters. For engagement scales or surveys, Cronbach's alpha was used to check the reliability of items measuring the same construct. Standardized procedures for GenAI tool use were implemented (e.g., same prompt structures, same writing platform). Procedural fidelity checklists were used during sessions to ensure uniform implementation across groups or classrooms. Test-retest reliability was conducted where possible (e.g., conduct a follow-up writing task a few weeks later to assess skill retention).

Statistical analysis used paired-sample t-tests or ANCOVA to analyze differences in writing scores pre- and post-intervention, controlling for confounding variables. Thematic analysis or coding reliability for qualitative data (e.g., open-ended student reflections or observational notes). Blind raters to student identity and treatment group were performed, and mixed-methods triangulation was used to balance quantitative findings with qualitative insights.

Findings

The findings of the pre- and post-intervention writing assessment scores were examined to determine changes in students' writing skills from pre- to post-intervention, focusing on

coherence, cohesion, grammatical accuracy, vocabulary usage, and overall writing quality, as illustrated in Table 1.

Table 1
Pre-post Test Correlations

		N	Correlation	Sig.	t	Sig.(2-tailed)
Pair 1	Coherence (Pre) & Coherence (Post)	100	.881	< 0.001	-57.000	< 0.001
Pair 2	Cohesion (Pre) & Cohesion (Post)	100	.717	< 0.001	-35.913	< 0.001
Pair 3	Grammatical Accuracy (Pre) & Grammatical Accuracy (Post)	100	.385	< 0.001	-34.114	< 0.001
Pair 4	Vocabulary Usage (Pre) & Vocabulary Usage (Post)	100	.318	.001	-33.075	< 0.001
Pair 5	Overall Writing Quality (Pre) & Overall Writing Quality (Post)	100	.707	< 0.001	-47.357	< 0.001

Note. *$p < .05$, **$p < .01$

Table 1 above shows that the correlation between pre- and post-intervention coherence scores is 0.881 ($p < 0.001$), indicating a strong positive relationship. The significant t-value of -57.000 ($p < 0.001$) suggests a substantial improvement in coherence. The correlation for cohesion of 0.717 ($p < 0.001$) and a t-value of -35.913 ($p < 0.001$), cohesion also shows a statistically significant improvement. For Grammatical Accuracy: This skill has a moderate pre-post correlation of 0.385 ($p < 0.001$), with a considerable t-value of -34.114 ($p < 0.001$), indicating an increase in grammatical accuracy. For Vocabulary Usage: The correlation is 0.318 ($p = 0.001$) with a t-value of -33.075 ($p < 0.001$), suggesting significant vocabulary improvement. For Overall Writing Quality: The correlation of 0.707 ($p < 0.001$) and a t-value of -47.357 ($p < 0.001$) indicate substantial improvements in overall writing quality. The mean scores for each writing skill show marked improvements from pre- to post-intervention, supported by reduced standard deviations.

A correlation analysis in Table 2 examined relationships between students' overall engagement levels and writing quality before (pre) and after (post) the intervention.

Table 2

Overall Engagement Levels and Writing Quality (pre and post) Intervention

		Engagement Level 5/30	Writing Quality (Post)	Engagement Level 5/23	Writing Quality (Pre)
Overall Engagement Level 5/30	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	100			
Overall Writing Quality (Post)	Pearson Correlation	.084	1		
	Sig. (2-tailed)	.409			
	N	100	100		
Overall Engagement Level 5/23	Pearson Correlation	.728**	.077	1	
	Sig. (2-tailed)	.000	.449		
	N	100	100	100	
Overall Writing Quality (Pre)	Pearson Correlation	.128	.707**	.215*	1
	Sig. (2-tailed)	.204	.000	.032	
	N	100	100	100	100

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 2 shows a weak positive correlation (r = .084) between overall engagement levels on May 30 and post-intervention writing quality. However, this correlation is insignificant (p = .409), indicating no meaningful relationship between later engagement and improved writing quality. A strong positive correlation (r = .728, p < .01) exists between overall engagement levels on May 23 and May 30, suggesting consistency in engagement levels over time. There is a significant, though moderate, positive correlation (r = .215, p < .05) between pre-intervention writing quality and engagement levels on May 23. This implies that higher initial writing quality may relate to higher engagement early in the study. A strong positive correlation (r = .707, p < .01) is observed between pre- and post-intervention writing quality, suggesting a significant association, likely indicating consistency in students' writing ability throughout the intervention. Overall, these results suggest that while engagement is relatively stable, its relationship to writing quality improvements is limited.

Discussion and Conclusion

The findings of this study reinforce the value of integrating Generative AI (GenAI) into cooperative learning to improve academic writing among Chinese EFL students in English-medium instruction (EMI) university settings. Both quantitative and qualitative results demonstrated substantial improvement in key writing skills—coherence, cohesion, grammatical accuracy, and vocabulary—when GenAI-supported instruction was implemented. These improvements support the anticipated benefits of GenAI integration, including increased writing proficiency, enhanced peer collaboration, and greater learning motivation

Students in the experimental group who utilized GenAI tools showed marked gains in writing quality, with statistical analyses revealing significant differences compared to the control group. Correlation and t-tests indicated that GenAI feedback, which provided timely, tailored suggestions, effectively addressed the linguistic challenges typical for Chinese EFL learners. However, the study also raised concerns regarding students' potential overdependence on AI

tools, which may hinder the development of critical thinking and autonomous writing skills. This highlights the need for a balanced instructional approach where AI serves as a support system, not a substitute for human instruction.

In addition, the comparative analysis between groups showed a strong correlation between GenAI use and post-intervention writing improvement. The experimental group significantly outperformed the control group in areas such as grammar, coherence, and argument development. These outcomes align with constructivist theories, suggesting that AI tools act as "scaffolding" mechanisms that support active learning by enabling students to revise and refine their writing with immediate feedback. GenAI's role thus expands the traditional understanding of constructivist learning by adding real-time, intelligent interaction into collaborative learning environments.

The collaborative writing component was equally crucial, promoting peer interaction, shared knowledge, and problem-solving. GenAI integration into cooperative tasks encouraged students to engage in peer review and group writing, which fostered inclusive learning environments. However, challenges such as uneven participation and group dynamics were noted. To address this, educators should establish clear roles, promote balanced collaboration, and monitor group interactions. One major advantage of GenAI noted in this study was its capacity to deliver personalized feedback, responding to students' linguistic and cultural learning needs. AI-driven error analysis and writing suggestions helped learners overcome common EFL hurdles and build writing confidence.

Nonetheless, AI's limitations—such as occasional inaccuracies and inability to understand cultural nuances—underline the need for teacher oversight. Teachers must contextualize and refine AI feedback to ensure it supports deeper understanding and accuracy in student writing. Hence, the study contributes to theoretical discussions by suggesting the need to evolve constructivist learning models to reflect AI's transformative role in education. GenAI can be viewed not just as a tool but as a collaborative learning partner. It simulates peer-like interactions, provides adaptive scaffolding, and facilitates differentiated instruction. This AI-enhanced learning environment aligns with and extends Vygotsky's Zone of Proximal Development by making individualized, scalable support possible.

Figure 2
Constructivist Learning With GenAI
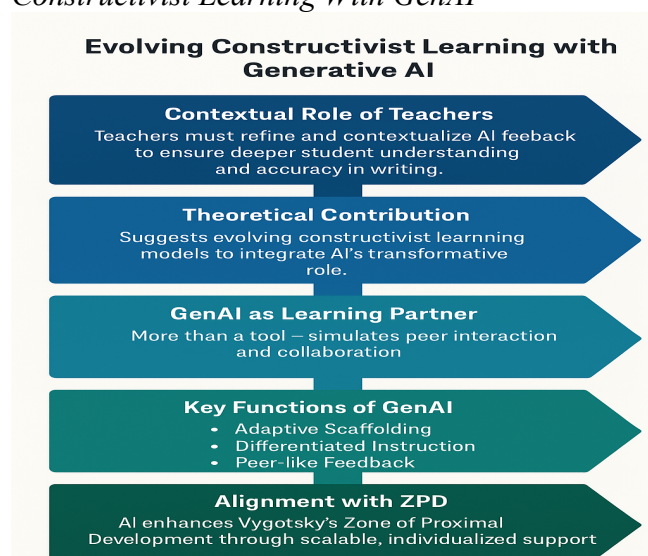
Despite the promising results, the study acknowledged several limitations. The participant group, consisting solely of Chinese EFL students from one EMI university, limits generalizability. Moreover, while efforts were made to control for confounding variables, such as AI familiarity and instructor engagement, these could still influence outcomes. The preference for teacher feedback over AI-generated suggestions also points to the nuanced role AI must play—complementary but not a replacement for human input. Importantly, while engagement showed a modest increase, its direct impact on writing improvement was less clear. Future studies should explore specific engagement factors, like peer review or revision frequency, and how these relate to learning outcomes. Additionally, the long-term impacts of GenAI use remain unexplored, as this study focused only on short-term outcomes. Future research should include longitudinal studies, a broader participant base, and a deeper analysis of how specific GenAI features influence writing skills.

In conclusion, GenAI integration in foreign language learning shows considerable promise as an instructional tool in EFL academic writing, particularly when used within cooperative learning frameworks. By providing immediate feedback and supporting collaboration, GenAI enhances student engagement and writing proficiency. However, its integration must be balanced with ethical use, teacher guidance, and a focus on fostering independent learning to maximize educational benefits.

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