

The Impact of AI-Assisted Writing Tools on the Quality of English for Specific Purposes Writing and Learner Strategies: An Empirical Study of Blended Learning

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ABSTRACT This study aims to explore the application effects of AI-assisted writing tools in English for Specific Purposes (ESP) writing instruction and their impact on learners' writing strategies. Using a blended learning empirical research design, this study recruited 128 students majoring in economics and management at a college. Through a 16-week teaching experiment, by combining writing tests, questionnaires, and in-depth interviews, this study systematically explored the specific mechanisms by which AI-assisted tools affect the quality of ESP writing. The results show that AI-assisted writing tools have the potential to improve learners' writing performance in five dimensions: grammatical accuracy, lexical richness, register appropriateness, content completeness, and structural logic. Simultaneously, these tools encourage learners to develop three adaptive writing strategies: human-computer collaboration, process monitoring, and metacognitive regulation. Interestingly, there were significant intergroup differences in tool use and strategy selection based on learners' English proficiency levels. This study provides empirical evidence and practical insights for AI-assisted ESP writing instruction in blended learning environments.

INDEX TERMS AI-assisted writing tools, blended learning, English for specific purposes, learner strategies, writing quality

I. INTRODUCTION

WITH the rapid development of AI technology, generative AI represented by large language models is deeply changing the teaching and learning models in education. In the field of language education and particularly in English writing teaching, the intervention of AI-powered writing tools presents unprecedented opportunities for learners in terms of prompt feedback, language polishing, and/or content generation support. This technological revolution has not only transformed traditional writing instruction but also offered new solutions to persistent learner challenges, including language accuracy, expressive diversity, and writing anxiety. Existing research has provisionally verified that AI tools have great potential in improving the grammatical accuracy of general English writing and personalized feedback. However, there are far fewer studies examining the actual effectiveness of these tools or various dimensions of learners' general attitudes, with limited existing research entering specific real-world contexts to systematically study the multidimensional mechanisms by which AI enhances

writing quality. Professional English writing not only involves the correctness of linguistic form but also emphasizes the appropriateness of register, the professional integrity of content, and conformity to industry conventions, thus this places even greater demands on the effectiveness of AI tools. While this study focuses on Business English as a representative domain of ESP, the pedagogical implications and observed strategy adaptations may provide a foundational framework for other professional contexts, such as medical or legal English, provided that industry-specific conventions are integrated into the AI prompting process. Furthermore, in blended learning environments, how learners work with AI, what new writing strategies emerge, and how these impact the development of their writing skills are "black boxes" which are in urgent need of exploration. Although the teaching intervention provided a structured framework for tool introduction, this study specifically focuses on how learners move beyond prescribed usage to develop autonomous, adaptive strategies during the independent online self-study phases.

The contributions of this study are mainly reflected in three aspects. First, in regard to research perspective, it breaks the existing research focus of verifying tool effectiveness, and moves the research topic from “can tools help write,” to “how tools affect writing quality and learners’ strategy adaptation,” and reveals the internal learning mechanism in the AI-assisted writing process. Second, in regard to research content, this study focuses on the specific field of ESP, carefully characterizing the impact of AI tool application from five aspects: grammatical accuracy, lexical richness, register adherence, content completeness, and structural logic. It also found differences in register appropriateness improvement among learners of different levels, providing empirical evidence for targeted teaching. Third, in terms of practical implications, this study has identified and summarized three types of adaptive writing strategies, including human-computer collaboration, process monitoring, and metacognitive regulation. It investigates real-world challenges and coping methods such as over-reliance and the suitability of AI-powered output, and provides practical references for adapting and revising curriculum design, strategy guidance, and evaluation reform for AI-supported writing in blended learning environments.

II. RELATED WORK

With the rapid development of AI technology, AI writing aids are increasingly widely used in the field of language learning. Rahmi et al. [1] evaluated the potential impact and effectiveness of an AI-powered writing assistant (ParagraphAI text generator) on the writing skills of second language learners. Mun [2] revealed how learners view the role of this AI tool in providing writing feedback, as well as their overall attitudes and experiences in integrating it into the English learning process. Bibi and Atta [3] revealed the perceptions, experience, and satisfaction levels of students when using ChatGPT as an English writing aid. The emergence of AI-driven writing tools has provided students with new ways to assist in English writing. Sukma et al. [4] explored the feasibility and value of Quillbot as an English writing aid for students. Minh [5] evaluated the effectiveness of using ChatGPT to improve the English writing skills and critical thinking of college freshmen, revealed the potential of ChatGPT in helping students to brainstorm, organize arguments, expand their thinking, and improve language expression, and offered insights on how to integrate AI tools into freshman-level teaching to cultivate comprehensive abilities.

Arochman et al. [6] examined the specific impact of project-based learning on the English writing skills of EFL learners. Hwang et al. [7] focused on observing and analyzing learners’ specific behavioral patterns when interacting with ChatGPT to revise their writing, especially how they constructed and adjusted the prompts or questions they submitted to ChatGPT. Ho [8] provided reflective insights

into the effectiveness of AI-powered tools in improving English writing skills among higher education students. Suryani et al. [9] measured the effectiveness of digital-based technologies in improving English writing skills and learners’ perceptions of the usefulness of the Storyboard That platform.

Masoudi [10] found that integrating ChatGPT into language learning had a positive impact on improving English writing skills and that it provided learners with personalized support and feedback. Although existing studies have verified the positive role of AI writing aids in general English writing instruction from multiple perspectives, most have focused on the effectiveness of the tools themselves or learners’ general attitudes, without exploring the specific impact mechanisms of AI aids on writing quality in ESP contexts, or the strategies learners adopt to adapt to human-computer collaboration in blended learning environments. Against this backdrop, this paper employs an empirical research design to reveal the practical utility of AI tools in ESP writing and their profound impact on learners’ writing strategies.

III. METHODS

A. RESEARCH DESIGN

This study employed a quasi-experimental design to conduct a 16-week teaching experiment among second-year students majoring in economics and management at a college. The research period spanned from March to June 2025, covering one full semester. The study adopted a Business English Writing course as the implementation vehicle, covering four Business English writing genres: business emails, meeting minutes, product descriptions, and market reports. A blended learning model was adopted, with 2 hours of classroom instruction per week and 2–3 hours of online self-study and AI-assisted writing practice per week. This study was approved by the college’s Ethics Committee and conducted in accordance with the principles of the Declaration of Helsinki. All eligible participants signed written informed consent forms.

The experimental design adopted a pre- and post-test comparison method. All participants underwent a pre-test writing assessment to obtain baseline data. After the teaching intervention, a post-test was conducted, supplemented by questionnaires and semi-structured interviews to collect learners’ strategy usage data and subjective experiences. To explore the differences in performance among learners with different English proficiency levels, the study divided participants into three proficiency groups: high, medium, and low, based on their pre-test scores and performed a comparative group analysis [11].

B. RESEARCH SUBJECTS

The study recruited 128 second-year students majoring in economics and management who were taking a compulsory

Business English Writing course at a college. Participants were 34 males and 94 females, aged 19 to 21. All participants had completed basic college English courses and possessed at least an intermediate level of English proficiency. To ensure sample representativeness, four parallel classes were selected, all taught by the same instructor, using the same teaching materials and instructional pacing. Pre-test data showed no significant difference in English writing scores among the four classes ($F = 1.23$, $p = 0.31$), indicating that the groups were comparable.

The participants' professional backgrounds covered four concentrations: international trade, logistics management, marketing and E-commerce, which provided a suitable sample composition for this study to examine ESP writing. All participants voluntarily participated in the study and signed informed consent forms. During the study, five students were excluded from the final sample due to more than three absences, and the effective sample size was 123 participants [12]. A comparison of the pre-test scores between the five excluded participants ($M = 17.20$, $SD = 2.45$) and the retained sample ($M = 17.63$, $SD = 2.58$) showed no statistically significant difference ($t = 0.36$, $p = 0.72$), suggesting that the exclusion did not introduce systematic bias to the baseline proficiency of the final group.

C. TOOLS AND DATA COLLECTION

A variety of tools were used in this study for data collection, comprising the following categories.

In terms of writing testing tools, the study developed two sets of writing tasks, a pre-test and a post-test, both of which were applied writing tasks in the business contexts. The pre-test task involved writing a business consultation email, in which learners were required to request product specifications, prices, and delivery times from prospective suppliers. The post-test task was to write a product market brief in which learners had to briefly provide an analysis of the performance of a product in three regional markets, with the provision of suggestions based on the information of the sales data. Both sets of tasks were validated for content validity by three Business English teaching experts to ensure consistency between task difficulty and scoring criteria. The scoring was an analytical scoring scale, with five elements of scoring dimensions, including content completeness, structural logic, grammatical accuracy, lexical richness, and register appropriateness, with a maximum score of 5 points per element and a total score of 25 points. Scoring was completed independently by two instructors each with over five years of experience teaching Business English, and the inter-rater reliability coefficient was 0.87 [13], [14].

The "AI-Assisted ESP Writing Strategy Questionnaire" was developed based on relevant literature. The questionnaire consists of three parts: Part 1 is basic information, including name, student ID, and years of English learning; Part 2 is AI tool usage, including frequency of use, types of

tool used, and purpose of use; Part 3 is a writing strategy scale with 24 items, covering three dimensions: human-computer collaboration strategies, process monitoring strategies, and metacognitive regulation strategies. The scale uses a five-point Likert scale, ranging from 1 (completely disagree) to 5 (completely agree). After a small-scale pre-test, the Cronbach's α coefficients for each dimension were between 0.79 and 0.86, indicating good reliability.

Regarding interview tools, a semi-structured interview outline was designed, mainly focusing on the specific ways learners used AI tools, difficulties they faced, strategy adjustment process, as well as their overall perceptions of AI-assisted writing. The interview outline was reviewed and modified by two experts in the field of educational research methods.

In addition, the research obtained learners' data on AI tool application. Plugins installed in the laboratory and in learners' personal devices measured specific behavioral data concerning learners' use of tools such as DeepSeek, LanguageTool and Wordvice AI, including usage duration, number of interactions and types of prompts.

The data collection process strictly followed the timeline. Week 1 saw the completion of the pre-test writing assessment and background questionnaire. Weeks 2 through 15 constituted the instructional intervention phase, and usage logs were recorded continuously. Week 16 marked the completion of the post-test writing task and strategy questionnaire. In week 17, based on pre-test scores, 30 learners were randomly selected via stratified sampling for one-on-one interviews lasting approximately 25–35 minutes, with all interviews audio-recorded and transcribed.

D. TEACHING INTERVENTION PROCESS

The teaching intervention implemented was embedded in the framework of a regular Business English writing course. The entire teaching process was divided into three modules: a pre-class preparation class, in which learners watched videos of micro lectures recorded by the teacher in an online learning platform to understand the basic characteristics and writing points of the writing style of the week, and tried to write a first draft using AI tools; a face-to-face class in which a teacher answered the question of the learners about their first draft writing, explained the core writing style norms and the common mistakes, and conducted peer review activities and group discussions; and a post-class reinforcement phase, in which learners revised their second drafts based on the feedback received in class and then submitted the final version to the online platform for assessment.

The use of AI tools was guided in a step-by-step manner. In weeks 1–4 instructors paid attention to helping learners use LanguageTool for grammar proofreading and polishing languages, developing basic tool operation skills. In weeks 5–8, Wordvice AI was introduced to aid in rewriting sen-

tences and pre-learning vocabulary to help learners develop greater linguistic diversity. In weeks 9–12, learners were guided to use DeepSeek for content generation and structure optimization and to learn how to design effective prompts to obtain high-quality output. In weeks 13–15, learners were encouraged to independently select and combine various tools according to specific writing tasks, creating individual strategies for tool use.

To avoid over-reliance on AI tools, teachers reiterated the auxiliary role of these tools during the teaching process, requiring learners to include “instructions for use” with each assignment, specifying which parts were completed independently, which parts utilized AI tools, and what modifications and adjustments were made. In addition, dedicated sessions were included in classroom discussions to share effective human-computer collaboration experiences and strategies.

IV. RESULTS AND DISCUSSION

A. THE IMPACT OF AI TOOLS ON THE QUALITY OF ESP WRITING

To examine the impact of AI-assisted writing tools on the quality of ESP writing, a paired-samples t-test was conducted on learners’ pre- and post-test writing scores. Table I presents the descriptive statistics and difference test results of the pre- and post-test scores.

As shown in Table I, learners’ post-test scores in the five dimensions were significantly higher than their pre-test scores, and the average total score increased from 17.63 to 19.98 (+2.35 points, $t = 8.76$, $p < 0.001$). The effect size for the total score improvement was calculated as Cohen’s $d = 0.98$, indicating a large practical significance. This result shows that AI-assisted ESP writing teaching has a positive impact on improving learners’ writing quality. This finding is consistent with the current research conclusions, including the perspective that AI-assisted writing tools can have a positive impact on the effect of learners’ writing performance. However, it is important to acknowledge that without a traditional control group, the observed improvements likely represent a synergistic effect of AI tools, teacher-led instruction, and natural linguistic development over the 16-week semester.

Specifically, among all dimensions, grammatical accuracy improved the most (0.64 points), followed by lexical richness (0.60 points). This result is easily understood given that tools such as LanguageTool have clear functional advantages in terms of grammatical correction and vocabulary substitution in that they can immediately identify any errors and require learners to correct them directly in their writing. Several learners who were interviewed mentioned, “Before, I was always worried about grammatical errors after writing emails. Now, after checking them with LanguageTool, I can be pretty much sure that the grammar is correct.” This shows

that linguistic errors and the standardisation of text can be reduced significantly by using AI tools.

The improvement in register appropriateness was 0.51 points, also reaching a significant level. Register appropriateness can be seen as the ability of learners to select the right tone, wording and expressions depending on a business situation, and this can be considered under the category of pragmatic competence. In the case of ESP writing, the appropriateness of registers is often far more important than just grammatical correctness. Research has found that when using generative tools such as DeepSeek, learners consciously ask the AI to give them multiple versions of expressions with different tones to choose from. One learner said, “When I’m writing business emails, I ask DeepSeek, ‘Is there a way to say this sentence in a more formal way?’ or ‘What tone should I use for an apology email to a client?’ Its suggestions are very helpful.” This means that AI tools not only assist learners to make corrections but also to a degree prove the improvement of pragmatic awareness.

The improvement in content completeness and structural logic was relatively small, which were 0.36 and 0.24 points respectively. These two dimensions concern the organization and content conception at the text level, and relying only on the immediate feedback provided by AI tools is unlikely to lead to significant improvement in the short term. As one teacher pointed out in an interview, “AI can help you write a sentence more beautifully, but it can’t help you figure out the logical flow of the entire article.” This initial research indicates that AI tools have a more direct impact on language assistance at the micro-level, whereas their contribution to text structure at the macro-level requires longer-term teaching guidance and practice. Therefore, while the composite total score indicates overall growth, the effectiveness of AI is most accurately reflected in the micro-level linguistic dimensions rather than macro-level structural logic.

It is worth mentioning that further analysis reveals that the learners with different levels of English clearly showed different improvements on all dimensions. Table II shows the improvement scores of high, medium and low-level learners in terms of total score, and scores for each dimension.

Table II shows that the low-level group exhibited the largest increase in total score (2.77 points), while the high-level group showed the smallest increase (1.95 points), with a significant difference between the groups ($F = 6.84$, $p = 0.002$). This result indicates that AI tools have a more significant “remedial” effect on learners with relatively weak foundations. In both grammatical accuracy and lexical richness, the low-level group showed significantly greater improvement than the high-level group. This is as expected, because low-level learners have more room for improvement in language accuracy, and the instant error correction function of AI tools can quickly address their knowledge gaps.

TABLE 1. Comparison of Learners' Pre- and Post-Test Writing Scores ($N = 123$)

Dimension	Pre-test mean	Pre-test SD	Post-test mean	Post-test SD	Mean difference	<i>t</i> -value	<i>p</i> -value
Content completeness	3.62	0.58	3.98	0.51	0.36	5.24	0.000
Structural logic	3.71	0.63	3.95	0.57	0.24	3.67	0.000
Grammatical accuracy	3.48	0.71	4.12	0.48	0.64	8.53	0.000
Lexical richness	3.45	0.67	4.05	0.53	0.60	7.92	0.000
Register appropriateness	3.37	0.72	3.88	0.61	0.51	6.18	0.000
Total score	17.63	2.58	19.98	2.21	2.35	8.76	0.000

TABLE 2. Comparison of Pre- and Post-Test Score Improvements Among Learners at Different Skill Levels

Dimension	Low-level group ($n = 38$)	Intermediate-level group ($n = 49$)	High-level group ($n = 36$)	<i>F</i> value	<i>p</i> -value
Content completeness	0.41	0.35	0.31	2.13	0.124
Structural logic	0.28	0.23	0.22	0.98	0.379
Grammatical accuracy	0.89	0.62	0.39	18.45	0.000
Lexical richness	0.76	0.58	0.45	11.32	0.000
Register appropriateness	0.43	0.52	0.58	4.21	0.017
Overall score improvement	2.77	2.30	1.95	6.84	0.002

However, in terms of register appropriateness, the improvement in the high-level group (0.58 points) was higher than that in the low-level group (0.43 points), and the difference was statistically significant ($F = 4.21$, $p = 0.017$). This finding is noteworthy. Register appropriateness involves the understanding and application of industry-specific communicative conventions, requiring learners to have a certain level of language proficiency and contextual sensitivity. High-level learners are better able to understand and internalize the pragmatic suggestions provided by AI tools, transforming them into their own writing abilities. One high-level learner mentioned in an interview: "I compare my own sentences with AI-corrected sentences, think about why the revision is more appropriate, and then summarize some patterns." This indicates that the interaction between high-level learners and AI tools exhibits more characteristics of "deep learning," rather than simply receiving corrections.

B. CHARACTERISTIC ANALYSIS OF LEARNERS' STRATEGY USE

To explore learners' strategy use in AI-assisted writing, this study collected data using a combination of questionnaires and interviews. Exploratory factor analysis of the questionnaire data identified three core strategies: human-computer collaboration strategies, process monitoring strategies, and metacognitive regulation strategies. Table III presents the frequency of learners' use of these three strategies.

As shown in Table III, the most frequently used strategy by learners was the human-computer collaboration strategy (mean = 3.87), followed by the process monitoring strategy (3.41), and the metacognitive regulation strategy was the least frequently used (3.28). This distribution reflects the behavioral patterns of learners when they first encounter

AI tools: they tend to view AI primarily as a writing assistant, obtain necessary support through prompt-based interaction, and pay relatively little attention to how to use AI strategically or how to evaluate the quality of its output.

Specific manifestations of strategies of human-computer collaboration are, among others: provision of explicit instructions to AI tools, revision of text based on AI feedback, comparison of the output of different tools. Questionnaire data shows that 85.4% of learners said that they "frequently use AI tools to check for grammatical errors," and 79.7% said they "ask AI to help rewrite sentences that are not well-expressed." In an interview, one learner explained their usage habits: "When writing emails, I start by writing myself, then check with LanguageTool to fix grammar, and then use Wordvice AI to replace some common expressions with more suitable business expressions." This "self-writing first, then tool-based optimization" is a typical approach to human-computer collaborative writing.

It is worth noting that there were significant differences in the frequency of human-computer collaboration strategy use across different level groups ($F = 8.93$, $p < 0.001$), with the highest frequency (4.12) in the low-level group and the lowest (3.61) in the high-level group. This difference can be approached from two perspectives. On the one hand, there is a greater sense of urgency in low-level learners for language accuracy and linguistic expressive diversity, which in turn makes them more likely to resort to using tools more frequently to make up for their own shortcomings. On the other hand, high-level learners might be more wary of the need for AI output, and they might only use tools when needed. One of the high-level learners said in an interview, "some simple sentences are fine if I write them myself, I don't need the AI help to revise them." In fact, it could

TABLE 3. Learners' Use of AI-Assisted Writing Strategies ($N = 123$)

Strategy type	Mean	SD	Low-level group	Intermediate-level group	High-level group	F value	p -value
Human-computer collaboration strategy	3.87	0.62	4.12	3.85	3.61	8.93	0.000
Process monitoring strategy	3.41	0.73	3.12	3.45	3.68	6.47	0.002
Metacognitive regulation strategy	3.28	0.78	2.95	3.32	3.59	8.12	0.000

make the originally natural expression seem very stiff.

Process monitoring strategies refer to learners constantly monitoring and evaluating their writing process throughout the writing process, including ensuring that suggestions from AI tools are reasonable, comparing the merits of different versions, and paying attention to whether they are too reliant on the tool. Table III shows that the high-level group recorded the highest score on process monitoring strategies (3.68), which was significantly higher than that of the low-level group (3.12). This difference shows that these high-level learners have a greater level of critical awareness when using AI tools and do not simply accept all suggestions blindly. One learner mentioned in the interview: "The first time that I used LanguageTool, I changed whatever it said. I later realized that some of the suggestions did not apply, such as changing active voice to passive voice, but active voice is often more direct in business emails. Now I judge first and accept suggestions selectively."

Metacognitive regulation strategies relate to the reflection and control of learning processes such as the tools learners employ depending on the requirements of the tasks, the summarization of successful human-computer collaboration models, and the formulation of personal learning standards. This is the most abstract of the three types of strategies and is most closely associated with self-directed learning ability. Data shows that the mean score of the high-level group was significantly higher than that of the low-level group in terms of metacognitive regulation strategies (3.59 and 2.95, respectively) and the difference was highly significant ($F = 8.12$, $p < 0.001$). High-level learners gave many examples in the interviews: "When using DeepSeek, it was known to me that the more specific the prompts I wrote, the more useful the answers I obtained." "Later, I also specifically summarized a method of writing prompts, including describing the role and scenario and also stating the specific needs." "After completing each assignment, I would look back on which parts of the assignment were changed by AI and which parts were not, think about why, and then write them down in my notebook." These descriptions represent the reflection and regulation of learners on their own learning process.

C. CHALLENGES AND SOLUTIONS IN AI-ASSISTED WRITING

While the study results demonstrate that AI tools have a positive effect on writing quality, there are a number of

difficulties that have been noted during the teaching process. If these issues are not addressed, they may reduce the long-term benefits of AI tools.

Over-reliance on AI is one of the most prominent problems. During the teaching process, some learners showed a high level of tool dependency, showing the lack of confidence in writing without AI, or submitting assignments very similar to AI-powered content. Usage log data indicates that 12 learners communicated with AI over 15 times per writing task after week 10, some of whom were cases of directly copying generated content. One learner frankly acknowledged in an interview, "After getting used to it, I found myself too lazy to think. Anyway the AI can write, I can just make minor modifications." If this tendency continues, it might cause a reduction of the independent writing skills of learners.

To correct this problem, various measures were implemented during the teaching process. First, an "autonomy" dimension was added to the grading criteria; learners were required to disclose their AI usage when submitting assignments, and self-completed and AI-assisted parts were graded separately. Second, "AI-free days" were incorporated into classroom discussions on AI usage, requiring learners to complete timed writing tasks without using any AI tools, and then compare their performance to how they would typically use AI and reflect on the impact of over-reliance. Third, individual learners who over-used AI were interviewed to coach them to adopt a "self-directed, then assisted" writing habit. These measures have had a regulatory effect to some extent. One of the learners who was earlier over-reliant on AI mentioned later on in the interview: "After the teacher's reminder, I started to consciously control how often I use AI, writing it myself first and then having it check. Although I wrote very slowly at first, I gradually got the feeling that I was really improving."

Another challenge is the appropriateness of AI output. In the case of ESP writing, culture, pragmatic conventions and industry characteristics place high demands on language appropriateness. Research has found that in some contexts, AI tools' output is not fully suitable for the business writing needs of the Chinese learner. One learner reported, "Emails generated by DeepSeek are sometimes too direct and do not conform to the Chinese habit of using euphemisms." Another learner commented, "There are some specialized terms and expressions in our industry that are not familiar to the AI; the sentences generated are grammatically correct

but they are not professional enough.” This suggests that most of the training data for AI tools is grounded in general English and does not adequately consider the register markers for different industries and cultures.

Several coping strategies have been developed by the learners. Some explicitly provide the industry background and cultural context in the prompts, such as “Please use the euphemisms commonly used in Chinese business emails” or “We are in the medical device industry, please use professional terminology.” Others compare the outputs of several tools and merge and adapt the results based on their own industry knowledge. One of the learners shared their experience using DeepSeek: “I use DeepSeek as a draft generator now, but I must modify the final version myself. Only I truly understand the client’s situation and the industry needs.” This awareness, in terms of using AI output as a reference rather than the final draft, is key to successful human-computer collaboration.

Peer collaboration was also found to positively contribute to strategy formation of learners. Classroom observation and interview data revealed that the learners shared their experiences on the design of effective prompts, exchanged ideas on the usage of different tools, and discussed how to judge the rationality of AI suggestions. One learner said, “Several of us in my dorm often talk about ways to use AI. Whoever discovers a useful prompt shares the prompt in the group. Seeing others using it well, we try it ourselves.” This informal learning community fostered the dissemination and internalization of strategies and also alleviated, to some extent, the contradiction of lack of teacher guidance time.

From a teacher’s perspective, the introduction of AI tools presents new challenges to instructional design. On the one hand, teachers need to help learners develop a correct understanding of AI tools, recognizing both their value and limitations. On the other hand, teachers need to design corresponding learning activities to foster learners’ critical thinking and metacognitive abilities through interaction with AI. One teacher involved in the study stated in an interview: “Previously, I mainly taught how to write; now I also teach how to use AI to assist writing, how to judge the quality of AI writing, and how to avoid being misled by AI. The focus of teaching has shifted from language knowledge to strategies and methods.” This shift reflects the new characteristics of writing instruction in the AI era.

V. CONCLUSION

This study, through a 16-week empirical investigation conducted in a blended learning environment, examined the impact of AI-assisted writing tools on ESP writing quality and learners’ strategy usage characteristics. The implications for teaching practice are that the introduction of AI-assisted writing tools should not be limited to providing a technological platform, but should be accompanied by complementary instructional design and strategic guidance.

Teachers should help learners develop critical awareness of AI use, cultivating their ability to discern AI output and regulate the human-computer collaboration process. Assessment methods also need corresponding adjustments, incorporating both independent writing ability and human-computer collaboration ability into the evaluation scope. Future research could further explore the applicability of AI tools in different types of ESP writing and how to integrate strategy-based teaching systems into curriculum design.

AUTHOR CONTRIBUTIONS

Chaoyi Huang designed, collected and analyzed the data, drafted the manuscript, conducted the study, critically revised the manuscript for important intellectual content, and gave final approval of the version to be published. Chaoyi Huang fully participated in this work, takes public responsibility for appropriate portions of the content, and agrees to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICTS OF INTEREST

The author declares no conflict of interest.

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