

Using AI Assistance Tools in Academic Writing: Voices from EFL Postgraduates Students

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ABSTRACT:

For many EFL postgraduates, academic writing is a challenging task. The emergence of AI writing tools provides support for them. AI-tools can not only provide immediate feedback on grammar, vocabulary and sentence summarization, but also help students better understand the norms and styles of English academic writing. Therefore, the current study adopted a mixed research approach to deeply explore the usage, benefits, practical difficulties and latent risks of AI-tools in academic writing among Chinese EFL postgraduates joining a Malaysian university. To achieve this aim, 108 postgraduates were surveyed and 8 students were interviewed. The results revealed that in general, students rely heavily on AI-tools, especially comprehensive writing assistance systems like ChatGPT and Grammarly during the writing stages such as language refinement, and logical adjustment. In addition, the respondents highly praised the positive role of AI tools in enhancing writing efficiency, grammatical accuracy and lexical diversity, especially in the early planning stage of writing. However, the findings also revealed a variety of challenges that students in using AI tools in academic writing, such as the disconnection between AI content and writing intentions, doubts about the accuracy of information, and anxiety over the deterioration of writing skills and the loss of academic voices. Insufficient educational support and guidance gaps also restrict the reasonable integration of AI tools in academic writing to a certain extent. Based on the findings, useful suggestions on how to enhance AI literacy, specify AI usage

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norms and develop a human-machine collaboration model are offered in this study.

Keywords: Artificial intelligence writing tools; Academic writing; Chinese EFL postgraduates; ChatGPT

1. Introduction

Generative artificial intelligence (AI) represented by ChatGPT is completely transforming the field of education (Wang et al., 2025). It has attracted the attention of scholars and practitioners in writing instruction for it can provide immediate feedback and support to students in different aspects including grammar correction, sentence structure and creative generation (Barrot, 2023; Nguyen & Barrot, 2024; Ya'u & Mohammed, 2025). Meanwhile, with the rise of generative GenAI tools such as ChatGPT and their increasing relevance in academic settings, the demand for AI literacy has become indispensable, especially for international students (Ngo & Hastie, 2025). Abdullah (2025) stated that AI is currently undergoing evolutionary changes, influencing almost all social fields, especially our way of learning. This already prompted many scholars and researchers in language education to regard AI as an important research topic. Meanwhile against the backdrop of increasingly frequent international academic exchanges, the demand for English academic writing among Chinese EFL postgraduate students is constantly increasing. However, due to the interference of the mother tongue, differences in teaching and learning methods, and the lack of training on academic writing, many Chinese EFL postgraduate students still face several challenges in English writing such as improper use of vocabulary, frequent grammatical errors, loose argumentative structure, lack of critical thinking

and so forth (Xu & Jumaat, 2024). Jin et al. (2025) mentioned that academic writing and career success are crucial, but they remain a challenge for many students. Many EFL students face numerous challenges in the process of academic writing, mainly reflected in aspects such as grammatical expression, logical organization, academic text structure, vocabulary usage and critical thinking. Since English is not their native language, many students often have difficulty accurately expressing complex ideas or meeting the language norms of academic writing when writing academic papers (Aljahdali & Alshakhi, 2021).

Besides, nowadays the methods for students to learn English writing are limited, mainly consisting of teacher guidance and self-study. The currently popular way of teacher guidance is the flipped classroom, which is a teaching strategy that encourages students to prepare for the course in advance, especially by using the online materials provided by the teacher. This approach can effectively enhance students' writing ability (Alghasab & Maha Bader, 2020). However, this method takes a long time and is suitable for students to study for a long time. Another approach is Written Corrective Feedback (WCF), in which teachers provide written feedback on students' mistakes in writing to help students identify and correct problems in grammar, vocabulary and structure. This method is helpful to improve students' writing accuracy and language expression ability and has a positive effect in

improving language accuracy (Evans et al.,2023). However, this method has a lag. Students have to complete the writing by their own ability first and then hand it over to the teacher for grading. Besides, there is a method that takes effect quickly and is very convenient, and that is Peer Feedback. It means that students review each other's writing works and provide feedback and suggestions. This way of interaction not only promotes cooperation and communication among students but also enhances their critical thinking and self-reflection abilities. Studies have shown that trained peer feedback has a similar positive effect to teacher feedback in improving writing ability and self-efficacy (Cui et al.,2021). However, the drawbacks of this method are also obvious, and the professionalism of Peer Feedback is questioned.

In today's world, with the rapid development of technology, AI can have a positive impact on EFL learners including Chinese postgraduates. It is particularly worth noting that in today's society, various AI writing assistance tools such as Grammarly, ChatGPT, etc. have been widely applied in academic writing. For instance, ChatGPT can encourage learners to study and provide timely feedback on their writing (Zhang et al.,2025). It handles narrative and lexical concreteness better than human writers (Zhou et al.,2024). In addition, this AI writing tool can offer a variety of functions such as grammar correction, content polishing, and writing suggestions, greatly facilitating the writing process of EFL learners (Ya'u & Mohammed,2025).

However, research on the impact of AI writing tools on learners is still in its infancy. Previous studies have pointed out that although AI-tools have improved grammatical accuracy and language fluency in the short term, there is still considerable

controversy over their potential impact on learners' autonomous writing ability, critical thinking and originality (Jamshed et al., 2024). Jiang et al. (2025) mentioned that most research focuses on a single feedback method, and this method is limited. The true exploration lies in combining AI with other methods. Some researchers are concerned that excessive reliance on AI will weaken students' language ability and independent thinking ability (Milton et al., 2024). Furthermore, how to rationally regulate the use of AI-tools in academic writing and avoid academic misconduct such as plagiarism and improper citation has also become the focus of current research (Navaie et al., 2000). Some scholars have combined anxiety with the usage rate of AI, pointing out that there is a positive correlation between frequent use of AI writing tools and writing anxiety, and Yu pointed that excessive reliance on AI may weaken students' independent writing ability (Yu,2024).

At present, most studies focus on the functional effectiveness of AI-tools, but few studies have explored the cognition, usage, benefits and challenges in using AI in academic writing among specific language learner groups such as Chinese EFL postgraduate students in a Malaysian university. Therefore, this paper aimed to investigate the usage, benefits, practical difficulties and potential risks of AI writing tools among Chinese EFL postgraduate students in in a Malaysian university through a combination of quantitative and qualitative methods.

2. Literature Review

2.1. AI in academic writing

Today's AI writing tools offer students a vast amount of information. These AI-tools can assist students to improve their academic writing skills by

accessing online resources such as online libraries, academic databases, and academic websites that provide reliable research and informational sources (Fyfe, 2022; Grassini, 2023; Mahmud & Fawaz, 2023). Besides, they can provide immediate feedback on students' writing. Nowadays, the most used AI writing tools are Chat-GPT, Quillbot and Grammarly. Currently, ChatGPT has sparked unprecedented interest and controversy. It is called ChatGPT because it is based on the Generative Pre-trained Transformer (Welsby & Cheung, 2023). The second one is Quillbot, but this AI is not as widely used as ChatGPT. It is a pure article generator. Grammarly is also an article generation tool. However, it is more inclined to make revisions to existing articles, correct grammatical errors and polish the articles.

2.2. Uses and purposes of using AI for writing

AI writing tools are widely used in multiple stages of English academic writing. Their main purposes include grammar correction, language polishing, content generation, logical structure planning, and inspiration for writing. For Chinese EFL postgraduate students, these tools can not only make up for their lack of language expression, but also help improve their writing efficiency and confidence.

First of all, in the early stage of writing, AI tools are often used to stimulate writing inspiration and generate writing Outlines. For instance, ChatGPT is employed by many students to conceive topics, expand viewpoints or provide writing frameworks, thereby helping them quickly get into the writing state. Yuan et al (2024) found that Chinese graduate students generally use ChatGPT to assist in brainstorming and generating writing drafts, a practice that significantly enhances their sense of

control over writing tasks.

Secondly, during the writing process, AI tools are used to optimize sentence structure, enrich vocabulary expression and improve language fluency. Faisal & Carabella (2023) pointed out that when students use tools such as Grammarly for language polishing, it can enhance the accuracy and clarity of expression of the article. This not only reduces the rate of grammatical errors but also enhances the professionalism of writing.

Furthermore, in the later stage of writing, AI tools are widely used for proofreading and structural review. Many AI platforms such as ChatGPT offer real-time language modification suggestions and citation format prompts, which help students comprehensively revise their texts before submission. EKİZOĞLU & DEMİR (2025) pointed out that such tools are particularly favored by non-native English learners who lack systematic writing training, as they can provide immediate feedback and reduce the frustration caused by repeated revisions.

2.3. The advantages of AI generative tools for academic writing

AI has completely transformed the speed at which students learn English skills in the 21st century, especially improving the English writing skills of learners of ESL and EFL (Kushki et al., 2022). Hwang et al. (2025) mentioned that AI-tools can promote L2 writing and highlighted the importance of digital literacy. AI writing tools, such as Grammarly, ChatGPT and Deep Seek, can provide students with writing ideas, frameworks, academic vocabulary and grammar error corrections. Many studies today have proved the usefulness of these AI tools in the English academic writing. For example, Moussa & Belhiah

(2024) mentioned that in English academic writing, AI tools can provide support to students in multiple aspects, including grammar correction, vocabulary selection, sentence structure optimization, and improvement of logical structure. Several studies have highlighted the positive impact of AI tools on writing proficiency. Jamshed et al. (2024) found that ChatGPT significantly improved the grammatical accuracy and writing skills of ESL students by providing real-time corrective feedback. Similarly, Tang (2024) found that college students who used AI-assisted writing strategies improved their academic writing by enhancing their ability to summarize and outline. Wei et al. (2023) conducted a randomized controlled trial using Grammarly that showed AWE improved coherence, cohesion, and grammatical accuracy in Chinese English learners. In addition to grammar and coherence, AI tools also affect the creativity of writing. Guo et al. (2024) mentioned that AI-tools can enhance students' potential in EFL writing. Jatin et al. (2023) found that automatic writing assessment (AWE) promoted creativity in pre-college students, allowing for unlimited revision and interactive feedback, promoting higher engagement. Abdullah (2025) mentioned that most participants held positive views on using Grammarly and Wordtune for grammar and academic style, Quillbot for rewriting and Abstracting, and ChatGPT for idea generation and creative ideation. Furthermore, most people admit that the use of AI- tools has greatly affected their writing practice at all stages of the writing process. Cowling (2022) pointed out that even though the use of AI-tools is primarily considered complementary to traditional methods rather than a substitute for analytical thinking or logical thinking, which are crucial for the

development of academic writing skills, they can significantly enhance academic writing skills and so on.

2.4. The limitations and challenges of AI-tools

Despite these benefits, there are limitations to the integration of AI in language learning. Some researchers have expressed concern about over-reliance on AI tools, which could hinder independent writing skills. Xi (2024) emphasized the drawbacks of AI-driven writing, such as reduced creative learning and weakened social connections. Milton et al. (2024) report that students rely more on generative writing rather than revising independently written content, highlighting the risk of declining self-editing skills. Furthermore, Tang (2025) points out that while Chinese English learners appreciate the efficiency of AI, they remain wary of its impact on critical thinking and originality. Similarly, Navaie et al. (2024) discuss the ethics of using AI in academic writing, emphasizing the need for a balanced approach.

There are also studies indicating that AI writing tools have an "illusion" phenomenon when generating text, that is, they produce information or quotations that seem true but are actually false. Welsby and Cheung (2023) warns that models such as ChatGPT may fabricate non-existent journal articles, citations or research results, thereby misleading learners and researchers. The Wikipedia entry on "AI illusion" also summarizes how models "imagine" data content out of thin air when lacking a factual basis, which has become one of the most criticized issues of AI in academic writing.

Studies have pointed out that AI-tool can make the depth and logic of students' language expression weaker. Ivanova et al. (2025) pointed out through a

survey of professional writers that AI tools have obvious deficiencies in style adaptability, in-depth expression and logical construction. Although the text generated by AI has correct grammar and smooth sentence structures, it is difficult to replace human logical processing ability in terms of the rigor of argumentation and the depth of thought. Similarly, Jain & Jain (2023) also pointed out that AI writing is prone to the problem of "seemingly coherent but logically disorganized", especially in academic paper writing, which affects the quality and credibility of the article.

Meanwhile, many studies are concerned that AI writing tools may weaken learners' ability to transfer writing skills and critical thinking skills. Ju (2023) found through experimental evidence that students who overly rely on AI for writing tasks perform significantly lower in reading comprehension tests, suggesting that the use of AI inhibits learning depth to some extent. The research by Zhai et al. (2024) also emphasizes that if AI tools are not properly guided, they can easily lead students to develop mechanical dependence, which affects the autonomous development of their writing skills.

AI-tools also carry moral and legal risks. Playfoot et al. (2024) discussed the influence of academic plagiarism on ChatGPT. Cheng et al. (2025) pointed out that AI writing still faces a series of ethical and legal issues, such as plagiarism, data leakage, and unclear author ownership. Since AI tools cannot independently determine whether a text is created by others, if it is published without verification, it may lead to serious academic misconduct. Shibani & Shum (2024), from the perspective of the educational ecosystem, pointed out that if AI tools lack a clear positioning in the teaching system, it may lead to ambiguous

responsibilities of teachers and students, chaotic writing evaluation systems, and inconsistent assessment criteria. They called for the establishment of a "human-machine collaboration mechanism" to prevent the structural chaos in education caused by the abuse of AI.

Combined with these findings, AI-assisted writing tools have great promise in Chinese EFL postgraduate students, but they must be used with care. Educators can provide guidance to balance AI-assisted with independent writing exercises. Future research should explore the long-term effects on writing ability, creativity, and critical thinking, ensuring that AI remains an adjunct tool in language learning, not an alternative. Therefore, the present study, conducted among Chinese EFL postgraduates in a Malaysian university, aimed to address the following research questions:

- (1) Which AI tools and for what purposes are used by Chinese EFL postgraduates in academic writing?
- (2) How do Chinese EFL postgraduate students view AI writing tools in academic writing?
- (3) What limitations and challenges do Chinese EFL postgraduate students encounter when using AI writing tools?

3. Methodology

3.1. Research design

The current study used a mixed method research design, combining quantitative with qualitative methods. According to Creswell and Creswell (2017), mixed method design can lead to a superior and more profound understanding of the research questions. In this study, the questionnaire survey was implemented first because it was meant to elicit views from the majority of the study sample. Secondly, interviews were conducted to obtain

detailed information.

3.2. Participants

This research was conducted and investigated in the course of English and New Technologies. This course is a compulsory one for the English Language Study major in a Malaysian university. It lasts for a total of one semester, 14 teaching weeks. This course includes lectures and three assignments. In classroom lectures, teachers will guide students to use AI tools correctly to assist them in their studies or writing. The three assignments are used to test whether students understand the class content and train their academic writing thinking. The students participating in this study came from two different classes at different times, and the supervisor was the same person.

In this study, Sampling techniques (Cochran, 1977) were used to determine the best sample size. The researcher used the finite population correction formula in Sampling techniques to determine the best sample size. That is, there are a total of 150 postgraduates in the entire ELS major. Under the condition that the error rate does not exceed 5%, the optimal sample size is 108. Therefore, the participants of this study were set at 108 (108 people participated in the questionnaire survey and 7 people participated in the interview). The IELTS scores of these 108 students are all above 6.0 (the IELTS admission score for UM ELS postgraduate students is 6.5), and these 108 students all take the same course and are taught by the same teacher.

As shown in Figure (1), there were a total of 90 female participants (83.3%) and 18 male participants (16.7%). The female postgraduates made up the majority of the ELS programs. Gender differences were not included in the scope of this study due to the limited sample size, which

did not allow for meaningful statistical comparisons between male and female participants.

In addition, Figure (2) shows that 78 students were joining the program in the second semester (72.2%), while 21 of them were first semester students (19.4%), and 6 of them were in the third semester (5.6%), and 3 students were in the fourth semester (2.8%).

3.3. Data collection procedures

This collected data by combining questionnaire surveys with interviews. Therefore, the data collection procedure of this study is divided into two stages. During the questionnaire survey stage, the researcher first adapted a questionnaire containing 15 Likert scale questions to ensure that the quantitative processing of the data was feasible and scientific. The questionnaire was distributed to 108 participants through the online platform (Google Forms), and the recovery period was two weeks. All the subjects had signed the informed consent form before participating to ensure the ethics of the study and the confidentiality of the data. The collected questionnaire data were imported into SPSS for collation, coding and analysis.

During the interview stage, the researcher selected 7 volunteers from the questionnaire participants and used purposive sampling to pick representative cases for semi-structured interviews. The interview questions delved deeply into the key findings in the questionnaire to supplement and explain the phenomena and causes that had not been revealed in the quantitative data. Every interview is conducted online. Each individual interview lasts approximately 15 minutes and is recorded with the permission of the interviewees. Subsequently, the researcher transcribed the audio content into

textual data and used thematic analysis for coding and identifying.

3.4. Ethical consideration

The entire data collection process was strictly carried out in accordance with the requirements of research ethics review, ensuring voluntary participation of participants, information transparency, privacy confidentiality, and the legality and compliance of data usage. In this regard, the participants were given consent on their voluntary participation to sign.

3.5. Data analysis procedures

The data analysis of this study was carried out in two stages to match the adopted hybrid research design. In terms of data analysis, this study first adopted the sampling technique proposed by Cochran (1977) to identify the suitable sample size. According to the calculation results, the final determined optimal sample size is 108. Therefore, altogether 108 questionnaires were distributed in the study and filled out and returned through an online form to confirm the efficiency and completeness of data collection. The questionnaire of this study was adopted from Meniado et al. (2024) and Yan (2023) to suit the purpose of this study. The instrument demonstrated high reliability in previous research, with Cronbach's alpha values exceeding 0.80. This questionnaire is divided into three parts. The first part includes basic information such as gender, English proficiency, and the frequency of AI usage. The second part is the opinions and views of Chinese EFL postgraduate on the use of AI-tools in writing. This part uses the Likert Scale (Rensis Likert, 1932). This scale is divided into :1- Strongly Disagree 2- Disagree 3- Neutral 4- Agree 5- Strongly Agree. The third part also uses the Likert Scale, covering

which factors have influenced your views on the use of AI-tools in writing. Subsequently, descriptive analysis was conducted using SPSS. The results were summarized based on quantitative data such as frequency and mean, and the research questions were answered accordingly.

Regarding the second stage, the students' interviews were transcribed and organized into PDF files for preservation. During this stage, a thematic analysis based on Six Phases of Thematic Analysis (Braun & Clarke, 2006): familiarization with the data (Reading & transcribing), generating initial codes (coding interesting features and assigning them to codes), searching for themes (group codes into potential themes), reviewing themes (Checking the themes), labeling and defining themes (assigning themes to names/labels and defining themes) and producing the report (interpreting and writing up the report) was performed. Finally, the quantitative data and qualitative data were integrated.

4. Results

A total of 108 valid questionnaires and 7 interviews were obtained in this study. The results of the study are presented according to the research questions as follows:

4.1. Which AI tools and for what purposes are used by Chinese EFL postgraduates in academic writing?

To address the first research question, the results revealed that among these 108 people, the usage rate of ChatGPT was the highest, reaching 97.2%. Secondly, Grammarly reached 88%, then Deep Seek reached 81.5%, and then Quillbot reached 56.5%. The usage rates of Google Gemini, Microsoft Copilot, Wordtune, Notebook lm and AI-powered features in MS or google doc were the

lowest, which were 21.3%, 6.5% and 0.9% respectively. 13.9%. Meanwhile, more than 80% of the students expressed when answering the question "Please explain why you find your selected AI tool most helpful." that this was because the AI tool I chose was very useful, with comprehensive functions and better than other AI tools. This shows that students prefer AI tools with comprehensive functions or language optimization. In contrast, the usage rates of AI functions such as Google Gemini, Microsoft Copilot, Wordtune, Notebook LM and document types are relatively low, all not exceeding 25%.

This study found that 14.2% of Chinese EFL postgraduates Always use AI-tools for writing, and 44.3% often use AI tools. This indicates that more than half of them can use AI-tools for writing. Furthermore, when they received the writing tasks, 79.6% of them would use AI-tools to generate ideas before writing, 44.4% would use AI-tools during the writing process, and 55.6% would use AI-tools to polish or modify. This indicates that when using AI-tools, students tend to let AI inspire them or modify their ideas, rather than relying directly on AI to assist them in completing the entire writing task. Meanwhile, this study also found that when using AI-tools, the vast majority of people (70%) are very worried that they will be identified as academic plagiarism by the school. Only 30% of people are not worried or may be worried. This indicates that students generally have concerns about academic integrity when using AI writing tools, especially worrying that their usage behavior may violate the academic norms of the school. This concern reflects that students lack a clear understanding of the legal boundaries for the use of AI tools and also highlights that colleges and universities still need to strengthen the guidance on

the use of AI writing tools. If there is a lack of clear policies and educational guidance, students may be restricted from using AI tools reasonably due to uncertainty, which will affect their writing development and technical adaptability.

4.2. How do Chinese EFL postgraduate students view the use of AI writing tools in academic writing?

In order to address the second research question, the results are provided in two sub-sections: students' views on the use and benefits of AI in academic writing and students' views on teacher and institutional support on using AI in academic writing

4.2.1. Views on the use and benefits of AI in academic writing

The results of the research are shown in Table 1. The analysis revealed that students' average scores on all 15 items related to the advantages/ benefits of AI writing tools ranged from 3.70 to 3.91, indicating that, on the whole, students generally tended to recognize the supportive role that AI tools played in all stages of academic writing. According to the explanation of the Likert scale, this interval reflects that the majority of students' views of "agreement" Which indicate that students hold strongly positive views on the benefits of AI in academic writing. Further analysis revealed that item 3 scored a mean value of 3.91 the highest rank, and item 1 scored the second highest rank ($M=3.88$). This indicates that AI tools are regarded as most practical in the early stage of writing by the postgraduates, especially in terms of task understanding and content conception. The extensive use of AI tools at this stage indicates that students expect to enhance their conception efficiency and sense of direction through AI-tools.

Furthermore, from the perspective of the distribution of items, students showed a high degree of recognition for the supporting functions of AI tools during the writing process such as content organization and language expression as well as the proofreading and revision in the later stage, and the average score difference was relatively small ($0.84 < M < 0.98$). This distribution trend reflects that students have regarded AI as an "auxiliary participant" or "digital writing partner" throughout the entire writing process, rather than merely a tool for grammar correction. This result is consistent with the current research views on "AI as cognitive support in academic writing" such as Meniado et al., 2024, that is, AI is not merely mechanical assistance but an intelligent system capable of participating in the cognitive processing process.

In terms of data stability, the standard deviations of most items were concentrated between 0.85 and 0.98, indicating that the surveyed students had relatively small differences in their responses and a high degree of consistency in their opinions. This consistency also enhances the reliability of the results, providing a solid foundation for subsequent data interpretation and theoretical extension. In conclusion, the research results reveal that students generally hold a positive attitude towards the functional value of AI writing tools in multiple writing stages, especially in the aspects of task understanding and idea generation in the early stage of writing, where AI demonstrates significant practicality and cognitive support potential.

4.2.2. Students' views on teacher and institutional support on using AI in academic writing

The results of the research are shown in Table 2.

Compared with the functional evaluation of the AI tools themselves, students' ratings of the college lecturers' institutional construction and basic support are generally low. For instance, the average score of "Whether the College lecturers provide effective training and support for the use of AI tools" is 2.69, reflecting that students generally believe that the current College lecturers are still not perfect in terms of relevant training and support mechanisms. Although there is a certain foundation in aspects such as equipment provision and ethical guidance (for example, the average value of item17 is 3.50), there are still deficiencies in its popularity and clarity, indicating the lack of systematic approach and consistency in the integration of AI writing tools in college. At the teacher level, the views of students' feedback show a certain degree of differentiation. Although teachers as a whole hold an open view towards AI tools (for example, the average value of "teachers holding a positive attitude towards AI tools" is 3.30), their performance in specific teaching practices is still insufficient. Especially in aspects such as "Whether teachers effectively integrate AI tools into classroom teaching" (item 22, with an average of 3.13) and "whether they demonstrate how to use AI tools at various stages of writing" (item 23, with an average of 2.99), the scores are relatively low. This indicates that teachers still need further professional training and guidance in the aspects of instructional design and technology integration.

However, it is worth noting that students have shown a high degree of enthusiasm in terms of their own abilities and subjective attitudes. The average score of item 28, "I think AI tools are helpful for academic writing," was 3.92, the highest among all the items, indicating that students

generally recognize the positive value of AI tools in academic writing. In addition, the score for "I like to use AI tools as a partner for second language writing" was also relatively high (3.75), further indicating that students are willing to accept and actively use AI-assisted writing at the subjective level. These results indicate that students possess strong digital literacy and technological adaptability, and AI tools have gradually become indispensable auxiliary resources in their writing process. Overall, this study reveals a significant "attitude-implementation gap": Although students highly recognize the effectiveness of AI writing tools and have the corresponding ability to use them, the lag in the integration of school system support and teachers' teaching restricts the wider and more effective application of AI tools in language teaching.

From the perspective of standard deviation, there is a significant difference in students' scores of "school support" and "teachers' teaching behaviors" (for example, the standard deviation of question 23 reaches 1.156), indicating that individuals' views on such issues are widely distributed. This reflects that AI education practices have not yet formed a unified standard in different teaching environments, and there is a clear implementation gap. Relatively speaking, the distribution of students' ratings regarding their attitudes towards the use of AI tools and their personal abilities is relatively concentrated, indicating that a positive consensus has initially formed at the student level. The difference in standard deviation provides important clues for educational intervention: Schools and teachers should accelerate the alignment in policy formulation, resource allocation and teaching practice, etc., to narrow the experience gap among

individuals and enhance the fairness and effectiveness of AI tools in language teaching.

4.3. What limitations and challenges do Chinese EFL postgraduate students encounter when using AI writing tools?

To address the third research question, this study used the qualitative data elicited from seven postgraduates through interviews. The findings are presented in three main themes as follows.

4.3.1. Cognitive and expressive limitations of AI in academic writing

The first aspect is that the content produced by AI is disconnected from the purpose of personal writing. Most respondents pointed out that the content generated by AI has deficiencies in context understanding and grasping the writing intention.

In other words, when expressing specific academic viewpoints or cultural semantics, AI appears to be "general" or "templated". For example, "AI often fails to understand the 'specific context' I want to write about, and the suggestions it gives are very general." (Student C) "The sentences written by AI are too stereotyped and lack my own thinking." (Student A) The second aspect is that the language style of AI does not match the tone. Respondents generally reflected that AI language has the problem of writing styles. Sometimes it is too written or colloquial, and sometimes it is disconnected from academic writing norms. For example, "The vocabulary used by AI is unstable. Sometimes it is too colloquial, and sometimes it is too academic." (Student D) "Sometimes its tone is too stiff, especially in practical writing." (Student C) The third aspect is the lack of logical coherence and paragraph organization. Although AI can generate grammatically correct sentences, some students find that its overall structure or logical

advancement ability is relatively weak and requires a lot of manual modification. Its language is correct, but the whole paragraph is not smooth. (Student A) "I don't think it's very helpful in terms of the logical structure of writing. Sometimes the AI's train of thought jumps." (Student D)

4.3.2. The trust dilemma and Handling Methods for AI-generated content

Regarding the trust challenges, the first aspect is the insufficient accuracy of the information. Several students have pointed out that there are phenomena of "forged information" or "incorrect citations" in AI-generated content, especially when it comes to theoretical support and case citations, inaccuracies are prone to occur. For example, "Once asked me to quote a document that doesn't exist at all." (Student A) "The interpretation of Shakespeare's works given by AI is completely wrong." (Student E) The second aspect is that the awareness of inspection and modification has been enhanced. Most respondents would manually revise the content produced by AI, including language polishing, logical organization, and literature verification, which also reflects that students hold an auxiliary and critical stance towards AI content. I usually only refer to the structure or the opening sentence. I write the specific content myself. (Student C) "Revision is necessary, especially for the parts of grammar and conjunctions." (Student D)

4.3.3. Emotions and concerns during the use of AI-tools

As far as emotions and concerns are regarded, the first challenge is postgraduates' concern about dependence on AI in academic writing. Almost all respondents expressed concerns: "the decline in writing ability due to reliance on AI" (Student B),

which is reflected in their sensitivity to "the decrease in writing initiative". For example, "I'm afraid my writing thinking will become lazy." (Student B) "Although it has improved efficiency, it has also reduced my chances to write by myself." The second concern is the weakening of the academic self-voice. (Student G) Some students are worried that their "voices" will be "replaced" by AI during the use of AI, thereby affecting their academic individuality and original expression. Academic writing requires the voice of "me", not that of AI. (Student E) "It doesn't read like 'my' language." (Student G) Then there is the guiding role of college/lecturers' attitudes on usage behavior. Although most schools have not completely banned AI tools, college lecturers do not advocate that students use AI either, making them more inclined for students to think completely by themselves. At the same time, the college's support for the use of AI is also insufficient, which is the same as the result of the survey questionnaire. For example, "Some teachers told me to preserve 'the traces of human writing', and I think it's quite right." (Student E) "The teacher requires students not to use AI-tools. If AI-tools are used for writing, it will be regarded as cheating." (Student B)

5. Discussion and implications

This study aimed to explore the phenomena, experiences and viewpoints of Chinese EFL postgraduate students in using AI-assisted tools in academic writing. Through a combination of questionnaire surveys and interviews, the study answered three research questions, revealing the widespread application of AI tools in students' writing processes and the complex attitudes of support and concern that have emerged as a result.

First, regarding the first research question: "Which AI tools are used and for what purposes?" "Research has found that the usage rate of multi-functional writing assistance tools such as ChatGPT, Grammarly and DeepSeek is extremely high. Students mostly use AI assistance in the stages of writing conception, language polishing and grammar checking. This result indicates that students do not view AI as a "generator" to replace writing, but rather as an "enhancement tool" to improve efficiency and the quality of language expression, especially playing a significant role in the initial conception stage of writing and the final revision stage. Ya'u and Mohammed (2025) also pointed out that the AI-tool most frequently used by students nowadays is ChatGPT, and many students consider ChatGPT merely an auxiliary tool rather than a substitute. This is consistent with the results of this study.

Secondly, in the second research question, "How do students view the use of AI tools?", the data indicates that the majority of students hold a positive attitude towards AI tools. AI tools are regarded as having significant value in enhancing the efficiency of conception, optimizing language expression, and strengthening logical organization. This conclusion is consistent with that of Xu & Jumaat (2024). They pointed out that students generally recognize the structural support, expression inspiration and proofreading functions provided by AI in academic writing. However, the research also found that there are still obvious gaps in teacher guidance and school support - insufficient training, unclear norms, and low integration of teaching, which leads to a lack of clear guidance and confidence for students in practical application. Therefore, compared with previous studies, this research is more in-depth.

The third research question focuses on "the challenges encountered in the process of using AI tools". Through interviews, it can be seen that students generally encounter three types of problems: (1) AI-generated content has issues such as templated expression, logical jumps, and contextual disconnection; (2) Insufficient accuracy of the content, with some references being untrue, has led to a crisis of trust among students regarding the AI-generated content. (3) Students are worried that long-term use of AI may weaken their critical thinking ability and academic voice. The existence of these problems causes students to experience psychological tension between "accepting AI assistance" and "maintaining writing independence". In addition, the ambiguous attitude from teachers and partial prohibitive policies have also exacerbated students' sense of uncertainty in practical operations. The results in this part of this paper are not consistent with the conclusion of Welsby and Cheung (2023). This is because AI-tools have developed rapidly and been updated frequently in the past two years, resulting in different research results. Another important reason is that different research subjects can bring about significant changes to the research.

Overall, AI writing tools have achieved a relatively high usage frequency and cognitive acceptance among EFL postgraduate students in China. However, their application effects are deeply influenced by both the limitations of the tools themselves and the completeness of the educational support system. The research results show that AI should not merely be regarded as a language error correction tool in academic writing, but should be incorporated into the cognitive process of students' writing, supplemented by systematic teaching design and ethical norms

construction, so as to achieve the educational ideal of "human-machine collaboration". The results of this study on the positive aspects of AI-tools have been discussed by most other researchers. For instance, Kushki et al. (2022) and Moussa and Belhiah (2024) discussed that AI-tools are indeed of great help to students' writing, and this help is reflected in vocabulary and grammar. Tang (2024) and Wei et al. (2023) also pointed out that AI-tools is an active tool that can help students summarize articles and polish them. However, the negative outcomes that each scholar considers are not consistent. Jain & Jain pointed out that the use of AI-tools would cause confusion in logical thinking. However, the results of this study concluded that AI-tools are merely an extension of students' thinking and are just machines that obey commands. Navaie et al. (2024) argued that the use of AI-tools would raise ethical issues and cause anxiety among students. However, this study concludes that AI-tools may raise ethical issues to a certain extent. But for postgraduates, AI-tools are merely auxiliary tools and do not cause negative emotions.

For today's society, enhancing AI literacy education is an urgent matter. Although students have a positive attitude towards AI tools, they lack systematic AI writing education and ethical training. Colleges and universities should incorporate AI literacy into the language curriculum system, teaching students how to consciously use AI tools at different writing stages, and at the same time enhance their ability to distinguish the authenticity of generated content, style matching and academic norms. This coincides with Yu's (2024) viewpoint.

For the college, it can establish guidelines for the use of AI to reduce academic risks. Tang (2024) also said so. At present, most students are still

confused about whether the use of AI constitutes plagiarism, how to quote it reasonably, and in which aspects they can rely on AI. Therefore, it is necessary for universities to introduce clear policies on the use of AI, covering aspects such as tool types, application scope, and citation norms, to help students leverage the positive role of AI tools on a legal and compliant basis and prevent academic misconduct caused by misuse or abuse.

The college can also establish a "human-machine collaborative writing model" to promote the development of writing skills. In writing teaching, the teaching concepts of "human first, then machine" and "human-machine co-creation" should be advocated. Teachers can help students enhance their critical and creative expression skills while using AI by setting up AI-assisted writing tasks (such as self-rewriting after generating the first draft, self-evaluation and peer evaluation, and comparative analysis of AI and human writing versions, etc.), preventing "tool dependence" from replacing "ability development".

For teachers, they can develop AI teaching capabilities. This study shows that although teachers generally hold an open attitude, they basically do not use AI tools in teaching practice, and teachers are relatively vigilant about AI-generated texts. The college can carry out teacher training to enhance its ability to integrate AI teaching, so that AI is no longer just a "self-study tool for students", but becomes a component of classroom writing teaching, thereby improving the overall teaching efficiency.

In the interview part, this study was found that although students generally recognize the auxiliary role of AI writing tools in improving writing efficiency and language expression, they still face

multiple challenges in the actual usage process. Firstly, AI-generated content has obvious limitations in terms of context understanding, academic style and logical structure. It often fails to precisely match the author's intentions and register requirements, resulting in a lack of individuality and depth in expression. Secondly, insufficient accuracy of information has become a barrier to trust. Some students have encountered situations of false citations or incorrect interpretations, forcing them to develop the ability to actively modify and verify the content. Finally, students generally expressed concerns about the weakening of their writing ability during the usage process, especially worrying that their voices would be weakened under the intervention of AI, which would affect the originality of academic expression. Furthermore, the attitudes of schools and teachers have to some extent influenced the way students use it, and the lack of clear guidance has also exacerbated their contradictory psychology between standardization and dependence. These findings reflect that although AI writing tools have potential, their effective application still relies on users' critical awareness and the normative guidance of the education system.

Therefore, against the backdrop of the rapid development of current AI technology, how to rationally integrate AI tools on the basis of ensuring the subjectivity and originality of students' writing has become an important issue that urgently needs to be explored. Specifically, the introduction of AI writing tools should not only be regarded as a technological innovation, but also be incorporated into the overall design of the language education system. Educators should play a guiding role in this process, helping students establish correct usage cognition and clarify the

auxiliary nature of AI tools, thereby preventing them from becoming a breeding ground for academic inertia. Meanwhile, the research results also suggest that the impact of AI tools on students' writing ability is not a single-dimensional "promotion" or "weakening", but rather a complex dynamic interactive relationship. Students may either use AI to optimize language expression, expand vocabulary and structure, or unconsciously weaken logical construction and critical thinking. Therefore, in teaching practice, students should be encouraged to form advanced writing skills in the cycle of "use - review - reconstruction" to achieve the coordinated development of technology and ability.

Finally, at the institutional level, it is necessary to consider formulating clearer and more reasonable norms for the use of AI writing. It is necessary to avoid both "one-size-fits-all" prohibitive regulations and prevent abuse and reliance. Through methods such as course embedding, writing training camps, and academic integrity guidance, students can learn how to appropriately utilize AI tools in real writing tasks and develop independent judgment and reflection abilities. This not only helps to build a healthy academic ecosystem but also provides a realistic path for the exploration of the integration of education and technology in the future.

6. Conclusion

This study explores the application of AI writing tools in the academic writing practice of Chinese ELS postgraduates. By adopting a mixed research method, it systematically investigates and analyzes students' usage behavior, functional cognition, benefits and challenges of AI tools in the actual writing process. Through the analysis of

questionnaire data from 108 postgraduate students in a Malaysian university and in-depth interviews with 7 students, the research found that AI writing tools have gradually become key auxiliary resources in students' academic writing. They not only provide immediate support at the language level (such as grammar correction, vocabulary replacement, and sentence reconstruction), It also assists students in overcoming writing obstacles at the cognitive level (such as stimulating writing ideas, planning structure, and organizing logic), and enhancing their overall writing ability and efficiency.

In terms of the motivation for using AI tools, students generally view them as an important means to reduce the difficulty of writing, alleviate language anxiety and enhance writing confidence. Especially in the initial conception stage and the final polishing stage of writing, AI shows obvious advantages. This shift from "instrumental assistance" to "process-oriented collaboration" indicates that students' reliance on AI tools is transitioning from superficial language error correction to deeper writing support. However, the research has also revealed a series of issues worthy of attention. Firstly, AI-generated content still has obvious deficiencies in context matching, style consistency, and logical coherence. Especially when dealing with complex academic argumentation and critical expression tasks, AI often fails to meet the demands of personalized and in-depth expression. Secondly, students are cautious about the authenticity and authority of AI content, fearing that it might provide false citations or misleading information, thereby affecting academic integrity.

In addition, students exhibit a certain degree of ambivalent mentality when using AI tools. On the one hand, they recognize the significant role of AI in enhancing writing performance; On the other

hand, there is concern that excessive reliance on technology will weaken one's independent thinking ability and language expression ability, leading to the blurring of the "academic voice" and the deterioration of writing skills. This psychological tension is particularly prominent in an educational environment that lacks systematic guidance and standardized management. Research also indicates that currently, universities are still insufficient in the educational guidance of AI writing tools. Teachers have different attitudes towards AI tools, and there is a lack of relevant training and clear usage norms in the courses, which leads to students facing the predicament of "technology available" but "unclear path" in practice.

In conclusion, as a product of the development of educational technology, AI writing tools have demonstrated great potential in enhancing the quality, efficiency and confidence of academic writing for Chinese EFL postgraduates. However, their effective integration still requires the education system to promote them in a coordinated manner from multiple dimensions such as teaching design, policy systems and teacher training. Only by clarifying the positioning assistance of AI tools while strengthening students' AI literacy and critical usage awareness can the true value of AI technology be brought into play, promoting students' transformation from "being assisted by technology" to "coexisting with technology", and achieving the two-way development of language ability and technical ability. The findings of this study not only provide empirical support for the field of language education, but also offer feasible paths and policy inspirations for universities to build a "human-machine collaborative" academic writing ecosystem in the context of the new era

Ethics declaration

This study did not require formal ethics committee approval in accordance with institutional/national guidelines. All procedures were conducted in accordance with ethical standards, and informed consent was obtained from all participants.

Consent to Participate declaration

Informed consent was obtained from all participants prior to their participation in the study.

Consent to Publish declaration

Not applicable.

Clinical trial number

Not applicable.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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