

The Application of Generative AI in Chinese as a Second Language Writing

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Abstract. The rapid development of generative artificial intelligence is profoundly changing the teaching environment of Chinese second language writing. This article systematically reviews relevant research at home and abroad since 2022, analyzing it from three levels: application scenarios, multidimensional impacts, and promotion directions. Research has found that generative AI is involved in the entire writing process, including pre-writing ideation and preparation, as well as expanding vocabulary richness. Generative artificial intelligence excels in grammar correction, but still lacks a comprehensive understanding of content and emotional nuance. From the perspective of impact, generative AI has different effects on learners at different levels, prompting teachers to shift their roles towards "designers" and "guides", and promoting the formation of a "human-machine dual teacher collaboration" feedback model. However, it also brings risks of language expression convergence and weakening of cultural connotations. In the future, it is necessary to develop a hierarchical and progressive human-machine collaborative teaching model, incorporate generative AI literacy into teacher professional development content, accelerate the development of a large-scale model for Chinese writing, and establish standardized measures for application, thereby seeking a balance between technology and education.

1 Introduction

Generative artificial intelligence technology, represented by large language models, is rapidly evolving and making continuous breakthroughs in natural language understanding, text generation, and intelligent interaction, exerting a profound impact on global language education. In the process of teaching students to learn a second language, the application of generative AI can not only provide good feedback but also automatically score and tutor students, which is a research hotspot in the field of education. In the current research, it is believed that the use of this tool can not only generate ideas but also polish language, correct errors, and generate model essays, which can not only improve teaching efficiency but also provide students with more opportunities for independent practice [1].

Whether it is a second language or a first language, writing is an important component in the process of learning. There are many problems in the process of writing, including the lack

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of teaching resources, the delay of feedback, the lack of personalized guidance, and the existence of writing anxiety. The traditional way of writing teaching is to rely on teachers to evaluate students' writing manually, which is time-consuming and laborious, and can not meet the needs of students. In the process of writing, students will make some mistakes in sentence construction, word selection, text cohesion and so on. These mistakes can not be corrected by classroom teaching alone [2]. The application of generative AI can solve these problems and promote the transition of teaching from human-dominated to human-machine cooperation.

At present, the research on the relationship between generative AI and second language writing focuses on English teaching, but the systematic review of the teaching of Chinese as a second language is relatively small, and most scholars only emphasize the role of technology in teaching, but do not analyze the role of technology in specific scenarios, and do not analyze the behavior characteristics of learners [3]. In this case, it should make a systematic analysis of the application of generative AI in the teaching of Chinese as a second language, and bring reference to the digital transformation of international Chinese education.

2 Application of generative AI in Chinese as a second language writing

From the perspective of teaching activities, the application of generative artificial intelligence in the writing of Chinese as a second language has gone through three stages: writing, pre-writing, and post-writing. In the pre-writing stage, it can help students prepare for writing, and in the writing stage, it can play the role of language assistant, and in the post-writing stage, it can give students feedback and evaluate the writing. These three stages are different in terms of maturity and depth of application, but from the overall point of view, the support system built by generative artificial intelligence for the whole writing process has been initially completed, and the application scenarios of the three stages will be analyzed one by one.

2.1 Before writing: conception and preparation

In the process of writing, learners can use AI to build a scaffold, which can help them get more materials, form more reasonable ideas, and reduce the burden of cognition. In the study, it is further realized that with the help of artificial intelligence, learners can accumulate more complex vocabulary in the process of completing tasks, and their vocabulary is relatively poor [2]. Artificial intelligence can automatically generate example sentences, keywords, outlines, etc., according to the topic, which can help learners write easily. For teachers, the use of ChatGPT can extract demonstration texts, and the evaluation results of senior teachers are consistent. In this way, the pressure of lesson preparation can be effectively alleviated.

2.2 In writing: real-time language support and expression optimization

When learners write, they can get help from AI, which can provide good language assistance, guide them in the use of vocabulary, help them to master the grammatical knowledge, and make up for the shortcomings of collocation in time, so that learners can understand the meaning of words and upgrade their sentence structure. A survey shows that learners have a higher willingness to seek feedback from AI, second only to seeking help from teachers, and value its professionalism, immediacy, and low psychological burden. AI can effectively compensate for insufficient knowledge reserves and improve the formality and fluency of text.

2.3 After writing: correction and feedback

Automatic grading and feedback are the most mature features of generative AI in writing applications. AI can quickly find errors in students' answers, give reasonable scores, and make revision suggestions from the aspects of vocabulary, grammar, and so on, which can make up for the shortcomings of teachers in correcting homework in a timely manner. Most students actively seek AI feedback because they believe that AI can provide feedback efficiently and save costs. AI can not only help students find language errors, but also guide them to adjust their discourse structure and improve the logic of their answers. Teachers can also use AI to evaluate students' answers, and then guide students in depth, which is a good way of human-computer cooperation.

3 The impact of generative Artificial Intelligence on teaching Chinese second language writing

In the process of writing teaching, the use of AI technology can not only change the teaching process, but also have a significant impact on teachers, students, and the whole teaching system. In this section, it will focus on the innovation of the feedback mechanism, the analysis of student behavior, the analysis of the teacher role, and the analysis of language and culture.

3.1 The differentiation effect of learners' writing behavior and cognitive strategies

Generative artificial intelligence has a significant impact on learners, but there are obvious differences between learners. According to the survey, most learners can actively seek feedback from AI, and high-level learners regard AI as a "creative negotiation partner", can maintain a critical screening awareness, and will not be overly dependent on technology [4]. Low-level learners are too dependent on technology and blindly believe in the output of artificial intelligence, which weakens their willingness to create independently [5]. It can be seen that the intervention of artificial intelligence will lead to the differentiation of cognitive strategies, and the stronger will be stronger, and the weaker will be weaker.

3.2 Teacher role transformation and feedback innovation

The deep integration of generative AI can help teachers achieve transformation in their roles, from "knowledge disseminators" to "learning activity designers" and "thinking facilitators". At present, AI can provide teachers with language support and automatically grade, so that teachers can pay attention to cultivating students' critical thinking and guide them to express themselves in cultural ways [6]. Surveys based on TPACK and UTAUT models show that teachers' performance expectations are the key to predicting whether they are willing to use AI [7]. However, through interviews, it is known that most teachers do not have the ability to integrate AI into classroom teaching, and the application of AI is limited to the preparation stage [8]. At the same time, the application of generative AI has changed the situation of writing feedback. Quasi-experimental research shows that the adoption rate of the human-computer collaborative feedback model reaches 84.12%, which is 21.75% higher than that of the pure AI feedback group [4]. In the process of surface correction, AI can correct vocabulary and grammar with high efficiency, but teachers can not be replaced in the process of deep correction, especially in the aspects of content logic, emotional expression and text structure. By creating writing agents, AI can play the role of "teaching assistants", so that

teachers can guide students to master high-level cognitive skills [9]. This kind of division of labor can make the feedback mechanism more perfect.

3.3 Potential tension between language standardization and cultural diversity generative

Although AI can improve the accuracy of writing, it will also lead to the dilution of cultural connotations and the homogenization of language expression. ChatGPT and other models only favor the standard English paradigm, which is not conducive to the creative writing of non-native speakers [10]. The training of AI is inevitably biased towards the West, which is not conducive to the creation of Chinese culture [11]. Therefore, it is necessary to find ways to enhance the accuracy of language and enhance cultural expressiveness.

4 Pathways for promoting the effective application of generative AI in Chinese second language writing

From the above analysis, it can be seen that the use of AI can improve the efficiency of teaching, but it can also bring problems, such as the homogenization of language and culture, the transformation of teachers' roles and so on. In the process of solving these problems, teachers should play the role of organizers and designers, guide students to use AI tools rationally, and strive for linguistic and cultural diversity with the help of technology and ethics.

4.1 Instructional model level: constructing a hierarchical and progressive human-computer collaborative writing instructional process

In the process of teaching, if people want to achieve the purpose of improving teaching effectiveness, it must integrate the feedback of teachers and AI organically. At the same time, teachers should carefully design the teaching process and guide students to make good use of AI, but they should not rely too much on it. Therefore, it should build a collaborative feedback mechanism and divide it into three stages: "teachers review in depth, AI preliminary review, and students reflect". After students complete the writing, AI can provide suggestions for revision, and teachers can analyze the logicity of the content and the coherence of the text. In the process of writing reflection reports, students need to analyze the advantages and disadvantages of their language, explain the reasons for accepting or rejecting AI suggestions, and compare the text before and after AI modification. The key point of this mechanism is to guide students to actively examine their writing process and use AI, so that teachers can make a deep evaluation of them, and students can have a certain ability to filter AI content.

4.2 Teacher development level: integrating generative AI instructional design competencies into professional quality training systems

In the process of using AI, teachers need to have strong effectiveness and unique thinking. If teachers have a high level of AI literacy, they can guide students to use AI reasonably in classroom teaching. This paper analyzes the significance of cultivating the quality of international Chinese teachers and points out that they should be trained in professional development courses, so as to integrate AI into teaching methods, make a critical evaluation of AI content, and strengthen AI ethics [12]. Workshops should be held regularly to guide teachers to use AI tools in writing teaching, so that they can become professional tool users [9]. In the process of teaching, teachers should organize students to carry out "AI

collaborative writing" exercises, and students should write drafts independently, use AI to optimize and improve them, and compare the two versions to find out the revision rules of AI. Teachers can also organize students to discuss the texts generated by AI, analyze the expressions that should be cautious about, and guide students to have a deeper understanding of AI through analysis and comparison. With the help of these methods, teachers can not only make full use of AI tools, but also cultivate students' awareness of using AI in the process of writing teaching, and help students with poor performance to get rid of their dependence on AI.

4.3 Technological research and development: accelerating the development of large-scale models and multimodal resources for Chinese second language writing

At present, the general large model has not yet solved the problem of Chinese language ambiguity, and there are obvious shortcomings in the processing of Chinese language phenomena, which is also the problem of mainstream models [13]. The text written by AI has many problems, such as shallow emotion, repeated vocabulary and so on. It should increase investment and develop large vertical models that can meet the needs of international Chinese education, and carry out fine-tuning in the field, so as to improve the perception accuracy of Chinese language and culture [14]. It should actively cultivate the ability of multi-modal generation, build a perfect resource system, and use AI tools to provide technical support for teachers to carry out teaching activities, so that students can get more real and diverse language models. At the same time, it should also make full use of learning analysis functions, track students' writing frequency, AI usage frequency, and other contents, and help students adjust their dependence.

4.4 Ethical governance: establishing a trinity normative framework of "technology-humanities-institutions"

The rapid development of AI has attracted the attention of more and more scholars. It is necessary to build a perfect prevention system to solve the problems of cultural bias, cognitive dependence and academic integrity [11]. On the other hand, AI ethics education should be carried out in writing courses, so that students can have a deeper understanding of the working principle of AI, and have a strong sense of responsibility when using AI [15]. Teachers should also strengthen their cultural review awareness and identify and correct the shortcomings of AI-generated materials. In practice, students should be required to write an "AI usage statement" when submitting compositions, which can reflect the stages of AI usage, the purpose of use, and the judgment and modifications made, so as to develop good habits in using technology. This framework is not only conducive to the use of technology, but also has a strong constraint, and can also play the role of education, so that students can have a strong sense of responsibility in the use of AI, and can form a good humanistic quality in the process of writing teaching.

5 Conclusion

This paper systematically analyzes the application of generative AI in Chinese second language writing. The study finds that generative AI has fully permeated the pre-writing, during-writing, and post-writing stages, demonstrating significant advantages in idea generation, language support, and automated feedback. However, its impact is dual-faceted: on the one hand, AI promotes personalized learning and instructional efficiency, drives the

transformation of teacher roles toward designers and facilitators, and fosters a new model of human-computer collaborative feedback; on the other hand, it exacerbates the differentiation of cognitive strategies among learners at different proficiency levels and poses risks of language homogenization and cultural dilution that cannot be overlooked. Future efforts should focus on advancing from four dimensions: instructional models, teacher development, technological research and development, and ethical governance. While leveraging technology's empowering role, it must uphold the humanistic nature of education to truly realize a new ecosystem of human-computer collaborative instruction in Chinese second language writing.

Authors Contribution

All the authors contributed equally, and their names were listed in alphabetical order.

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