An Empirical Study on the Application of ChatGPT in Writing Learning for English Major Students

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Abstract: *With the widespread use of artificial intelligence tools such as ChatGPT in English writing, the academic community has begun to pay attention to its potential in improving writing efficiency and quality. However, there is still a lack of research on its application in actual teaching, especially in terms of grammatical accuracy and academic integrity. This study aims to explore the impact of ChatGPT on English writing teaching, especially its role in improving students' writing efficiency, autonomous learning ability and writing quality. In the study, students in the experimental group use ChatGPT to obtain writing suggestions, grammar revisions, content expansion and other support during the writing process. The researchers conduct a before-and-after comparative analysis by recording students' writing time, revision time, completion rate and teacher scores. The results showed that after using ChatGPT, students' writing efficiency was significantly improved, the average writing time was shortened by 35 minutes, and the revision time was also reduced accordingly. In terms of teacher ratings, teachers' scores on student writing increased by an average of 1.26 points. The results of the study indicate that AI tools play a positive role in improving writing quality. In addition, students' independent learning ability and problem-solving ability had also been significantly improved, with an average increase of 1.89 points and 1.36 points, respectively. Overall, this tool has significant advantages in improving writing efficiency and quality, and can effectively support students' independent learning. However, in terms of academic integrity and grammatical accuracy, further in-depth exploration and optimization are still needed.*

Keywords: ChatGPT, English writing, Empirical research, Language learning assistance.

1. Introduction

Language models such as ChatGPT are increasingly used in the field of education, especially in English writing teaching, and have received widespread attention. With the continuous development of globalization, improving English learning and writing skills has become an important goal for students in many countries. Although traditional English writing teaching has improved students' language ability to a certain extent, many students still face problems such as low writing efficiency, frequent grammatical errors, and unclear writing ideas. Therefore, how to improve writing efficiency and enhance writing quality through modern technological tools has become a major challenge in current teaching.

As a natural language processing tool based on deep learning, ChatGPT can assist students in completing the entire process from writing conception to revision through functions such as generative dialogue and automatic writing feedback. There is still a lack of in-depth empirical research on the practical application of ChatGPT in English writing, especially its impact on students' autonomous learning ability, problem-solving ability and writing quality, especially its application effect on the specific group of Chinese English majors. This study aims to fill this research gap and empirically evaluate the application effect of ChatGPT in writing learning of English major students through experimental design. Specifically, the study will focus on analyzing the impact of ChatGPT on students' writing efficiency, autonomous learning ability, writing quality and teacher evaluation, and explore its practical application value in English writing teaching. The contributions of this paper are: on the one hand, through comparative experiments, it reveals the specific performance of ChatGPT in improving writing efficiency and quality; on the other hand, it analyzes its supporting role in students' autonomous learning ability and writing process, and provides a new perspective based on AI-assisted writing.

The second part of this paper focuses on the application of ChatGPT and other artificial intelligence tools in English writing and their current research status; the third part details the design and implementation process of this study, focusing on the grouping method of the research subjects and the data acquisition and processing methods; the fourth part presents the experimental results, focusing on the analysis of the impact of ChatGPT on students' writing efficiency, quality and autonomous learning ability; the fifth part discusses the research results, puts forward the application prospects and challenges of ChatGPT in writing teaching, and provides relevant suggestions for future research.

2. Related Work

ChatGPT, as an artificial intelligence tool, is increasingly used in English writing and has attracted the attention of scholars. Many studies have explored its impact on improving writing skills and educational practice. Fitria's study explored the performance of ChatGPT in generating English essays and found that it can effectively complete various writing tasks, but its grammatical accuracy still needs further verification [1]. Bibi and Atta investigated students' attitudes, experiences, and satisfaction with ChatGPT as an English writing assistant, focusing on its impact on writing style, proficiency, and autonomous writing ability [2]. Baskara explored the potential benefits and challenges of using ChatGPT in EFL writing teaching [3]. Hidayatullah studied how students can use ChatGPT appropriately to improve their English writing skills and avoid plagiarism, using qualitative methods such as observation, interviews, and test result analysis [4]. Minh evaluated the impact of the artificial intelligence conversational agent ChatGPT on the English writing ability and critical thinking of freshmen at Ho Chi Minh City University of Industry and Trade [5]. Tseng and Lin explored the innovative integration of GPT-3.5 in university EFL writing courses and its potential to improve students' writing efficiency and critical thinking [6]. Zebua

and Katemba investigated perceptions of using the ChatGPT OpenAI application to improve students' writing skills [7]. Chen explored the application of ChatGPT in the medical field, focusing on the issue of ghostwriting in academic writing, covering issues such as academic ethics, originality, and authorship [8]. Raheem et al. comprehensively analyzed the impact of artificial intelligence tools such as QuillBot, Grammarly, and ChatGPT on English academic writing, and explored their functions, user experience, writing efficiency, writing quality, and related ethical issues [9]. Zou and Huang explored the impact of doctoral students on ChatGPT in second language writing [10]. Although existing research has revealed the potential of ChatGPT in improving writing efficiency and supporting the writing process, research on its grammatical accuracy, academic integrity and other issues in practical applications is still insufficient. The innovation of this study is to comprehensively evaluate the actual impact of ChatGPT in different teaching environments and propose more targeted application strategies.

3. Methods

3.1 ChatGPT Usage and Intervention Design

In this study, some students will use the assistance provided by artificial intelligence tools in the English writing process [11]. These students will use the tool to get writing suggestions when they start writing tasks, covering guidance on topic selection, structural arrangement, content framework, etc. ChatGPT will provide personalized suggestions to help students clarify the main purpose of the paper and propose relevant research questions or angles. Students can request grammatical corrections and vocabulary replacements from ChatGPT at any time during the writing process. ChatGPT's natural language processing capabilities will help students identify and correct grammatical errors, spelling errors, and inappropriate sentence structures, thereby improving the language fluency and accuracy of their articles [12]. For content expansion, students can ask ChatGPT how to elaborate on a point or provide more examples and supporting materials to help them improve the depth and argumentation of their papers. Throughout the process, researchers will record the frequency and specific ways in which students interact with ChatGPT, including the types of questions students ask ChatGPT, the number of times they get suggestions, and the modifications they make after receiving feedback. The study aims to comprehensively evaluate the actual impact of ChatGPT as a writing assistance tool on students' writing ability.

3.2 Consideration of Writing Efficiency and Revision Process

In this study, writing efficiency will be evaluated through multiple indicators [13], mainly including the total writing time, the time required for revision, and the degree of writing completion. The study will record the total time it takes students to complete the first draft from the time they start writing it, aiming to evaluate whether ChatGPT can speed up the writing process. Students in the experimental group will receive structural suggestions, grammatical corrections, and content expansion suggestions through ChatGPT. The researchers will compare the time it takes for students using

ChatGPT to complete the same task with those in the control group [14]. The study will record in detail the time of students' revision process, especially the time of revision after receiving ChatGPT feedback. The writing completion will be evaluated in terms of content completeness, logical structure and language quality. The researchers will score the students' writing according to the predetermined scoring criteria and compare and analyze the scoring results with the time the students took to complete the task and the number of revisions. These indicators will help evaluate whether ChatGPT can improve writing efficiency and enable students to complete high-quality writing tasks in a shorter time. Table 1 is a student writing efficiency and completion evaluation table.

Table 1: Student writing efficiency and completion evaluation table

Student ID	Total Writing Time (minutes)	Revision Time (minutes)	Completion Score (out of 10)
Student 1	120	30	8
Student 2	150	40	7
Student 3	100	25	9
Student 4	130	35	8
Student 5	140	38	7
Student 6	110	28	9

3.3 Analysis of the Impact of Individual Differences

In this study, individual differences may significantly affect the results and therefore need to be identified and analyzed. Students' English proficiency directly affects their effectiveness in using ChatGPT. Students with higher English proficiency are generally better able to understand and apply ChatGPT's suggestions, thereby effectively improving the quality and efficiency of their writing; in contrast, students with lower English proficiency may encounter obstacles in understanding and applying feedback, which will affect their writing process and final results. Another key factor is students' adaptability to technology [15]. Students who are familiar with new technologies can usually quickly adapt to ChatGPT and flexibly use its functions to improve their writing efficiency, while students with poor technological adaptability may need more time to familiarize themselves with the tool and may even develop resistance, which affects their enthusiasm for writing. In addition, the frequency with which students use ChatGPT also affects the results. Students who frequently use ChatGPT tend to have formed an effective interaction model and can use feedback more efficiently to accelerate the writing process; while students who use ChatGPT less frequently may not be able to fully utilize the advantages of ChatGPT, thus affecting the writing effect. Comprehensive consideration of these individual difference factors will help ensure the comprehensiveness and representativeness of the research results and provide a more accurate basis for further analysis.

4. Results and Discussion

4.1 Autonomous Learning Ability

Autonomous learning ability will be assessed through two dimensions: the ability to complete tasks independently and the ability to solve problems. By observing the improvement of students' independent writing ability after using ChatGPT

and recording students' ability to complete writing tasks without external help, we evaluated whether they were able to independently complete higher-quality writing after receiving ChatGPT suggestions. Students in the experimental group relied on ChatGPT' s feedback during the writing process to guide their thinking, improve their language and structure, thereby improving their ability to complete tasks independently. Problem-solving ability will measure whether students can independently solve problems through ChatGPT's prompts and suggestions when they encounter writing difficulties. For example, during the writing process, students may encounter problems such as confusing structure, unfluent language, or lack of depth. With the feedback and suggestions provided by ChatGPT, students can find effective solutions and apply them to overcome difficulties in writing. The study will compare students' performance before and after using ChatGPT to evaluate the improvement of their autonomous learning ability. Figure 1 shows the changes in students' autonomous learning ability and problem-solving ability (out of 10 points, the higher the better).
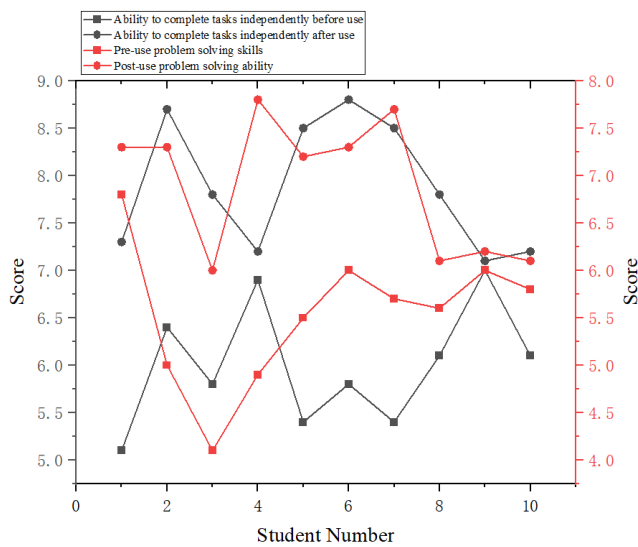

Figure 1: Changes in students' autonomous learning and problem-solving abilities

As can be seen from Figure 1, students' ability to complete tasks independently and their problem-solving abilities have been significantly improved before and after using ChatGPT. Most students' scores on their ability to complete tasks independently improved, with an average increase of 1.89 points, indicating that ChatGPT plays a positive role in helping students improve their independent writing and task completion. Problem-solving skills are also generally improved, with an average increase of 1.36 points. Although some students have smaller changes, such as Student 9 and Student 10, the scores of independent task completion and problem-solving skills still improve, indicating that ChatGPT has a positive impact on the improvement of writing skills of most students.

4.2 Writing Speed

In this study, writing speed will be evaluated by comparing the difference in writing time between students using ChatGPT assistance and those without it. Writing time refers to the time it takes students to finish writing the first draft from the beginning. This study will record the writing time of

the experimental group of students when using ChatGPT and compare it with the writing time of the control group of students when they did not use ChatGPT. With ChatGPT, students can get real-time feedback during the writing process, including structural suggestions, grammatical corrections, and content expansion. This feedback helps improve writing efficiency and reduce the time in the revision and editing stages, thereby shortening the overall writing time. In addition, the study will evaluate the actual role of ChatGPT in improving writing efficiency by comparing the writing speed of students in different groups. If the writing time of students in the experimental group is significantly lower than that of the control group, and the writing quality does not decrease, it means that ChatGPT has a positive effect on improving writing speed. Figure 2 shows the comparison of students' writing time before and after.
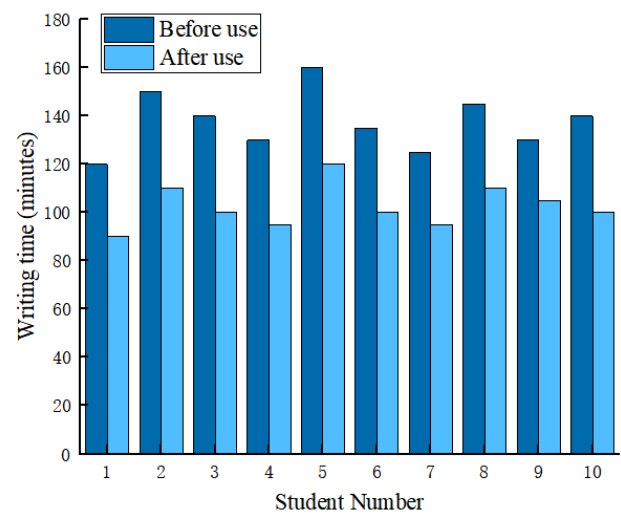

Figure 2: Comparison of students' writing time before and after

From this set of data, we can see that after using ChatGPT, students' writing time has generally been shortened, indicating that ChatGPT has played a positive role in improving writing efficiency. For example, Student 1 reduces the time from 120 minutes to 90 minutes, and Student 5 reduces it from 160 minutes to 120 minutes, showing that ChatGPT effectively helps students save time, especially by providing instant feedback, grammar corrections, and structural suggestions during the writing process, enabling students to complete writing tasks more efficiently. All students show varying degrees of time reduction after using ChatGPT, with the average writing time reduced by 35 minutes, further demonstrating the tool's potential in improving writing speed. Despite the reduction in writing time, the writing quality of these students do not decrease significantly, indicating that ChatGPT not only improves writing efficiency, but also do not have a negative impact on the integrity and quality of the writing content. Therefore, ChatGPT helps improve writing speed and provides valuable support for writing teaching.

4.3 Teacher Evaluation

In this study, teacher evaluation will measure the effect of students using ChatGPT to assist writing through two indicators: teacher rating and teacher feedback. Teachers' scoring mainly focuses on changes in students' writing quality,

especially whether students' grammatical accuracy, content logic, writing structure and creativity have been improved after using ChatGPT assistance. Teachers will evaluate students' writing according to predetermined scoring criteria and compare the scoring differences before and after use to evaluate the impact of ChatGPT on writing quality. In addition, teacher feedback will help evaluate the effectiveness and feasibility of ChatGPT as a writing assistance tool in teaching. Teachers will provide feedback on the effectiveness of using ChatGPT based on their overall perception of student writing, evaluating its potential in improving student writing skills, enhancing classroom interaction, and supporting writing instruction. Through teacher ratings and feedback, the study aims to gain a deeper understanding of the application effect of ChatGPT in EFL writing classes, especially its actual impact in helping students improve their writing quality. Figure 3 shows the comparison before and after teacher ratings.
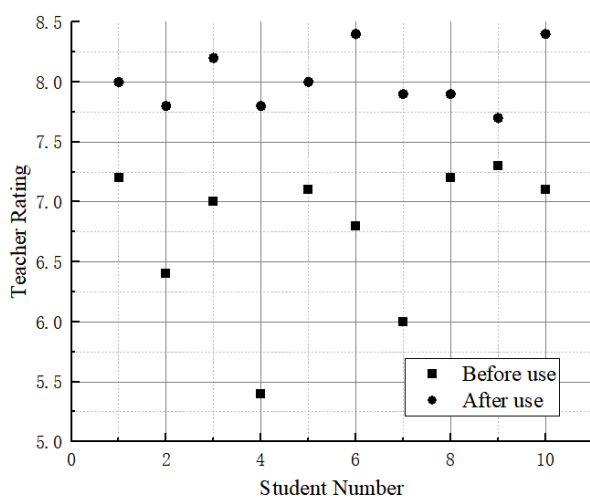

Figure 3: Comparison of teacher ratings before and after

From this set of data, we can see that after using ChatGPT, teachers' scores on students' writing generally improved, showing the positive role of this tool in improving writing quality. The score of Student 1 increases from 7.2 to 8, and the score of Student 3 increases from 7 to 8.2, both indicating that after using ChatGPT, students' writing skills have been significantly improved in terms of grammar, structure, and logic. In particular, the rating of student 4 increases significantly from 5.4 to 7.8, and the ratings of all students increases by an average of 1.26 points, showing that ChatGPT is particularly helpful to some students. Overall, the improvement in teacher ratings reflects the general improvement in students' writing quality, especially in the fluency and standardization of writing. ChatGPT not only helps students improve their writing efficiency in a short period of time, but also effectively improves the quality of writing and enhances their self-confidence in the writing process. In general, the data show that ChatGPT has a good effect in teaching students writing and has the potential to become an important tool for improving students' writing skills.

5. Conclusion

This study explored the application effect of ChatGPT in writing learning of English major students through empirical analysis. The research results show that ChatGPT

significantly improved students' writing efficiency, with the average writing time reduced by 35 minutes, revision time shortened, and teacher ratings increased by 1.26 points on average, reflecting the potential of this tool in improving writing quality. In addition, ChatGPT also effectively supports the improvement of students' independent learning abilities, especially in completing tasks independently and solving writing problems, students' performance has been significantly improved. The contribution of the study is that, through experimental design, it comprehensively evaluates the actual effect of ChatGPT in writing teaching, providing empirical basis for the future teaching application of AI-assisted writing. However, the study also pointed out that ChatGPT still has certain challenges in academic integrity and grammatical accuracy, especially in avoiding over-reliance on AI-generated content and maintaining language accuracy, which still needs further optimization. Future research can focus on how to balance the auxiliary role of AI tools with students' writing independence, and explore in depth the adaptability and impact of AI in different cultural and linguistic contexts. At the same time, with the continuous development of AI technology, the functions of ChatGPT are expected to be further expanded, providing more personalized and precise support for the cultivation of students' writing skills.

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