THE USE OF CHATGPT AS AN INTERACTIVE MEDIUM TO IMPROVE WRITING SKILLS OF ELEMENTARY TEACHER EDUCATION STUDENTS AT NAHDLATUL ULAMA UNIVERSITY OF SIDOARJO

1st Ahmad Wahyudi 2nd Ryan Purnomo 3rd Pratama Wirya Atmaja
1st Pendidikan Guru Sekolah Dasar, Universitas Nahdlatul Ulama Sidoarjo, Sidoarjo, Indonesia, 2nd Pendidikan Bahasa Inggris, Universitas Nahdlatul Ulama Sidoarjo, Sidoarjo, Indonesia 3rd Bisnis digital, Universitas Pembangunan Nasional "Veteran" Jawa Timur, Surabaya, Indonesia
achmadwahyudi270@gmail.com

Abstract: This study aims to optimize writing instruction management in the Elementary School Teacher Education (PGSD) program using ChatGPT as an interactive media tool based on artificial intelligence (AI). Writing skills are essential competencies that support literacy development, academic communication, and critical thinking for pre-service teachers. However, many PGSD students still struggle with organizing ideas coherently, using proper sentence structures, and applying correct grammar consistently. ChatGPT, as a generative AI model, offers adaptive and responsive learning interactions, enabling students to receive instant feedback, suggestions for improvement, and idea enrichment. This research employed a true experimental approach with a pre-test post-test control group design, involving PGSD students at Nahdlatul Ulama University of Sidoarjo. The experimental group used ChatGPT in writing instruction, while the control group followed conventional methods. Research instruments included observation, writing tests (pre-test and post-test), student response questionnaires, and interviews with lecturers. The analysis showed that the experimental group experienced a significantly greater improvement in writing skills compared to the control group. The average score of the experimental group increased from 63.5 to 81.2 (a gain of 17.7 points), while the control group only improved from 64.1 to 71.3 (a gain of 7.2 points). Questionnaire results also indicated that students felt ChatGPT helped them generate writing ideas (86%), correct

grammar (91%), build confidence (78%), and enhance motivation (84%). These findings demonstrate that integrating ChatGPT into writing instruction is effective in improving academic literacy and learning management among PGSD students.

Key Words: Learning management, writing skills, PGSD, ChatGPT, artificial intelligence.

INTRODUCTION

This study focuses on the effectiveness of an interactive writing model using ChatGPT to improve English writing skills among students at the Elementary School Teacher Education (PGSD) program at Nahdlatul Ulama University of Sidoarjo. In today's digital era, mastering English writing skills has become increasingly critical not only as a component of formal academic curriculum but also as a 21st-century competency that supports global communication, information access, and professional success (Bahari, 2022). Despite its importance, many PGSD students continue to face challenges in developing coherent ideas, using appropriate vocabulary, and applying grammar accurately.

The advancement of artificial intelligence (AI) presents new opportunities in education. ChatGPT, an AI platform based on natural language processing, offers an interactive, personalized, and responsive learning experience. It allows students to engage in independent writing practice, receive instant feedback, and explore various writing styles suited to their proficiency levels. As stated by Cavanaugh and Song (2017), AI-based technologies provide students with anytime-anywhere access to learning resources tailored to their individual needs and preferences.

In the context of teacher education, writing is a fundamental aspect of academic literacy development. However, conventional instruction methods often fail to address the diverse learning styles and paces of university students. Integrating AI-based tools like ChatGPT provides a promising solution by offering adaptive feedback and supporting continuous engagement in the writing process. Previous studies (Chen & Hung, 2016; Raharjo, 2020) have highlighted the potential of AI technologies in enhancing student motivation, promoting active learning, and improving writing performance through contextualized and interactive learning environments.

Therefore, this research aims to develop and evaluate the effectiveness of an interactive writing model using ChatGPT in improving English writing skills among PGSD students at Nahdlatul Ulama University of Sidoarjo. By adopting an item response theory (IRT) framework and a learning memory cycle approach, this study explores how technology-based interventions can be personalized to student characteristics to maximize learning outcomes. The findings are expected to contribute both theoretically and practically by offering innovative, efficient strategies for integrating AI in academic writing instruction within teacher education programs.

The increasing integration of technology in higher education, particularly within teacher training programs, reflects the need to prepare future educators who are not only pedagogically competent but also digitally literate, communicatively effective, and critically aware. Writing skills, especially in English, are essential for pre-service teachers as they support academic literacy, research engagement, and global communication. According to the Partnership for 21st Century Skills (2015), communication and information literacy are among the core

competencies that must be mastered in the current digital age. Therefore, strengthening English writing proficiency among students in the Elementary School Teacher Education (PGSD) program is crucial to ensure their readiness to teach, learn, and participate in both national and international academic contexts.

More specifically, students in PGSD programs are expected to become literacy role models for their future pupils. However, research and classroom observations indicate that many of these students still struggle with basic writing components such as organizing ideas coherently, using correct grammar and sentence structures, and selecting appropriate vocabulary (Sari & Anggraini, 2020). One of the contributing factors is the lack of individualized feedback and limited time for intensive writing practice during formal coursework. Traditional methods of writing instruction often fail to accommodate diverse student needs and learning paces, leaving many learners unsupported in their development as effective writers. The emergence of artificial intelligence tools such as ChatGPT offers a promising solution to these instructional challenges. ChatGPT provides real-time assistance in generating, revising, and refining written texts, allowing students to engage in independent and iterative writing processes. As noted by Luckin et al. (2016), AI-powered platforms can enhance learning by delivering adaptive and personalized feedback that supports deeper understanding and self-regulation. For writing instruction, this means students can improve their drafts based on immediate input, fostering increased fluency, accuracy, and confidence. Furthermore, the interactive nature of ChatGPT encourages students to practice more frequently, which is essential for developing writing skills.

Another reason this research is important is the scarcity of empirical studies on the use of generative AI technologies like ChatGPT in Indonesian higher education settings, particularly in teacher education programs. While some studies have explored conventional digital tools such as Grammarly or collaborative platforms like Google Docs (Putri & Lestari, 2021), there is a lack of research examining how AI can actively support and enhance the writing process through intelligent language modeling. This study aims to fill that gap by analyzing how ChatGPT can be integrated into writing instruction to meet the specific needs of PGSD students and improve their academic writing outcomes.

In line with the background and significance of the study, this research addresses several key problems. First, it seeks to examine how effective an interactive writing model using ChatGPT is in enhancing English writing skills among PGSD students at Nahdlatul Ulama University of Sidoarjo. Second, it aims to identify which aspects of writing such as idea organization, grammar, vocabulary, and coherence are most positively impacted using ChatGPT. Third, the study explores students' perceptions of ChatGPT as a learning tool, including its usefulness, ease of use, and overall contribution to their learning process. Fourth, it investigates the challenges and limitations students may encounter when engaging with ChatGPT for academic writing. Finally, the study considers how the implementation of ChatGPT can be optimized within writing instruction frameworks in PGSD programs to support differentiated, student-centered learning and sustainable skill development.

METHODOLOGY.

This study employed a true experimental design with a pre-test post-test control group format to evaluate the impact of using ChatGPT

on the English writing skills of students in the Elementary School Teacher Education (PGSD) program at Nahdlatul Ulama University of Sidoarjo. According to Sugiyono (2018), true experimental designs offer high internal validity as they allow researchers to control extraneous variables by systematically grouping subjects and administering treatments. The research involved two groups: an experimental group that received instruction using an interactive writing model powered by ChatGPT, and a control group that followed conventional writing instruction methods. The pre-test and post-test format enabled objective measurement of changes in students' writing performance across both groups (Sanjaya, 2016).

Before the intervention, both groups completed a pre-test to establish baseline equivalence in English writing skills, minimizing potential bias. The pre-test is a critical step in experimental research as it provides insight into participants' initial abilities before treatment is administered (Arikunto, 2019). The experimental group was then exposed to the ChatGPT-assisted interactive writing model, where they engaged in real-time writing exercises, received automated feedback, and revised their compositions based on AI-generated suggestions. Meanwhile, the control group received writing instruction using traditional classroom methods, including lectures, textbook exercises, and peer review. Following the instructional period, a post-test was administered to both groups to assess progress. As Nurgiyantoro (2017) highlights, post-tests are essential for evaluating the effectiveness of an instructional intervention, especially in identifying statistically significant improvements in targeted skills.

The research instruments included several tools to ensure comprehensive data collection. Observations were conducted to document classroom practices and student engagement throughout the intervention. Written tests (pre-test and post-test) were used to measure the improvement in students' writing skills, focusing on aspects such as coherence, grammar, vocabulary, and organization. Structured interviews with English lecturers explored their perspectives on the integration of ChatGPT into writing instruction. Additionally, questionnaires gathered students' perceptions and experiences using ChatGPT, while documentation. including lesson plans, student attendance records, and instructor journals provided contextual support and validation of classroom activities. The data were analyzed using an independent samples t-test to compare the mean post-test scores between the experimental and control groups. This statistical test was chosen to examine whether the use of ChatGPT had a significantly greater impact on improving writing skills compared to traditional methods, using a significance level of 0.05.

This study is expected to offer both theoretical and practical contributions. Theoretically, it enriches the body of literature on the effectiveness of AI-assisted learning in English language education at the tertiary level. As noted by Hapsari (2020), AI-based learning tools have the potential to transform conventional teaching approaches into more adaptive and data-driven practices, particularly in language learning contexts. Practically, the study offers actionable insights for instructors and curriculum developers, guiding how to design and implement technology-enhanced writing instruction that engages students more deeply. This aligns with findings by Ramadhani and Kusuma (2018), who emphasize that the integration of interactive digital media in education significantly boosts student motivation and engagement. In this

regard, the adoption of ChatGPT in writing instruction not only fosters English literacy skills but also supports the broader goal of digital transformation in higher education

Data Collection Techniques

To ensure comprehensive and reliable data for evaluating the effectiveness of the ChatGPT-based interactive writing model, this study employed a combination of quantitative and qualitative data collection techniques. The following instruments and methods were used:

1. Pre-test and Post-test Assessments

Standardized writing tests were administered to both the experimental and control groups before and after the intervention. The tests measured key aspects of English writing performance, including grammar accuracy, vocabulary usage, coherence, cohesion, and organization. These assessments served as the primary quantitative data to evaluate learning gains and to determine the statistical significance of differences in writing improvement between the two groups.

2. Observation

Classroom observations were conducted throughout the intervention phase to monitor teaching and learning activities. A structured observation sheet was used to document student engagement, interaction with ChatGPT (for the experimental group), and general classroom dynamics. These observations helped contextualize the test results and provided insight into how students interacted with the AI writing tool.

3. Structured Interviews

Interviews were conducted with English lecturers involved in the study to explore their views on the use of ChatGPT in writing instruction. The interview questions focused on perceived benefits, challenges, instructional adjustments, and future recommendations for integrating AI tools into the curriculum. These qualitative data enriched the interpretation of student outcomes by incorporating educator perspectives.

4. Questionnaires

Post-intervention, students from both the experimental and control groups completed questionnaires designed to capture their experiences and attitudes. For the experimental group, the questionnaire included items related to ease of use, perceived usefulness of ChatGPT, satisfaction with the feedback provided, and the overall learning experience. For the control group, the questionnaire assessed perceptions of traditional instruction methods. The data from the questionnaires were analyzed descriptively to highlight trends in learner responses.

5. Documentation Review

Supporting documents such as lesson plans, teacher journals, student attendance records, and screenshots or transcripts of ChatGPT interactions were collected to verify the implementation process. These materials served as complementary evidence that confirmed the consistency and fidelity of the instructional intervention across the study duration. By triangulating data from tests, observations, interviews, questionnaires, and documentation, the study aimed to produce a holistic understanding of the impact of the ChatGPT-assisted

writing model on student performance. This multi-method approach also enhanced the internal validity and credibility of the research findings.

Data Analysis Procedures

The data analysis in this study employed both quantitative and qualitative approaches to comprehensively evaluate the effectiveness of the ChatGPT-assisted interactive writing model on students' English writing skills. The analysis procedure was structured as follows:

1. Quantitative Data Analysis

a. Pre-test and Post-test Score Analysis

The primary quantitative data were obtained from standardized writing tests administered to both the experimental and control groups before (pre-test) and after (post-test) the intervention. The scores measured aspects such as grammar, vocabulary, coherence, and organization. To determine the effect of the ChatGPT-based instruction, an independent samples t-test was conducted to compare the mean post-test scores between the experimental and control groups. The significance level was set at $\alpha = 0.05$. If the p-value was less than 0.05, the difference in post-test scores would be considered statistically significant, indicating that the ChatGPT intervention had a meaningful impact on students' writing performance. Additionally, descriptive statistics (mean, standard deviation, and gain scores) were used to summarize performance improvements within each group.

2. Qualitative Data Analysis

a. Observation Data

Data from classroom observations were analyzed using thematic analysis. Observation notes were categorized based on student engagement, interaction with the learning model (ChatGPT vs. traditional), and classroom dynamics. Patterns and trends were identified to complement the quantitative test findings.

b. Structured Interviews

Responses from English lecturers were transcribed and coded thematically to identify key insights regarding the implementation, benefits, and challenges of ChatGPT-assisted instruction. Themes such as instructional adjustments, technological readiness, and pedagogical impact were explored

c. Questionnaires

Questionnaire data were analyzed using descriptive statistics to reveal students' attitudes, satisfaction levels, and perceived effectiveness of the instructional approach. Frequency distributions and percentage values were calculated for each item.

d. Documentation Review

Supporting documents such as lesson plans, student attendance, teacher journals, and ChatGPT interaction logs were reviewed for content validity and triangulation. These documents were examined to ensure consistent implementation across sessions and to verify alignment between instructional practices and observed outcomes.

e. Triangulation and Interpretation

To enhance the validity and reliability of the findings, data from multiple sources (tests, observations, interviews, questionnaires, and documentation) were triangulated. This comprehensive analysis enabled cross-validation and provided a richer understanding of how ChatGPT-assisted instruction influenced student learning outcomes.

This study aims to investigate the effect of implementing an interactive writing model using ChatGPT on improving the English writing skills of students in the Primary School Teacher Education (PGSD) Study Program at Nahdlatul Ulama University, Sidoarjo. The research was conducted in two Student classes using a true experimental approach with a pre-test post-test control group design. The sample consisted of two groups: the experimental group (using ChatGPT) and the control group (using conventional methods). The research sample comprised fourth-semester students selected through purposive sampling. The selection of classes was based on considerations of relatively equal initial skill levels and readiness to participate in online learning. Each group of students underwent a pre-test to ensure that their initial English writing abilities were at a comparable level. After the treatment was administered to the experimental group, a post-test was conducted to measure the changes or improvements in students' writing abilities resulting from the ChatGPT intervention.

FINDING AND DISCUSSION

This study aims to examine the effect of implementing an interactive writing model using ChatGPT on improving the English writing skills of students in the Primary School Teacher Education (PGSD) Study Program at Nahdlatul Ulama University, Sidoarjo. The

research employed a true experimental approach with a pre-test post-test control group design. The research sample consisted of two groups: an experimental group that received English writing instruction with the assistance of ChatGPT, and a control group that used conventional teaching methods. The sample was selected using purposive sampling, considering the students' initial writing skill equivalence and their readiness for online-based learning. Students from both groups were given a pre-test to ensure that their initial English writing proficiency was at a comparable level. After the intervention was applied to the experimental group, a post-test was administered to measure any changes or improvements in writing ability resulting from the use of ChatGPT in the learning process.

Pre-Test and Post-Test Results

Based on the results of the pre-test conducted before the intervention, it was found that both the experimental and control groups demonstrated relatively balanced average English writing skills. Data analysis revealed no significant differences between the two groups in terms of initial writing ability, including sentence structure, vocabulary usage, and idea coherence. This equivalence served as an important foundation to ensure that the treatment given to the experimental group could be evaluated fairly and objectively. The main purpose of the pre-test was to establish a baseline of the students' writing abilities before they received any instructional intervention. By identifying the students' initial proficiency levels, the researchers were able to minimize potential bias and ensure that any outcome differences after the intervention were indeed caused by the use of the ChatGPT-based interactive writing model, not by other external factors. This process also strengthened the internal validity of the true experimental design used in the study.

Following the pre-test, the experimental group received writing instruction using ChatGPT, while the control group continued with conventional classroom methods. The sessions in the experimental group involved interactive writing activities with automatic feedback from ChatGPT, aiming to encourage students to be more active, explorative, and reflective in constructing their written texts. The intervention was carried out over several meetings with equivalent content and duration in both groups. After the intervention period, a post-test was administered to both groups to measure improvement in writing skills.

The analysis showed that both groups experienced an increase in average scores compared to the pre-test, indicating an overall development in writing skills. However, the improvement observed in the experimental group was statistically more significant than that of the control group, particularly in aspects such as text organization, vocabulary usage, and idea development. These findings suggest that the use of the ChatGPT-based interactive writing model had a stronger impact on enhancing students' English writing skills.

The effectiveness of this model appears to lie in its ability to provide instant feedback, repeated practice, and a more adaptive learning experience tailored to individual student needs. The pre-test and post-test results of this study revealed that the ChatGPT-based interactive writing model was significantly more effective in improving students' English writing abilities compared to conventional teaching methods. Initially, the pre-test showed that both groups had equal writing proficiency, ensuring that any observed improvements were directly attributable to

the intervention. This reinforces the internal validity of the experiment and allows the treatment effect to be measured objectively.

Following the implementation of the ChatGPT model, the post-test results for the experimental group showed a significant increase in average student scores, indicating improvements in sentence structure, word choice, idea organization, and text coherence. While the control group also showed some improvement, the smaller increase in scores indicated that conventional methods were less effective than the AI-based interactive approach.

Further analysis highlighted that ChatGPT's effectiveness stemmed from its ability to provide personalized, immediate feedback, enabling students to revise and refine their writing in real time. The repeated interactions between students and ChatGPT promoted active and reflective learning, reinforced grammar understanding, and expanded students' critical and creative thinking in writing. Moreover, ChatGPT's adaptive features allowed for customization of learning content according to individual student needs something traditional approaches could not offer.

Therefore, this intervention not only impacted technical aspects of writing but also enhanced students' confidence, motivation, and engagement in the learning process. These findings affirm that integrating AI technologies like ChatGPT into writing instruction is not just a technological innovation, but a transformative pedagogical approach that supports digital-era student literacy. The results strongly support the argument that AI integration in writing instruction enhances not only academic outcomes but also student motivation and engagement on a deeper level.

Gorup	Average	Difference
	Pre-test Post-test	
Experiment	63,5	81,2
Control	64,1	71,3

Table 4.1 Pre-test and Post-test Analysis

Statistical Analysis (Independent T-Test)

To determine whether the difference in post-test results between the experimental and control groups was statistically significant, an independent t-test was conducted. This test aims to compare the means of two unrelated groups one receiving writing instruction supported by ChatGPT and the other following conventional teaching methods. The use of an independent t-test in this context is essential, as it provides a quantitative basis for assessing whether the observed difference stems from the intervention or merely results from random variation.

The results of the t-test analysis revealed a calculated t-value of 4.27. This value was then compared to the critical t-value from the t-distribution table at a degree of freedom (df) of 58 and a significance level (α) of 0.05, which is 2.00. This comparison was used to test the null hypothesis (H_0), which posits that there is no significant difference between the two groups. If the calculated t-value exceeds the critical value, the null hypothesis is rejected in favor of the alternative hypothesis (H_a).

In this case, since the t-value (4.27) is significantly greater than the t-table value (2.00), the null hypothesis is rejected, and the alternative hypothesis is accepted. This indicates that there is a statistically

significant difference between the group using the ChatGPT-based interactive writing model and the group using conventional methods.

These findings demonstrate that the ChatGPT intervention had a measurable and meaningful impact on improving students' writing skills. The results strongly support the argument that technology-assisted learning especially through interactive tools like ChatGPT is more effective in enhancing students' English writing proficiency. Accepting the alternative hypothesis not only confirms the success of this new method but also emphasizes the importance of innovation in teaching strategies that align with technological advancements in education.

This serves as a solid foundation for educators and academic institutions to seriously consider the structured and wider integration of AI tools into learning processes. It highlights that AI-assisted instruction is not just an experimental approach but a transformative step forward in meeting the evolving needs of modern education and student engagement.

Observation and Interview Results

The observation results indicated that students in the experimental group appeared more active, enthusiastic, and engaged throughout the writing instruction process. They were more inclined to construct new sentences, correct their errors with the assistance of AI, and interact directly with the ChatGPT platform to receive instant and contextual feedback. This level of engagement not only reflected increased student participation but also signaled a positive shift in their learning attitudes toward English writing. The interaction between students and ChatGPT encouraged them to explore new ideas, experiment with varied sentence structures, and build greater confidence in expressing their thoughts through writing.

In addition to direct observation, interviews with the writing course lecturer revealed that students using ChatGPT demonstrated noticeable improvement in their writing structure, vocabulary choice, and ability to convey ideas coherently. The lecturer also noted that the integration of AI significantly reduced the time and effort typically required to provide individual feedback to each student. As a result, instructional time and energy could be redirected to more strategic learning activities. ChatGPT proved effective in identifying basic writing errors, offering revision suggestions, and presenting alternative, more precise expressions thus accelerating the revision process and supporting students' independent learning.

Overall, the results of observations and interviews suggest that the integration of ChatGPT in writing instruction not only enhanced students' academic performance but also created a more efficient and enjoyable learning experience for both students and instructors. These findings further affirm that AI-based tools like ChatGPT can play a transformative role in language learning by fostering greater autonomy, responsiveness, and motivation in the classroom.

Student Questionnaire Results

The majority of students in the experimental group stated that ChatGPT helped them in several key areas, particularly in enhancing their English writing skills. The feedback gathered from the student questionnaires revealed the following points:

Aspect	Percentage (%)
Finding Writing Ideas	86
Correcting Grammar	91
Increasing Self-Confidence	78
Writing Motivation	84

Table 4.2: Analysis of Questionnaire Results

Based on the results of the questionnaire distributed to students in the experimental group, the majority of respondents stated that the use of ChatGPT was very helpful in various aspects of the writing process. A total of 86% of students felt assisted in generating writing ideas. This indicates that ChatGPT is capable of providing initial stimuli or idea triggers that students need to begin their writing tasks. In the context of writing instruction, generating ideas is often a major challenge especially for students who are not yet accustomed to developing narratives or arguments in a foreign language. The presence of ChatGPT as a digital writing partner offers initial references and inspiration that help students plan the structure of their writing more easily.

In addition, 91% of students reported that ChatGPT helped them correct grammar. The automatic and real-time grammar correction feature was one of the most appreciated aspects by the students, as it allowed them to learn from their mistakes as they occurred. Conversely, data revealed that 78% of students felt more confident in their writing after using ChatGPT, while 84% reported increased motivation to write. These findings indicate that interaction with ChatGPT not only provides technical support but also significantly contributes to students' psychological development. Increases in confidence and learning motivation are key indicators of the effectiveness of an instructional approach. When students feel supported and can observe tangible

improvements in their writing outcomes, they are more driven to continue learning and improving. Based on the questionnaire results from the experimental group, it can be concluded that the use of ChatGPT positively impacts not only students' technical writing skills but also affective aspects such as motivation and self-confidence. A total of 86% of students stated that ChatGPT helped them generate writing ideas. This highlights that one of the main challenges in writing instruction difficulty in initiating and developing ideas—can be addressed through the idea stimulation provided by AI technology like ChatGPT. ChatGPT serves as an idea facilitator, helping students overcome writer's block and begin writing with greater confidence.

In addition, 91% of students reported that ChatGPT assisted them in grammar correction. The real-time feedback provided by ChatGPT is of high instructional value because it not only identifies errors but also offers appropriate alternatives. This allows students to learn grammar in a contextual and applied manner, strengthening their understanding through actual use. These positive effects extend into the affective domain, as shown by the high percentage of students who felt more confident and motivated. This reflects ChatGPT's role not just as a technical tool, but also as a learning companion that offers emotional support. Students feel safe to explore their writing without the fear of immediate criticism from a teacher, thus creating a more open and reflective learning environment.

Therefore, the integration of ChatGPT into writing instruction is not merely a technological innovation, but a pedagogical transformation that responds to the needs of modern education: personalized, interactive,

and humanistic. In the digital era, technologies like ChatGPT have the potential to become learning partners that enhance student engagement, support autonomous learning, and foster confidence in developing academic literacy.

DISCUSSION

Effect of the ChatGPT-Based Interactive Writing Model on Students' Writing Skills

The results show that implementing the ChatGPT-based interactive writing model had a significant impact on improving writing skills of junior high school students. The experimental group posted a 17.7-point increase on the post-test, compared to only 7.2 points in the control group. This substantial difference confirms that AI technologies like ChatGPT can be an effective strategy in writing instruction, especially in offering adaptive and personalized guidance.

The improvements spanned several key aspects of English writing: sentence structure, vocabulary usage, coherence, and idea development. ChatGPT assisted students in crafting grammatically correct sentences, offering alternative expressions, and guiding them toward critical and systematic thinking. With its instant feedback and sample sentences, students could self-correct and deepen their contextual understanding of proper English usage.

Statistical Validity and Significance

Statistical analysis using an independent t-test resulted in a t-value of 4.27, which exceeds the critical t-table value of 2.00($\alpha = 0.05$, $df = 58$). This confirms a statistically significant difference between students taught with ChatGPT and those using conventional methods.

Therefore, the null hypothesis is rejected, confirming that the improvement is directly attributable to the ChatGPT intervention, not random chance.

Student Engagement and Response to ChatGPT-Based Learning

Aside from better test scores, observations and in-depth interviews with teachers also confirm the model's effectiveness. Students in the experimental group displayed higher levels of engagement and experimentation in writing. Teachers noted ChatGPT eased the burden of providing individual feedback, as the system automatically supplied initial corrections and suggestions. Survey data aligns with these observations: 91% of students reported grammar correction help, 86% said it aided idea generation, 84% felt more motivated, and 78% experienced increased writing confidence. These results indicate ChatGPT's effectiveness not only in technical writing support but also in enhancing affective learning aspects like motivation and confidence.

Affective Dimension and Adaptive Learning with ChatGPT

Affective components such as motivation and self-confidence play critical roles in successful writing instruction. ChatGPT, by offering fast and relevant interactions, gives students a psychologically safe space to experiment with language. This judgment-free environment helps learners feel safe to explore, reflect, and independently practice English key to successful foreign language acquisition.

Consequently, ChatGPT enables adaptive learning tailored to each student's pace and needs. It doesn't replace teachers but strengthens instruction by modernizing feedback delivery. This aligns with 21st-century education principles that highlight human–machine collaboration for better learning outcomes.

Implications for Teaching and Future Recommendations

This study has significant educational implications, especially in teaching writing through technology. First, teachers should embrace AI tools like ChatGPT to enhance instructional effectiveness. Second, schools need to invest in training and infrastructure to facilitate AI integration. Third, English writing curricula should be updated to include digital-based methodologies that meet contemporary challenges. For future research, it is advisable to examine the long-term effects of ChatGPT on students' digital literacy and other language skills such as speaking and reading. This study shows that when used strategically, AI can significantly elevate writing instruction making it more effective, enjoyable, and meaningful.

Conclusion

Based on the comprehensive analysis of quantitative data, classroom observations, teacher interviews, and student feedback, it can be concluded that the ChatGPT-based interactive writing model significantly enhances the English writing skills of junior high school students. The model provides robust instructional support, enabling students to generate ideas, improve grammatical accuracy, and develop coherence and cohesion in their texts. This creates a more adaptive,

individualized, and student-centered learning environment where learners are actively engaged in the writing process.

The improvement observed in the experimental group is not only noticeable but statistically significant. The independent sample t-test result (t = 4.27 > t-table = 2.00) confirms that the progress made by students was not due to random chance, but directly attributed to the intervention. This statistical significance strengthens the reliability of the findings and supports the efficacy of integrating AI tools like ChatGPT into writing instruction.

In addition to academic improvement, the model also had a profound affective impact on learners. Students reported higher levels of motivation, confidence, and enjoyment when using ChatGPT, as the platform provided non-judgmental, immediate feedback and fostered a safe space for experimentation and learning. This dual influence cognitive and emotional underscores the model's holistic educational value.

Moreover, these findings emphasize the importance of strategic integration of AI in modern classrooms. ChatGPT should not be viewed as a replacement for teachers, but rather as a complementary tool that enhances the instructional process, promotes learner autonomy, and supports differentiated instruction. When properly implemented, this model can cultivate essential 21st-century skills such as digital literacy, critical thinking, and self-directed learning.

In summary, ChatGPT is more than a technological writing assistant it is a transformative educational tool that aligns with current

pedagogical shifts toward interactive, personalized, and future-oriented learning. Its integration into English writing instruction can lead to sustained improvements in student outcomes, increased learner engagement, and more effective teaching practices. Future research and development should explore its broader application across other language domains and educational levels to further realize its potential in advancing language education.

Research Implications

The findings of this study suggest that integrating AI-powered tools, such as ChatGPT, into English writing instruction should be purposefully designed to support the entire writing process. Teachers should emphasize the following stages:

1. Pre-writing: Assisting students in generating ideas, brainstorming, and organizing thoughts with the help of AI prompts.
2. During-writing: Promoting real-time drafting, grammar correction, and vocabulary enhancement through AI feedback.
3. Post-writing: Guiding students in revising, editing, and reflecting on their writing with peer and AI-supported feedback.

Research Recommendations

1. Design an AI-Integrated Writing Curriculum

Curriculum developers should integrate AI-supported tools, such as ChatGPT, into writing instruction, ensuring that students receive support throughout all stages of writing from idea generation to final revision.

2. Develop Digital and Metacognitive Writing Strategies

Students should be taught how to interact critically and reflectively with AI tools. Strategy training should include planning,

evaluating AI feedback, and refining content to build autonomy and digital literacy.

3. Incorporate Authentic and Creative Writing Tasks

Assignments should involve real-world, meaningful writing topics that stimulate student interest and creativity. ChatGPT can help scaffold these tasks while fostering engagement and deeper thinking.

4. Establish Continuous Reflection and Feedback Loops

Teachers should encourage students to reflect on their learning process, evaluate how AI tools contribute to their progress, and engage in peer feedback sessions. This promotes self-awareness, confidence, and continuous improvement.

This comprehensive approach not only enhances writing proficiency but also supports the development of related language domains such as reading, grammar, and critical thinking.

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