PROJECT
(Professional Journal of English Education)
Volume 9, No. 1, January 2026
p–ISSN 2614-6320
e–ISSN 2614-6258

The Effectiveness of Artificial Intelligence (AI) in Enhancing Lower-Level University Students' Writing Proficiency

Ru'yatul Hilal[1], Siti Ayu Surayya[2], Siti Maysuroh[3], Yulia Agustina[4]

Universitas Hamzanwadi, Indonesia
[1] hilalrahmat646@gmail.com, [2] ssurayya@hamzanwadi.ac.id, [3] sitimaysuroh@hamzanwadi.ac.id, [4] rahestin@gmail.com

Abstract

The purpose of this study is to assess how well artificial intelligence (AI) may enhance the writing abilities of second-semester Hamzanwadi University students. A pre-experimental design with a one-group pre-test–post-test methodology utilized in the present study. Thirty students from the second semester took part. Before and after the intervention, writing tests were administered, and SPSS 22 for Windows was used to evaluate the results. The alternative hypothesis was accepted and the null hypothesis was rejected as a result of the paired-sample t-test results showing an enormous distinction between the scores obtained before and after the test ($t(29) = -19.589$, $p = 0.000$). Thus, AI tools such as Grammarly, QuillBot, and ChatGPT were found to be significantly effective in improving students' writing proficiency, particularly in grammar, vocabulary, and coherence. Considering the findings, it is recommended that English lecturers integrate AI tools into writing instruction as supplementary media to support students' writing development.

Keywords: Artificial Intelligence; Writing Proficiency; Lower-Level Students

INTRODUCTION

In the current era of information technology, where the exchange of data and communication across national boundaries has become increasingly significant, effective writing skills are an indispensable foundation for individual success, both within the academic realm and in the professional world (Rochmahwati et al., 2024). The capacity to articulate concepts with clarity, coherence, and persuasiveness through writing is an invaluable asset that can lead to numerous opportunities, ranging from accessing scientific literature to engaging in global collaborations (Oetomo et al., 2025). The contemporary globalized world has rendered English proficiency an indispensable skill, empowering individuals to effectively engage in global communication (Khan & Haidar, 2024). Writing is deemed to be one of the hardest language skills to learn, even yet it's necessary to access a variety of professional and academic resources. (Taye & Mengesha, 2024). In contrast to receptive skills such as listening and reading, writing demands active language production. This active production necessitates not only critical thinking but also the ability to organize ideas and express them clearly and logically. During studying English as a foreign language (EFL), learners confront particular linguistic and cultural obstacles, making these demands even more pressing.

As Alharbi (2019) pointed out, EFL learners often face unique challenges in writing due to linguistic differences between their first language (L1) and English, unfamiliar rhetorical conventions, and limited lexical resources. Writing also encourages more profound language processing in students, thereby helping them solidify their understanding of grammatical principles and expand their vocabulary. Additionally, writing fosters critical thinking skills and equips students with the ability to articulate complex concepts coherently and systematically. In the context of English as a Foreign Language (EFL) classrooms, writing is not merely a

product to be evaluated; it is also a process through which language learning is reinforced (Wardani et al., 2025).

Furthermore, the role of technology and artificial intelligence in supporting the development of students' writing skills has increased in recent years (Pratama & Sulistiyo, 2024). Technological advances, particularly those pertaining to artificial intelligence, have emerged as a promising solution to the challenges encountered in the process of writing. AI has demonstrated considerable value in educational settings, particularly in the realm of academic writing (Subedi & Nyamasvisva, 2024). Research has demonstrated that artificial intelligence (AI)-powered tools, including writing assistants, can substantially improve students' capacity to formulate coherent arguments, effectively integrate sources, and maintain the expected formality in academic writing (Guhan et al., 2023). Tools such as ChatGPT and Grammarly provide students with immediate feedback and recommendations, thereby assisting them in addressing challenges related to grammar, vocabulary, and the coherence of their texts (Shaqila, 2025). Furthermore, highlighted that Grammarly significantly enhanced the clarity and grammatical accuracy of EFL students' academic writing, supporting its role as a valuable instructional aid for improving technical writing skills (Damayanti & Azizah, 2024).

The integration of AI has been demonstrated to augment student engagement with the writing process, thereby facilitating a more interactive and personalized learning experience (Z. Xu, 2024). Digital tools such as Grammarly, QuillBot, and ChatGPT offer real-time grammar correction, paraphrasing assistance, vocabulary suggestions, and support for idea development. While the implementation of AI has been shown to offer numerous benefits, it is imperative that its use is managed judiciously to avoid the development of excessive reliance and to ensure that students continue to cultivate critical thinking and independent writing skills.

However, Gerlich (2025) cautioned that over-reliance on AI writing tools may inhibit students' development of critical thinking and self-editing skills, suggesting the need for thoughtful integration and teacher mediation in AI- assisted learning. However, within the domain of English as a Foreign Language (EFL), writing poses a significant challenge for many students. This challenge stems from a combination of linguistic and cultural differences, limited exposure to authentic language use, and psychological factors such as anxiety and low self-confidence. A considerable number of EFL students, particularly those at lower proficiency levels, encounter challenges in producing coherent and communicative texts. These challenges can be attributed to factors such as limited vocabulary, unfamiliar grammar rules, and varying cultural conventions in writing.

Nevertheless, while extant studies have demonstrated the potential of AI to improve writing skills in general, there is a paucity of literature specifically targeting the effectiveness of AI on lower-level university students. The majority of extant studies tend to focus on learners with intermediate or advanced language proficiency, or do not explicitly differentiate the impact based on proficiency level. Lower-level university students frequently encounter significant obstacles in their efforts to master the fundamental principles of English writing. These challenges may necessitate the implementation of diverse approaches or the incorporation of AI-based support systems. Therefore, the objective of this study is to address this gap by specifically investigating the efficacy of AI in enhancing writing skills for lower-level university students, thereby providing more focused insights into the specific needs of this group of learners. The novelty of this investigation is predicated on its exhaustive evaluation of three AI tools such as Grammarly, QuillBot, and ChatGPT when they are employed concurrently for lower- level students at Hamzanwadi University, who frequently encounter substantial challenges in the realm of academic writing. Utilizing a pre-experimental design with pre- and post-tests, the study aims to provide empirical evidence on the efficacy of these

AI tools in enhancing students' writing proficiency. Additionally, it seeks to offer practical pedagogical insights for EFL educators in the Indonesian higher education context.

METHOD

A quantitative method of investigation has been adopted in this study, which places an emphasis on gathering and analyzing numerical data in order to evaluate variables objectively and look at their relationships (Herwanis et al., 2025). The quantitative method is particularly suited for evaluating the effectiveness of interventions because it allows for statistical testing of changes in outcomes (Busetto et al., 2020). The one-group pre-test–post-test approach which is a pre-experimental design, has been employed. This design involves measuring a single experimental group both before and after an intervention is put into place (Knapp, 2016). The structure is represented as follows:

Table 1. Pre-experimental design

Experimental Group	Pre-test	Treatment	Post-test
Second Semester	Y1	x	Y2

Notes: Y1 as Pre-Test, X as Tretment, Y2 as Post-Test

The post-test evaluated the experimental group's development after being exposed to AI-based tools, whereas the pre-test evaluated the students' baseline writing skills before the intervention. By comparing the results of the pre-test and post-test, the effect of various AI tools on writing skill was assessed. This investigation was carried out at Hamzanwadi University in the academic year 2024/2025, focusing on second-year (2D) English Language Education students. The population for this study comprised around 150 second-semester students in the English Language Education Program at Hamzanwadi University, divided into 4 classes. This study employed purposive sampling to select 3 students with lower-level writing proficiency from Class 2D as the experimental group. This method ensures that the sample aligned with the purposes of the study. Furthermore, the data collected through three main steps. The first was Pre-Test by giving a writing test to the students before using any AI tools to measure their initial writing ability. Secondly, treatment was applied to the students by introducing and guiding them on how to use AI tools (ChatGPT, Grammarly, and QuillBot) for writing. They used these tools during writing exercises over a certain period. Following the intervention period, a post-test was administered. To gauge if their writing abilities had improved, the students took an additional writing exam. In order to determine whether employing AI technologies significantly boosts students' writing abilities, data analysis was done for this study. The steps in the procedure are as follows: The first was grading the writing of the students. Both the pre-test and post-test scores for their writing were determined using a standardized criteria that addresses coherence, grammar, vocabulary, mechanics, and structure. The next was Descriptive Statistics. In this study, the data was collected and analyzed by descriptive statistic. In order to determine the standard deviation and mean score of students test performance, the researcher calculated the mean and standard deviation the researcher perform frequencies using SPSS 22 windows. Moreover, Statistics Required for Testing Hypothesis was applied with the following tests:

a. Normality testing
   The data's normality was examined in order to find out whether or not the population sample would be divided. With SPSS 22 Windows, the researcher carried out one basic test.
b. Testing Hypothesis

To decide whether to accept or reject the alternative hypothesis, hypothesis testing has been conducted. The researcher used SPSS 22 for Windows to perform a paired-sample t-test to check whether the mean scores from the pre-test and post-test differed significantly. Furthermore, the effect size was measured using Cohen's d, which sheds light on the extent of the influence of utilizing AI techniques.

RESULTS AND DISCUSSION

Results

a. Descriptive statistics

were employed to analyze the collected data in this study. For the pre-test, conducted with a sample size of 30 participants, the scores ranged from a minimum of 52 to a maximum of 79. The dispersion of these scores was indicated by a standard deviation of 7.400. Conversely, the post-test results demonstrated a higher performance range, with scores extending from a minimum of 80 to a maximum of 95. The standard deviation for the post-test scores was 3.975, suggesting a comparatively narrower distribution. These statistical outcomes are visually presented in Table 2.

Table 3. Descriptive statistics of pre-test and post-test

Group	N	Minimum	Maximum	Mean	Std. Deviation
Pre-test	30	52	79	64,83	7,400
Post-test	30	80	95	87,70	3,975

According to the study's findings, using AI-based tools like Grammarly, QuillBot, and ChatGPT significantly increased the writing skills of second-semester students at a lower level. The improvement in post-test scores exceeding pre-test outcomes demonstrated that AI can significantly enhanced students' writing performance, particularly in aspects such as grammar accuracy, text coherence, and vocabulary use. Overall, the study provides strong evidence that AI tools play a substantial role in improving students' writing abilities.

b. Hypothesis testing

Hypothesis testing was performed to assess whether the null hypothesis could be accepted or rejected. To compare the mean scores of the pre-test and post-test, the researcher applied a paired-sample t-test. After analysis showed a significant difference between the two sets of scores (t(20) = -35.296, p = -25.704), the alternative hypothesis was accepted and the null hypothesis was rejected. These findings suggest that digital storytelling was a successful instructional method for encouraging second-semester Hamzanwadi University students to write more.

Table 3. Paired Samples Test

Mean: -22.867		
Std. Deviation: 6.394		
Std. Error Mean: 1.167		
95% Confidence Interval of the Difference	Lower: -25.254	Upper:-20.479
t= -19.589	df= 29	p= 0.000

The results show a statistically significant disparity between the scores obtained before and after the test because the p-value (0.000) is less than the 0.05 cutoff. As a result, the alternative hypothesis which suggested that the employment of AI tools had a significant impact on students' writing performance was accepted and the null hypothesis was rejected. With a standard deviation of 6.394 and a standard error of 1.167, the paired-sample t-test findings revealed a mean difference of -22.867 between the pre-test and post-test scores. For this disparity, the 95% CI was between -25.254 and -20.479. The 95% confidence interval for this difference ranged from -25.254 to -20.479. With 29 degrees of freedom and a p-value of 0.000, the computed t-value was -19.589. The null hypothesis is rejected and the alternative is accepted since the results show a substantial difference, with the p-value being significantly below 0.05. All things considered, this study offers compelling evidence that integrating artificial intelligence (AI) tools into the educational process might greatly improve students' writing skills.

c. The effect size

The effect size of using AI tools to help pupils improve their writing abilities was measured using Cohen's d. The standard deviation of the score differences was used to standardize the difference between the pre-test and post-test scores. Cohen's d was calculated by dividing the mean gain score by the standard deviation of that gain score, taking into account that the study employed a single-group pre-experimental design with both pre-test and post-test measures. The following information was gathered based on the paired sample t-test analysis results that were presented:

a. Mean Difference = -22.867
b. Standard Deviation of the Differences = 6.394

The formula employed for this calculation was Cohen's d formula for paired samples.

$$\text{Cohen's d} = \frac{\text{Mean Difference}}{\text{Sdt. Deviation of the Differences}}$$

So, Cohen's d calculation is:

$$\text{Cohen's d} = \frac{-22.867}{6.394} = -3.576$$

Cohen's d absolute value is 3.58 (rounded).

A Cohen's d value of 3.58 indicates an exceptionally significant impact of using AI tools (such as Grammarly, QuillBot, and ChatGPT) to improve the writing skills of low-level students, in accordance with Cohen's (1988) rules for interpreting effect sizes, which state that 0.2 represents a small effect, 0.5 a moderate effect, and 0.8 a large effect. This figure indicates that the mean increase in writing scores following the AI intervention is substantial and has a significant practical impact.

Discussion

The study began with students being assigned a writing task before the use of Artificial Intelligence (AI) tools. This task measured their ability before they used the tools. After the pre-test, the students received treatments that involved using AI tools like Grammarly, QuillBot, and ChatGPT to support their writing process. The treatment included different writing activities. In these activities, the students used the tools to revise and improve their

texts. The findings indicated that the use of AI-based resources led to significant improvements in students' writing abilities. By incorporating tools such as Grammarly, QuillBot, and ChatGPT, students received immediate feedback that supported the refinement of grammar and vocabulary while also guiding them in organizing their ideas more coherently. These features not only enhanced the technical accuracy of their writing but also encouraged greater independence and confidence in the writing process. Overall, the integration of AI tools proved to be an effective means of supporting students' academic writing development, particularly for learners at the lower proficiency level. Moreover, this result is consistent with previous empirical studies that have examined the impact of AI in writing instruction. For instance, Tussa'diah & Yantamara (2025) reported that QuillBot significantly improved students' vocabulary range and sentence structure. Likewise, study by Abdi (2024) demonstrated that ChatGPT contributed to the development of ideas, coherence, and student confidence. Grammarly, as reported by Indiah (et al. 2025), facilitated reductions in grammatical errors and enhanced students' awareness of sentence construction. The findings of this research showed that AI tools not only enhance linguistic features of writing but also promote autonomous learning behavior, particularly among lower-proficiency learners. It is essential to consider the broader educational context, particularly in Indonesia, when transitioning from empirical findings to pedagogical implications. Alghasab (2025) emphasized that English as a Foreign Language (EFL) teachers must adopt technology-integrated approaches to writing instruction to foster more effective learning experiences. While many prospective teachers demonstrate familiarity with digital tools such as smartphones, their usage often remains limited to basic functions without meaningful pedagogical integration. This technological-pedagogical gap underscores the importance of equipping educators with the necessary digital competence to meet the evolving demands of 21st-century language education. Furthermore, enhancing teacher readiness in this area is vital to fully realize the potential of AI in supporting students' writing development.

Furthermore, existing empirical literature reinforces the psychological and motivational benefits of integrating AI tools in writing instruction. Campos (2025) found that students who received AI-generated feedback exhibited stronger self-regulation and better revision strategies. Similarly, Deng et al. (2025) highlighted the dialogic capabilities of ChatGPT, noting its capacity to support students in generating arguments, sustaining logical flow, and engaging in idea development. Additionally, the study by Chaudhary et al. (2024) revealed that the use of AI tools was found to foster substantial improvements in students' behavioral, emotional, and cognitive engagement. This suggests that such tools not only support technical aspects of writing but also play a meaningful role in enhancing learners' motivation, confidence, and persistence. By providing immediate feedback and practical guidance, AI technologies help create a more supportive learning environment, enabling students to approach academic writing with greater assurance and sustained effort.

Despite the numerous benefits, it is also important to address challenges associated with the use of AI in EFL writing. Xu & Jumaat (2024) noted that while students acknowledged ChatGPT's usefulness in idea generation and content development, they often struggled with formulating precise prompts and interpreting AI-generated responses that were occasionally irrelevant or biased. This underscores the need for prompt engineering training to help students maximize the effectiveness of AI in academic settings. Likewise, research by Huang et al. (2020) demonstrated that students experienced significant improvement through the intervention using Grammarly and expressed satisfaction with the real-time feedback it offered. However, the study also emphasized the necessity of consistent guidance to prevent overdependence on AI tools, particularly during the formative stages of learning, where critical thinking and independent revision skills are still being developed.

CONCLUSION

This study concludes that the integration of Artificial Intelligence (AI) tools such as Grammarly, QuillBot, and ChatGPT can effectively enhance the writing proficiency of lower-level second-semester students at the University of Hamzanwadi. The findings highlight the potential of AI technologies to support students in improving accuracy, fluency, and confidence in their writing, particularly for learners who face greater challenges in language learning. Beyond improving performance, AI tools also offer practical support by accelerating the writing process and providing immediate feedback, making them valuable complements to traditional instruction. Future research could expand on these findings by involving larger and more diverse samples, applying alternative research designs, or examining the role of AI in other language skills such as speaking, reading, or grammar. Moreover, exploring students' perceptions and experiences with AI-assisted learning may provide richer insights into its pedagogical implications. Together, such investigations would contribute to a deeper understanding of how AI can be strategically integrated into language education to promote more effective and learner-centered outcomes.

ACKNOWLEDGMENTS

I am deeply grateful to all my lecturers for the invaluable knowledge and guidance they have shared throughout my academic journey. My heartfelt appreciation goes especially to my two supervisors, whose patience, support, and direction have been instrumental in the completion of this article.

REFERENCES

Abdi, M. M. (2024). Exploring the use of ChatGPT in improving students' paragraph composition skills. *Focus on ELT Journal*, *6*(4), 17–36. https://doi.org/10.14744/felt.6.4.2

Alghasab, M. B. (2025). English as a foreign language (EFL) secondary school students' use of artificial intelligent (AI) tools for developing writing skills: unveiling practices and perceptions. *Cogent Education*, *12*(1). https://doi.org/10.1080/2331186X.2025.2505304

Alharbi, M. A. (2019). EFL university students' voice on challenges and solution in learning academic writing. *Indonesian Journal of Applied Linguistics*, *8*(3), 576–587. https://doi.org/10.17509/ijal.v8i3.15276

Busetto, L., Wick, W., & Gumbinger, C. (2020). How to use and assess qualitative research methods. *Neurological Research and Practice*, *2*(1). https://doi.org/10.1186/s42466-020-00059-z

Campos, M. (2025). AI-assisted feedback in CLIL courses as a self-regulated language learning mechanism: students' perceptions and experiences. *European Public and Social Innovation Review*, *10*. https://doi.org/10.31637/epsir-2025-1568

Chaudhary, A. A., Jr, R., Calimlim, F., & Khan, S. Z. (2024). the Impact of Ai-Powered Educational Tools on Student. *International Journal of Contemporary Issues in Social Sciences*, *July*.

Damayanti, S., & Azizah, S. (2024). Grammarly's Effectiveness in Enhancing English Writing: A Case Study of Vocational High School Students. *PANYONARA: Journal of English Education*, *6*(2), 15–24. https://doi.org/10.19105/panyonara.v6i2.13825

Deng, R., Jiang, M., Yu, X., Lu, Y., & Liu, S. (2025). Does ChatGPT enhance student learning? A systematic review and meta-analysis of experimental studies. *Computers and Education*, *227*(August 2024), 105224. https://doi.org/10.1016/j.compedu.2024.105224

Gerlich, M. (2025). AI Tools in Society: Impacts on Cognitive Offloading and the Future of Critical Thinking. *Societies*, *15*(1), 1–28. https://doi.org/10.3390/soc15010006

Guhan, M., Venkatesan, D., Chandramohan, S., Monika, M., Divyavarsini, V., & Suganthan, C. (2023). A survey on analyzing the effectiveness of AI tools among research scholars in academic writing and publishing. *Ijariie*, *9*(6), 1293. https://www.researchgate.net/publication/376198760

Herwanis, D., Alianur, M., Maulida, & Nasir, K. (2025). Quantitative Research: Data Collection and Data Analysis for Beginner Researcher in Discussion. *Educompassion: Jurnal Integrasi Pendidikan Islam Dan Global*, *2*(1), 1–18. https://doi.org/10.63142/educompassion.v1i3.88

Huang, H. W., Li, Z., & Taylor, L. (2020). The Effectiveness of Using Grammarly to Improve Students' Writing Skills. *ACM International Conference Proceeding Series*, *August*, 122–127. https://doi.org/10.1145/3402569.3402594

Indiah Pane, I. I., Alvindi, A., Dimas, D., & Sadri, I. (2025). Exploring Students' Perceptions of Grammarly as a Tool for Enhancing Grammar Accuracy in Writing. *Vision*, *20*(2), 90. https://doi.org/10.30829/vis.v20i2.4192

Khan, I., & Haidar, S. (2024). Neoliberal Branding and the Commodification of Language : English as the Language of Success in Advertisements for Language Centre in Pakistan. *Register Journal*, *17*(2), 250–278. https://doi.org/10.18326/rgt.v17i2.250-278

Knapp, T. R. (2016). Why Is the One-Group Pretest–Posttest Design Still Used? *Clinical Nursing Research*, *25*(5), 467–472. https://doi.org/10.1177/1054773816666280

Oetomo, D., Widoretno, S., Ramli, M., Prayitno, B. A., Sugiarto, B., & Prabowo, C. A. (2025). Analysis of students' scientific writing skills in the biology education study program at Sebelas Maret University. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, *11*(1), 253–261. https://doi.org/10.22219/jpbi.v11i1.37437

Pratama, A., & Sulistiyo, U. (2024). A Systematic Review of Artificial Intelligence in Enhancing English Foreign Learners' Writing Skill. *PPSDP International Journal of Education*, *3*(2), 170–181. https://doi.org/10.59175/pijed.v3i2.299

Rochmahwati, P., Yuliasri, I., & ... (2024). Empowering Academic Writing in Education 5.0 Era: the Efficacy of Hybrid Project-Based Learning. *Unnes-Teflin ...*. https://proceeding.unnes.ac.id/utnc/article/view/4008

Shaqila, C. (2025). The Influence of AI Writing Tools on Students ' Self -Efficacy in Academic Writing : A Systematic Literature Review. *International Seminar on Student Research in Education, Science, and Technology*, *2*(April), 454–462.

Subedi, R., & Nyamasvisva, T. E. (2024). a Review of the Influence of Artificial Intelligence in Academic Writing. *Journal of Computer Science and Information Technology*, *2*(1), 71–80. https://doi.org/10.70248/jcsit.v2i1.1134

Taye, T., & Mengesha, M. (2024). Identifying and analyzing common English writing challenges among regular undergraduate students. *Heliyon*, *10*(17), e36876. https://doi.org/10.1016/j.heliyon.2024.e36876

Tussa'diah, H., & Yantamara, P. (2025). Using Quillbot As Ai Versatile Writing Assistant for Writing Performance in Relation To Moslem Students' Perspective: Pitfalls and Potentials. *Proceeding International Seminar on Islamic Studies*, *6*(1), 2552–2559.

Wardani, H. K., Pramartaningthyas, E. K., Rohman, T., & Alimin, A. (2025). Development of Interactive E-Module to Foster EFL Students' Critical Thinking in Essay Writing. *Jurnal Kependidikan: Jurnal Hasil Penelitian Dan Kajian Kepustakaan Di Bidang Pendidikan,*

Pengajaran Dan Pembelajaran, *11*(1), 190. https://doi.org/10.33394/jk.v11i1.13577

Xu, T., & Jumaat, N. F. (2024). ChatGPT-Empowered Writing Strategies in EFL Students' Academic Writing: Calibre, Challenges and Chances. *International Journal of Interactive Mobile Technologies* , *18*(15), 95–114. https://doi.org/10.3991/ijim.v18i15.49219

Xu, Z. (2024). AI in education: Enhancing learning experiences and student outcomes. *Applied and Computational Engineering*, *51*(1), 104–111. https://doi.org/10.54254/2755-2721/51/20241187