

The Effects of Using Grammarly's Artificial Intelligence (AI) Application to Improve EFL Undergraduate Students' Writing Skills*

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This study investigated the impact of Grammarly, an AI-powered writing assistant, on the writing skills of undergraduate EFL students. The mixed-methods study employed quantitative and qualitative analyses to evaluate Grammarly's impact on students' writing performance. The study employed cluster sampling to select 126 third-year students from a population of 496 at Nakhon Pathom Rajabhat University. The results demonstrated that Grammarly significantly improved students' writing proficiency in various aspects, including spelling, grammar, punctuation, sentence structure, vocabulary, and style. The average scores of the students showed substantial improvement in all assessed categories. In addition, group interviews revealed that most students viewed Grammarly as a valuable tool for fostering independent learning. This study, therefore, suggests that integrating AI-powered tools such as Grammarly can complement traditional teaching methods, address limitations, and enhance the overall learning experience in English language education.

Research Article

Abstract

Keywords

Grammarly;
artificial intelligence;
English as a foreign
language;
writing skills

* This research article is part of a study titled "The Effects of Using Grammarly's Artificial Intelligence (AI) Application to Improve EFL Undergraduate Students' Writing Skills"

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ผลของการใช้แอปพลิเคชันปัญญาประดิษฐ์ (AI) Grammarly
เพื่อพัฒนาทักษะการเขียนภาษาอังกฤษ

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งานวิจัยนี้มุ่งศึกษาประสิทธิผลของ Grammarly ซึ่งเป็นผู้ช่วยเขียนที่ใช้ปัญญาประดิษฐ์ (AI) ต่อทักษะการเขียนของนักศึกษาระดับปริญญาตรีที่เรียนภาษาอังกฤษเป็นภาษาต่างประเทศ (EFL) การวิจัยครั้งนี้ใช้วิธีการวิจัยแบบผสมผสานทั้งเชิงปริมาณและเชิงคุณภาพเพื่อประเมินผลกระทบของ Grammarly ต่อความสามารถในการเขียนของนักศึกษา กลุ่มตัวอย่างในการวิจัยประกอบด้วยนักศึกษาชั้นปีที่ 3 จำนวน 126 คน ซึ่งได้มาจากการสุ่มตัวอย่างแบบแบ่งกลุ่ม (cluster sampling) จากประชากรทั้งหมด 496 คน ของมหาวิทยาลัยราชภัฏนครปฐม ผลการวิจัยแสดงให้เห็นว่า Grammarly ช่วยพัฒนาความสามารถในการเขียนของนักศึกษาอย่างมีนัยสำคัญในหลายด้าน ทั้งการสะกดคำ ไวยากรณ์ เครื่องหมายวรรคตอน โครงสร้างประโยค คำศัพท์ และรูปแบบการเขียน คะแนนเฉลี่ยของนักศึกษาแสดงให้เห็นถึงการพัฒนาอย่างเห็นได้ชัดในทุกหมวดที่ถูกประเมิน นอกจากนี้ การสัมภาษณ์กลุ่มยังแสดงให้เห็นว่า นักศึกษาส่วนใหญ่เห็นว่า Grammarly เป็นเครื่องมือที่มีคุณค่าในการส่งเสริมการเรียนรู้ด้วยตนเอง ดังนั้นงานวิจัยนี้จึงชี้ให้เห็นว่า การผสมผสานเครื่องมือที่ใช้ AI อย่าง Grammarly สามารถเสริมวิธีการสอนแบบตั้งเดิม แก้ไขข้อจำกัดและยกระดับประสิทธิภาพการเรียนรู้โดยรวมในการศึกษาภาษาอังกฤษ

บทความวิจัย

บทคัดย่อ

คำสำคัญ

Grammarly;

ปัญญาประดิษฐ์;

ภาษาอังกฤษ

เป็นภาษาต่างประเทศ;

ทักษะการเขียน

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1. Introduction

In recent years, integrating artificial intelligence (AI) into education has significantly impacted how language learning is approached, particularly in English language teaching (ELT). AI tools have consistently demonstrated effectiveness in facilitating non-native speakers' acquisition of complex English language structures. Mastering English enhances access to scholarships, study programs, and career opportunities in global markets, serving as the primary language of communication (Visaltanachoti et al., 2021). Although Thai students acknowledge the significance of English proficiency, they encounter substantial challenges, particularly in writing, which is widely considered the most challenging of the four essential language skills: listening, speaking, reading, and writing. Effective writing demands both linguistic mastery and robust organizational capabilities.

In addition, writing entails critical cognitive functions such as planning, translating ideas into coherent text, and revising content for clarity and accuracy, making it one of the most intellectually demanding components of language acquisition due to its cognitive complexity and critical thinking skills needed for effective writing (Fahmi & Cahyono, 2021). Thai students often face considerable difficulties in developing English writing proficiency, particularly grammatical accuracy, improper punctuation, and awkward sentence structures, all of which impede their language proficiency (Jelita et al., 2023). The predominant use of traditional teaching methodologies in Thailand compounds these pedagogical challenges. Many educators emphasize rote memorization and a rigid focus on grammar rules rather than encouraging the practical use of the language. This approach diminishes students' motivation and limits their engagement in the learning process (Harirannukroh & Wongprom, 2019).

To proficiently address these persistent challenges, digital tools, including Automated Writing Evaluation (AWE) systems, have been incorporated into the educational environment to enhance students' writing abilities. AWE tools, including Grammarly, ProWritingAid, and Ginger Software, employ AI algorithms to provide real-time feedback on grammar, punctuation, spelling, and writing style, enabling students to correct mistakes and enhance their writing autonomously (Fitria, 2021). These tools provide instantaneous feedback, eliminating the need to wait for teacher corrections, saving time, and fostering independent learning. Studies have shown that using AWE tools can significantly improve students' writing abilities by allowing them to correct and learn from their mistakes in real-time (Fahmi & Cahyono, 2021). Grammarly, in particular, has gained popularity among EFL learners due to its accessibility, ease of use, and ability to function across various platforms, including mobile devices, web browsers, and Microsoft Office (Roe et al., 2023). Since AWE tools like Grammarly employ natural language processing algorithms to analyze text and provide targeted feedback, students' ability to identify common errors, suggest improvements, and offer detailed explanations is essential for enhancing their writing skills.

While AWE tools offer numerous advantages, several challenges persist for educators and students alike. A primary concern is students' potential over-reliance on AI tools, potentially stunting their

development of critical thinking and independent writing skills. While AWE tools such as Grammarly provide valuable feedback on grammar and style, they may not adequately address deeper writing issues such as coherence, argument structure, and creativity, which require human judgment and insight (Abdul Rahman et al., 2022). Some studies have also noted that AWE tools can occasionally provide inaccurate or inappropriate feedback, leading to confusion among students (Anditasari & Sitompul, 2023). For these reasons, educators should complement AI tools with traditional writing instruction to ensure students can correct surface-level errors and develop the higher-order writing skills necessary for academic and professional success.

Within the Thai educational context, where conventional teaching approaches and limited exposure to English outside the classroom often hinder English language education, introducing Automated Writing Evaluation (AWE) tools can provide a significant opportunity for reform, as the advent of AWE instruments offers a substantial prospect for transforming the existing framework. Studies conducted at Nakhon Pathom Rajabhat University (NPRU) have revealed that many Thai students struggle with basic writing skills, with most scoring low on English proficiency (Ministry of Higher Education, Science, Research and Innovation, 2022). Consequently, the university has recognized the need to improve student's writing abilities and has incorporated several English language courses into the curriculum. However, these courses often lack the interactive or technology-enhanced components crucial for engaging students in writing (Maulidina & Wibowo, 2022). Introducing AI-powered tools like Grammarly into these courses could address these gaps by providing students with consistent, immediate feedback, thus enhancing their learning experience.

Therefore, this study aims to explore the impact of integrating Grammarly, an AI-based automated writing evaluation tool, into English writing courses at NPRU. Specifically, it seeks to assess how this tool can improve students' writing performance by addressing common writing issues and providing real-time feedback. Furthermore, the study examines how using Grammarly can complement traditional teaching methods and enhance the overall learning experience for students. By incorporating qualitative and quantitative approaches, this research offers insights into the potential benefits and limitations of using AI tools in EFL writing instruction and provides recommendations for future integration in Thai educational contexts.

2. Literature Review

This research is founded on constructivist principles, emphasizing that students construct knowledge based on their prior experiences, interests, and needs. Education represents a dynamic, interactive process where learners explore new concepts with their existing knowledge. In this framework, teachers are crucial in facilitating learning, guiding students to develop self-understanding,

and enhancing their writing and communication skills (Giovanny, 2019). As an essential skill in higher education, academic writing represents a complex socio-cognitive process where students generate meaningful text using their existing knowledge, preferences, and requirements. The writing process involves several stages: brainstorming, drafting, revising, and editing, which help students refine their ideas and produce coherent and structured content (Gregg & Steinberg, 2016). Each stage is critical to improving writing proficiency and fostering students' ability to develop content and structure in their academic writing (Kelly, 2019).

This review synthesizes current research on Grammarly's application in enhancing EFL undergraduate students' writing skills. The review covers key themes related to academic writing, the role of Automated Writing Evaluation (AWE) tools in EFL classrooms, the broader application of AI in English Language Teaching (ELT), and, specifically, the contributions of Grammarly in improving writing outcomes. This study also highlights and identifies gaps in the current literature and provides directions for future research.

1. Academic Writing as a Crucial Skill in Higher Education

Academic writing, a cornerstone of higher education, enables individuals to communicate complex ideas with precision and formal structure. Birhan (2017) defines academic writing as any writing that meets university requirements, which often includes tasks such as essays, theses, and research papers. Writing involves brainstorming, organizing ideas, drafting, revising, editing, and finalizing a written product, essential to developing writing proficiency (Labidi, 2022). Effective academic writing requires technical skills such as grammar, punctuation, and the ability to structure and express ideas logically. As McGarrell & Brillinger (2002) notes, the stages of the writing process, from pre-writing to publishing, are all integral to producing high-quality academic work.

2. Automated Writing Evaluation (AWE) in EFL Classrooms

Automated Writing Evaluation (AWE) tools like Grammarly are becoming increasingly popular in EFL classrooms. These tools offer real-time feedback and holistic grading, helping students identify and correct writing issues such as grammar, spelling, punctuation, sentence structure, and style. AWE tools are particularly beneficial in providing low- and high-performing students with diagnostic feedback that allows them to self-correct and improve their writing skills (Fahmi & Cahyono, 2021; Setyowati et al., 2024). While these tools offer significant advantages, research suggests they should complement teacher feedback rather than replace it (O'Neill & Russell, 2019). Grammarly, for example, is highly regarded for its ability to provide immediate corrections and suggestions, making it an indispensable tool for EFL classrooms (Alharbi, 2023; Nova, 2018).

3. Artificial Intelligence (AI) in English Language Teaching (ELT)

AI has revolutionized education, particularly in English Language Teaching (ELT), by enhancing personalized learning experiences and providing real-time feedback to students. AI-powered tools such as speech recognition, language processing, and automated feedback systems have significantly impacted language learning by making it more interactive and efficient (Labidi, 2022; Tucci, 2024). Using AI in ELT, especially in writing instruction, has improved student engagement and writing accuracy. Researchers have highlighted AI's significant role in enhancing students' writing skills and boosting their confidence (Alharbi, 2023; Zawacki-Richter et al., 2019). AI applications like automated writing feedback and plagiarism detection offer innovative ways to support students' writing development, providing constructive feedback that helps refine their writing process (Pedro et al., 2018).

4. Grammarly's AI Application for Teaching English Writing

Grammarly, a widely used AI-powered tool, has become an essential resource for improving writing skills in EFL classrooms. Developed by a Ukrainian technology company with U.S. headquarters, Grammarly provides comprehensive features, including grammar and spelling checks, style suggestions, and plagiarism detection (Qassemzadeh & Soleimani, 2016). Accessible across multiple platforms such as Mac, Windows, Android, and iOS, Grammarly allows both students and educators to leverage its capabilities seamlessly (Huang, 2020). Grammarly's AI-driven feedback system helps students identify and correct errors while guiding them through drafting, revising, and editing their work. By providing immediate and contextual corrections, Grammarly significantly enhances students' writing quality (You, 2018). As Armada et al. (2022) note, this real-time feedback system helps students refine their writing and boosts productivity, making Grammarly a valuable tool in any EFL classroom.

The literature review explores several critical aspects of integrating Grammarly's AI application to improve the writing skills of EFL undergraduate students. Numerous studies have investigated the efficacy of Grammarly, an AI-powered writing tool, in enhancing the writing skills of English as a Foreign Language (EFL) learners. Fitria (2021) conducted a study that demonstrated how Grammarly improved the writing quality of EFL students by helping them produce better essays and attain higher test scores. This finding aligns with Syafi'i (2020), who highlighted Grammarly's role as a valuable aid in writing, particularly by identifying spelling, punctuation, and grammar errors. Further research by Dizon & Gayed (2021) and Jelita et al. (2023) supported these results by showing that Grammarly improved the grammatical accuracy, lexical diversity, coherence, and syntactic complexity of L2 learners' writing. These studies emphasized Grammarly's potential in helping beginning writers, particularly those with limited proficiency, to reduce errors and improve word choice. Other researchers like Barrot (2020) also corroborated these findings, illustrating how Grammarly helps EFL and ESL students through its automated feedback system, although they noted the need for further refinement of the tool's capabilities. While many studies focus on the positive impacts of Grammarly, such as its role in grammar correction and vocabulary enhancement, some expressed concerns about its limitations. Miranty et al. (2021) found

that while Grammarly could be beneficial for correcting basic writing mistakes, it was less effective in improving more complex aspects of writing. In addition, Zinkevich & Ledeneva (2021) noted that while Grammarly is useful for self-study, it cannot fully replace traditional teacher feedback. This gap highlights the importance of integrating Grammarly as a supplemental tool rather than a standalone solution for language instruction.

Despite the expanding research base on Grammarly, several research gaps remain. First, most studies have used small sample sizes or specific student populations, such as first-year English majors (Miranty et al., 2021) or high school students (Jelita et al., 2023). These findings may not be generalizable to a broader audience, particularly in non-Western or non-English-speaking contexts. In addressing this issue, the researcher will conduct a study using a larger sample of undergraduate students from Rajabhat University in Thailand, representing a more diverse range of language learners. Second, many studies have employed pre-experimental designs, which limit the ability to draw definitive conclusions about the effectiveness of Grammarly (Fahmi & Cahyono, 2021). This study adopts a mixed-methods approach to ensure methodological rigor, integrating quantitative and qualitative data to comprehensively analyze Grammarly's impact on student writing. Third, prior research has often allowed students to use Grammarly during post-assessments, raising concerns about whether this leads to inflated performance. The current study will address this issue by restricting using Grammarly during post-tests to measure students' true writing abilities without the tool's assistance. Lastly, while much of the literature focuses on the grammatical accuracy of students' writing, fewer studies have explored the broader implications of Grammarly on students' motivation and engagement with the writing process. Future research should investigate how Grammarly's AI-driven feedback influences students' confidence, writing habits, and overall attitude toward learning English.

In conclusion, while previous studies have demonstrated the potential benefits of using Grammarly to enhance writing proficiency, several gaps remain in the literature. By expanding the sample size, adopting more rigorous experimental designs, and exploring additional factors such as motivation and engagement, future research can further illuminate the role of AI tools like Grammarly in improving EFL students' writing skills.

3. Materials and Methods

3.1 Study Design and Participants

This study employs a mixed-methods approach, utilizing quantitative and qualitative techniques to assess the impact of Grammarly, an AI-based writing tool, on students' writing proficiency. Srisaat (2010) discusses his theory on identifying population groups and using cluster sampling. He suggests

a 15-30% sample size is appropriate if the population is in the hundreds. In the present investigation, the comprehensive sample population comprised 496 third-year undergraduate students enrolled in the General English Course (1500104) drawn from diverse academic disciplines within the Education Curriculum at Nakhon Pathom Rajabhat University, Thailand. These students were divided into 31 groups of 16 people. A sample of 126 students was then selected, comprising 24% of the total population. Participants' English proficiency levels were initially assessed through GETS Placement Test scores at university entry. The participants, comprising both English and non-English majors, had proficiency levels ranging from beginner (A1) to pre-intermediate (A2), according to the Common European Framework of Reference for Languages (CEFR). The researcher subsequently employed cluster random sampling to select five student sections for participation, with each group representing a designated research section. This sampling approach ensured representative distribution across academic disciplines while maintaining practical feasibility. The cluster method preserved the natural groupings within the broader population, avoiding the logistical challenges of individual selection. The sample comprised English and non-English majors, providing a diverse representation of students' abilities.

3.2 Data Collection

The study assessed the effectiveness of Grammarly's AI application as an Automated Writing Evaluation (AWE) tool for improving English writing skills among students. The questionnaire's reliability, entitled "The Questionnaire on Students' Reflections on Grammarly's Artificial Intelligence (AI) Application as an Automated Writing Evaluation (AWE) Intervention to Improve English Writing Skills" was thoroughly tested. The results demonstrated high reliability, with Cronbach's Alpha values of 0.960 for the pilot study and 0.955 for the main study. These values confirm the strong internal consistency of the questionnaire, making it suitable for capturing students' perceptions of Grammarly's effectiveness. Data collection involved pre- and post-tests, self-assessment surveys, and semi-structured interviews, with quantitative data analyzed using SPSS software and qualitative data examined through thematic analysis. Data triangulation was employed to enhance reliability, utilizing multiple sources, including written assessments, surveys, and interviews. The questionnaire, adapted from Giovanny (2019), was administered via Google Forms and included 12 statements with a Likert scale ranging from poor to outstanding. It was designed to gather insights into students' views on Grammarly's impact on their writing process.

3.3 Ethics of the Experiment

This study adhered to ethical standards throughout the investigation. The researcher carefully evaluated the experiment's potential benefits and challenges and examined and effectively handled any ethical considerations or complicated issues. Moreover, each participant in the study signed a document of informed consent, affirming their comprehension of the study's aims, their voluntary engagement, and their acknowledgment of any possible risks. Before the study was started, the Nakhon Pathom Rajabhat University Institutional Assessment Board (IRB) and Central Research Ethics Committee (CREC) evaluated these ethical issues.

4. Results and Discussion

This study assessed the impact of Grammarly's AI application on the English writing proficiency of students through the pre-post test administered to 126 third-year students, primarily from the Faculty of Humanities (67.65%) and the Thai Language program (44.12%). The results indicate that Grammarly's AI application significantly improved the writing skills of EFL (English as a Foreign Language) students. After the intervention, students improved spelling, grammar, punctuation, sentence structure, vocabulary, and writing style. The median score increased from 6 to 8, indicating a shift from 'Adequate' to 'Good' or 'Outstanding' proficiency levels. The significant reduction in the "Weak" category and the complete elimination of the "Poor" category demonstrate the overall improvement in student performance and the tool's effectiveness in enhancing writing standards. A Wilcoxon test analysis of pre- and post-intervention writing scores showed significant improvements in all assessed areas. Spelling scores increased from a median of 7 to 9 ($Z=6.787$, $p<0.001$), grammar scores improved from 6 to 7 ($Z=6.595$, $p<0.001$), punctuation proficiency rose from 6 to 8 ($Z=6.301$, $p<0.001$), sentence structure improved from 5 to 7 ($Z=6.971$, $p<0.001$), vocabulary scores increased from 6 to 8 ($Z=7.670$, $p<0.001$), and writing style improved from 6 to 7 ($Z=7.033$, $p<0.001$). The average median score also increased significantly from 6.5 to 7.5 ($Z=7.282$, $p<0.001$). These findings highlight the transformative effect of Grammarly in considerably enhancing students' writing proficiency across all the assessed areas. These results align with previous studies, such as those by Fitria (2021) and Dizon & Gayed (2021), which also found that AI tools like Grammarly can improve grammatical accuracy and lexical diversity. The present study further confirms Grammarly's potential to improve various aspects of writing, thus contributing to the growing body of evidence supporting the use of AI-based tools in enhancing writing skills in EFL contexts. These findings highlight Grammarly's transformative impact, strongly improving students' writing skills across all assessed areas, leading to a more polished and professional writing approach, as shown in Table 1.

Table 1

Comparison of English Writing Achievement of Students Before and After Instruction through Grammarly's Artificial Intelligence (AI) Application

| Criteria (Total Scores: 10) | Pre-test | Post-test | Z | Asymp. Sig. (2-tailed) |
|--|---------------------|----------------------|--------------|-----------------------------------|
| | Median (IQR) | Median (IQR) | | |
| Spelling | 7 (6–8) | 9 (8–9) | 6.787 | 0.000* |
| Grammar | 6 (5–7) | 7 (6–8) | 6.595 | 0.000* |
| Punctuation | 6 (5–7) | 8 (7–8) | 6.301 | 0.000* |
| Sentence Structure | 5 (4–6) | 7 (6–8) | 6.971 | 0.000* |
| Vocabulary | 6 (5–7) | 8 (7–8) | 7.670 | 0.000* |
| Style | 6 (5–7) | 7 (6–8) | 7.033 | 0.000* |
| Average | 6.2 (5–7) | 7.5 (6.8–8.3) | 7.282 | 0.000* |

* Statistically significant at the 0.05 level.

The findings from the semi-structured group interviews provide valuable insights into students' opinions regarding using Grammarly's AI application to improve their English writing skills. The results reveal that all students (100%) reported using Grammarly, suggesting that the tool is widely perceived as effective in enhancing academic writing. This high adoption rate aligns with previous studies, such as Fitria (2021), which demonstrated that Grammarly contributed to better student writing outcomes, particularly in improving spelling, grammar, and sentence structure. When asked about the areas in their writing that needed the most improvement, students identified grammar (50.31%), spelling (40.85%), and punctuation (8.84%) as the primary focus areas. These areas align with the main strengths of Grammarly, which is designed to address common writing challenges faced by English as a Foreign Language (EFL) learners. This finding is consistent with research by Syafi'i (2020) and Dizon & Gayed (2021), who found that AI-based writing tools, including Grammarly, help students correct grammar and spelling errors effectively. While students also noted that the vocabulary features could be more robust, this point reflects a broader concern highlighted in studies like Syafi'i (2020), suggesting that the tool could further enhance vocabulary recommendations. Most students (91%) viewed Grammarly positively as a learning tool. The strong positive perception of Grammarly's educational value aligns with previous research by Javier (2022), who highlighted the role of digital tools in improving second language (L2) writing. However, a small group of students (9%) noted concerns, particularly about the cost of the premium version. This concern reflects similar findings by Rahmadani (2022), where students appreciated the tool but were wary of its premium cost. Despite these concerns, the overall perception of Grammarly as a valuable educational tool was overwhelmingly positive. Another significant finding was the unanimous support (100%) for incorporating AI technology into traditional teaching methods. Students appreciated the convenience, enhanced feedback, and engaging learning experience that Grammarly offers, consistent with the views expressed by Huang (2020) and Rahmadani (2022), who

emphasized the benefits of integrating AI tools with traditional teaching methods. This finding highlights the potential of combining technology with conventional education to improve student learning outcomes, especially in writing. A notable portion of students (80.25%) expressed a desire for extended access to Grammarly, indicating that they found continued use of the tool beneficial. Additionally, 15.85% of students requested more diverse grammar learning materials. This desire for more resources aligns with Muwahhidullah et al. (2022) findings, who suggested that additional learning materials could further support students' language development. These insights underscore the importance of providing students with sustained access to AI tools and supplementary resources to maximize their learning potential. The students also greatly valued Grammarly's detailed feedback, especially in grammar, spelling, and punctuation. Many students reported that receiving detailed feedback boosted their confidence and improved their writing skills. These findings align with Halim et al. (2022), who emphasized that detailed, real-time feedback from AI tools is crucial in enhancing students' writing abilities. The ability to receive immediate corrections and suggestions enhances students' self-confidence and motivates them to continue improving their writing. However, some students highlighted concerns about the potential over-reliance on technology, a point also discussed in previous research by Miranty et al. (2021). While Grammarly is an effective tool, there is a risk that students may become too dependent on it, which could undermine their development of independent writing skills. This concern suggests that educators should encourage students to use Grammarly as a supplementary tool rather than a crutch, ensuring they still engage in active learning and problem-solving. In conclusion, the findings from the group interviews reinforce the effectiveness of Grammarly in improving students' writing skills, particularly in grammar, spelling, and punctuation. These results align with previous studies highlighting the benefits of AI-based writing tools in enhancing academic writing. However, concerns about the cost and the potential for over-reliance on technology point to areas for further research. Future studies could explore ways to mitigate these issues, such as offering affordable access to premium features and encouraging a balanced approach to using AI tools alongside independent writing practice. These findings suggest that students see Grammarly as a valuable resource for improving writing skills and expressed support for its integration into blended learning approaches, as summarized in Table 2.

The study's results strongly support integrating AI writing technologies like Grammarly into traditional teaching methods. Students value AI tools' additional resources as they facilitate independent learning and reduce reliance on teacher-centered instruction. Overall, the results show that using Grammarly's AI program improves EFL undergraduate students' writing abilities in several areas, including syntax, sentence structure, vocabulary, style, spelling, and punctuation. These findings underscore the potential of AI-powered tools like Grammarly to enhance academic writing skills significantly. The transition from lower proficiency to higher levels across various writing components demonstrates the application's effectiveness. The students' positive feedback further highlights the benefits of integrating technology into language learning.

Table 2

Summary of the Semi-Structured Group Interviews on Students' Opinions Towards Using Grammarly's Artificial Intelligence (AI) Application to Improve Writing Skills

| Question/ Topic | Key Terms | Summary of Responses |
|--|--|--|
| Effectiveness of Grammarly in Improving Academic Writing | Algorithm, Grammarly, Accuracy, Understanding, Synthesis (100%) | <ul style="list-style-type: none"> - Grammarly improves grammar accuracy and helps correct spelling errors. - Useful for learning English grammar and enhancing writing skills. - Suitable for EFL learners to check grammar and vocabulary. - Convenient for quick and correct sentence construction. |
| Aspects of Writing Improved by Grammarly | Vocabulary, Grammar (50.31%), Spelling (40.85%), Punctuation (8.84%) | <ul style="list-style-type: none"> - Significant improvement in spelling and grammar structures. - Helps with complex sentence structures and corrects word usage. - Accurate corrections for spelling, punctuation, and grammar. |
| Benefits and Drawbacks of Using Grammarly | Benefits (91%), Drawbacks (9%) | <p>Benefits</p> <ul style="list-style-type: none"> - Convenient and accurate for grammar correction. - Quick and easy to use for writing adjustments. <p>Drawbacks</p> <ul style="list-style-type: none"> - Requires payment for full features. - Sometimes alters the meaning of sentences. - Requires internet access and may reduce self-learning. |
| Preference: Teacher-Centered Approach vs. AI Technology | AI Writing Technology (100%) | <ul style="list-style-type: none"> - Students prefer incorporating AI as it provides additional resources for self-learning. - AI technology makes learning more engaging and less stressful. - Blended learning (AI + teacher instruction) is seen as more effective and enjoyable. |
| Additional Thoughts on Using Grammarly for Writing Improvement | Long-term Usability (80.25%), Need for Grammar Materials (15.85%) | <ul style="list-style-type: none"> - Students need to combine app usage with textbook learning. - Developers should ensure long-term usability and consider ways to generate revenue without impacting users. |

The results from this study, as shown in Table 3, suggest that the students were generally satisfied with using Grammarly's recommendations, with an overall mean score of 4.46 (SD = 0.59). This high level of satisfaction aligns with previous research, such as that by Fitria (2021), which found that students using Grammarly significantly improved their writing, indicating that AI-driven tools can be highly effective in enhancing students' writing abilities. The positive feedback from students in this study reflects the growing acceptance and value of AI-based writing tools in academic contexts. The highest-rated item (mean 4.66) was the students' appreciation for teachers providing additional explanations regarding Grammarly's suggestions. This finding highlights the importance of teacher involvement in the learning process when using AI tools. Syafi'i (2020) states that while digital tools like Grammarly are beneficial, teacher guidance can further enhance their effectiveness. In this study, students valued the synergy between AI technology and teacher input. This combination enhanced their understanding and enabled them to apply the suggestions effectively. Such findings emphasize the importance of integrating AI tools with traditional teaching methodologies. Rahmadani (2022) underscored this hybrid approach, asserting it holds significant potential to elevate student learning outcomes. The second-highest score (mean 4.60) indicated satisfaction with Grammarly's detailed writing recommendations. This finding is consistent with previous studies, such as that of Halim et al. (2022), who highlighted that detailed feedback from AI tools is instrumental in enhancing students' writing skills. The ability to receive specific, real-time corrections helps students improve their grammar, spelling, and overall writing quality, fostering a more thorough understanding of writing mechanics. This study's satisfaction with detailed feedback suggests that students recognize the tool's role in offering individualized, actionable insights to improve their writing.

The two items ranked third (mean 4.59) were related to students feeling that Grammarly boosted their independent learning abilities and was a valuable tool for practicing general English writing. These findings align with Dizon & Gayed's (2021) research, which suggested that AI tools like Grammarly can promote autonomous learning by providing students with immediate feedback and enabling them to identify and correct errors independently. This capacity for self-correction is a significant advantage, as it allows students to take ownership of their learning process and develop critical writing skills outside the classroom. Students also provided suggestions for improving Grammarly's functionality. They requested more content and assignments, free access to Grammarly Premium, and the inclusion of other learning platforms. These suggestions point to the students' desire for more comprehensive learning resources. According to Muwahhidullah et al. (2022), additional learning materials and platforms could enhance the utility of digital tools like Grammarly, providing students with more resources to strengthen their writing skills. The request for free access to the Premium version also aligns with the findings of Rahmadani (2022), where students expressed concerns about the affordability of the full suite of features available on Grammarly, which could limit its widespread use. In addition to these positive responses, students noted some limitations, such as Grammarly's functionality for editing longer texts and the need for improvements in mobile security measures. These limitations reflect the need for

continuous improvements in the tool's capabilities to meet the diverse needs of students. As noted by Barrot (2020), while AI tools like Grammarly are effective, there are still areas for development, particularly in handling more complex writing tasks and ensuring the security of user data on mobile platforms.

Overall, the students in this study expressed high satisfaction with Grammarly, appreciating its detailed feedback and its role in boosting their independent learning abilities. These findings are consistent with the broader literature on AI-based writing tools, which has shown that such tools can significantly enhance students' writing skills (e.g., Dizon & Gayed, 2021; Fitria, 2021). However, the students suggested enhancements, including better content, more accessible Premium features, and improvements for longer texts and mobile security. These suggestions point to the ongoing need to refine and expand the functionality of AI tools like Grammarly to ensure they meet the evolving needs of students and educators alike.

Table 3

Number, Percentage, and Satisfaction with Grammarly's Language Writing Suggestions of Sample Group Students (n=102)

| Students' Satisfaction with Grammarly's Language Writing Suggestions | Mean | SD. | Interpretation |
|---|------|------|----------------|
| 1. I am satisfied with the detailed comments that Grammarly offers. | 4.60 | 0.51 | Highest |
| 2. I believe that Grammarly's comments are beneficial for boosting my writing abilities and offering practical advice for enhancing my writing in academic assignments. | 4.66 | 0.48 | Highest |
| 3. I prefer comments from Grammarly to other types of criticism, even though Grammarly's detailed comments make writing seem difficult. | 4.29 | 0.61 | High |
| 4. I prefer that the teacher continue using Grammarly in my classroom and prefer having a teacher alongside to help provide students with feedback, guidance, and coaching to improve their writing abilities by addressing any confusion or issues when using Grammarly for suggestions. | 4.66 | 0.54 | Highest |
| 5. Grammarly, in my opinion, empowers students to become independent learners. | 4.59 | 0.59 | Highest |
| 6. Grammarly, in my view, helps students feel more confident when they write. | 4.57 | 0.54 | Highest |
| 7. I consider Grammarly's comments before editing my writing. | 4.47 | 0.54 | Highest |
| 8. I use Grammarly's comments to improve my writing. | 4.58 | 0.50 | Highest |
| 9. Comments from teachers or other sources are less effective than automatically written remedial comments (Grammarly). | 3.58 | 1.08 | High |

| Students' Satisfaction with Grammarly's Language Writing Suggestions | Mean | SD. | Interpretation |
|---|-------------|-------------|----------------|
| 10. I believe that Grammarly is suitable for undergraduate students at Rajabhat University. | 4.43 | 0.64 | Highest |
| 11. Grammarly is a valuable tool for writers in general as well. | 4.59 | 0.51 | Highest |
| 12. I am satisfied with using Grammarly in English writing for professional purposes courses. | 4.54 | 0.52 | Highest |
| Overall | 4.46 | 0.59 | Highest |

5. Implications for Future Research on EFL Education

The study highlights several implications for EFL (English as a Foreign Language) education based on the observed improvements in students' writing skills after using Grammarly's AI tool.

1. **Integration of AI Tools:** AI-powered tools like Grammarly can enhance traditional teaching methods by providing individualized feedback and real-time corrections. Educators should incorporate these technologies into writing programs to complement teacher-led instruction and support consistent, immediate improvements in students' writing.
2. **Personalized Learning:** Grammarly's ability to deliver tailored feedback allows educators to differentiate instruction by addressing specific student needs, such as improving grammar or punctuation. This feature is an invaluable tool in larger classes, where it can be challenging to provide individual attention.
3. **Curriculum Development:** Educators should integrate AI tools into language instruction curricula, as their successful implementation in improving writing skills has become evident. AI tools can supplement traditional methods by offering students practice and immediate feedback, which enhances learning and writing outcomes.
4. **Teacher Training:** Effective integration of AI tools requires that educators receive training on the technical use of these tools and the pedagogical strategies for incorporating them into their teaching. Professional development should cover using AI tools effectively and providing constructive feedback based on their insights.
5. **Equity and Accessibility:** Ensuring equitable access to AI tools is crucial. Institutions should provide access to premium features and address disparities in technology access. Training for students and teachers on using AI tools can help bridge gaps in digital literacy and ensure equitable access.
6. **Student Autonomy:** AI tools can promote self-directed learning by providing immediate feedback and fostering independent study skills. Educators should encourage students to use these tools outside the classroom to enhance their self-editing skills and develop a culture of lifelong learning.

This study investigating Grammarly's impact on the writing proficiency of EFL undergraduate students has several limitations. First, the sample size of 126 students was not entirely representative, as participants were from specific academic fields and a single institution, limiting generalizability. Second, the findings might not apply broadly to other educational contexts or language acquisition settings. Third, the study focused on specific writing aspects and overlooked others, such as cohesion and audience adaptation, potentially providing an incomplete view of overall writing skills. Fourth, technological limitations may have affected the results, including differences in internet access and digital literacy. Fifth, the short duration of the intervention (8 weeks) may not have captured long-term improvements in writing proficiency. Finally, external factors such as varying instructor support and individual learning environments may have influenced the outcomes. Addressing these limitations in future research will enhance our understanding of AI tools in language instruction and their broader implications.

6. Conclusions and Recommendations

This study demonstrates that AI tools such as Grammarly can significantly enhance the writing proficiency of EFL students. The integration of this technology resulted in marked improvements in various writing aspects, including spelling, grammar, punctuation, sentence structure, vocabulary, and style. These findings suggest that institutions should develop structured implementation plans for integrating AI writing tools, including faculty training programs and student support systems. The intervention significantly improved students' proficiency levels and revealed quantitative and qualitative enhancements in students' writing skills. The AI tool's ability to offer personalized feedback, targeted exercises, and real-time coaching effectively addressed the common challenges that EFL learners face.

In addition, the overwhelmingly positive student feedback highlights AI's transformative potential in reshaping language instruction. These results indicate that educational institutions should explore AI-powered technologies to enhance language acquisition. By implementing AI tools such as Grammarly, students can be provided with valuable support and feedback, which contributes to improving their writing skills and overall academic performance. Thus, institutions should consider integrating such technologies into their curricula and offering training for educators and students to maximize their benefits. Additional research should be conducted to investigate other AI applications further and assess how they affect the different facets of language acquisition. Embracing innovative technologies will help create more effective, engaging, and inclusive educational environments that will better prepare students for success in an increasingly digital world.

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