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Grammarly as a Computer-Mediated Tool for Enhancing Writing Instruction

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ABSTRACT

Purpose of the study: This research explores the impact of Grammarly as a computer-mediated instruction tool, on the academic writing skills of Senior High School students in the Philippines.

Methodology: A quasi-experimental research design was used, involving 44 Grade 11 students. Participants were randomly assigned to either an experimental group which received instruction via Grammarly and a control group which followed traditional teaching writing methods. Both groups completed a pretest and posttest thru writing a descriptive essay and a 100-item achievement test.

Main Findings: The results showed that Grammarly significantly improved the writing performance and overall achievement of the experimental group, with their mean scores surpassing those of the control group. The findings suggest that integrating Grammarly into writing instruction can positively influence student performance.

Novelty/Originality of this study: This study provides valuable insights into both lecturers and students by investigating how feedback and evaluation processes facilitated by Grammarly impact the quality and development of academic essays, the study highlights the tool's potential to enhance the writing process. Specifically, it examines the effectiveness of real-time corrections, suggestions, and feedback provided by Grammarly in helping students improve their writing skills.

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1. INTRODUCTION

In the Philippines, Senior High School students are challenged with numerous academic writing tasks across various subjects, including Reading and Writing Skills and English for Academic and Professional Purposes. Despite the considerable efforts of teachers to improve students' writing skills, many continue to struggle in academic writing courses. Lasala [1] revealed that Filipino secondary students' writing skills were significantly lower than their spoken language abilities. This issue is further highlighted by Pablo & Lasaten [2], who identified the most common writing issues among Senior High School students. In terms of content, students often lack variety in their ideas; in terms of organization, there is a lack of cohesive connectives; regarding vocabulary, students struggle with inappropriate word choice; and in language use, poor sentence structure remains a persistent issue.

The integration of technology in education has opened new opportunities for addressing these challenges [3]. Specifically, the use of computer networks and software tools in language education has shown promising effects on improving writing skills [4]. In modern English as a Second Language writing classes, computers are not only used for language practice and word processing but also as powerful tools to enhance students' composition and revision skills [5]. More advanced systems now exist that go beyond basic spelling and grammar checks, offering suggestions for improving writing style and structure, and even providing feedback on the coherence and clarity of written work [6].

Among the most widely used tools is Grammarly, which has gained significant popularity for its ability to detect a variety of writing errors, such as grammar, punctuation, spelling, and style issues [7]. Studies have demonstrated that Grammarly can significantly reduce common writing errors in English, including grammatical, lexical, and mechanical issues [8]. By understanding how this tool works, teachers can potentially leverage it in English as a Second Language classrooms to enhance their students' academic writing skills. However, as pointed out by Ishak [9], the use of Grammarly in English as a Second Language classrooms requires teachers to have a deep understanding of the software's functionalities in order to effectively integrate it into their instruction.

In line with this, various studies have investigated the effectiveness of Grammarly as a writing assistant, particularly in the context of English as a Foreign Language settings. Ghufron & Rasyida [10], Jayavalan & Razali [11], Shin & Kim [12], Japos [7], and Sutaryo, Asrul & Hassan [13] have all confirmed that Grammarly-evaluated papers exhibit fewer errors in terms of grammar, spelling, and punctuation. However, these studies have also highlighted that Grammarly's assistance in improving the content and organization of writing is less pronounced. Most of these studies were conducted in English as a Foreign Language contexts, focusing primarily on university-level students or higher education settings.

Despite the growing body of literature on Grammarly's role as a writing assistant, there is a notable gap in research regarding its application in English as a Second Language contexts, particularly within Senior High School settings in the Philippines. Most existing studies focus on English as a Second Language contexts, such as those in non-English-speaking countries or tertiary education, leaving a significant gap in empirical research on the impact of Grammarly in basic education or secondary school English as a Second Language settings. Furthermore, while Grammarly has been recognized as effective in identifying grammatical errors, there is a lack of comprehensive studies exploring how this tool can be utilized as a computer-mediated instruction tool to address broader academic writing challenges—such as improving the organization of ideas, enhancing content variety, and aiding the development of cohesive and well-structured essays—in the English as a Second Language context.

Moreover, while previous studies have examined the use of Grammarly as a writing assistant in improving surface-level issues like grammar and punctuation, little attention has been paid to its pedagogical potential beyond error correction [14]. Specifically, there is a need for more research into how Grammarly can be used systematically by teachers to facilitate writing instruction in a way that fosters critical thinking and writing development among L2 learners [15]. Additionally, the contextual factors influencing the effectiveness of Grammarly in diverse educational environments, such as the availability of resources, students' technological proficiency, and the level of teacher training, remain underexplored [16].

Given these gaps, this study seeks to fill a crucial void by examining the effect of Grammarly as a computer-mediated instructional tool on improving the academic writing skills of Senior High School students enrolled in the Reading and Writing Skills subject at Kabacan National High School in Kabacan, Cotabato, Philippines. This study aims to assess whether Grammarly can assist students in identifying writing errors and improving their overall writing proficiency. Specifically, it will explore the extent to which Grammarly can help L2 writers—in the context of English as a Second Language —improve the accuracy and quality of their academic essays, focusing on both surface-level writing errors (such as grammar and spelling) and higher-order concerns such as content development, idea organization, and overall coherence.

Thus, there remains a significant gap that exists in the literature regarding the application of Grammarly as a writing tool in English as a Second Language contexts, particularly in Senior High School settings in the Philippines. While several studies have examined the effectiveness of Grammarly in improving surface-level writing issues such as grammar, spelling, and punctuation in English as a Foreign Language contexts Ghufron & Rasyida [10], Jayavalan & Razali [11], Shin & Kim [12], few have focused on its role in addressing more complex academic writing challenges, such as content development, idea organization, and essay coherence. Additionally, the majority of existing research is centered on higher education or non-English-speaking countries, leaving a gap in research specific to secondary education in the Philippines.

As such, the urgency for addressing this gap stems from the critical need to improve the academic writing skills of Senior High School students in the Philippines, where a significant proportion struggle with writing tasks [1], [2]. With the integration of technology in education becoming more widespread, tools like Grammarly offer an opportunity to bridge the writing gap by providing immediate feedback and helping students develop critical writing skills. The lack of research on how Grammarly can aid in improving both surface-level

and higher-order writing issues, such as content variety and organization, underscores the importance of this study. The Philippines, where English as a Second Language students face specific challenges, needs empirical research to assess the potential of technology-based tools in enhancing writing skills in the secondary education context. Hence, the study will contribute to a better understanding of how Grammarly can be effectively integrated into English as a Second Language instruction for Senior High School students in the Philippines, offering insights that can guide English as a Second Language educators, policy makers, and researchers in harnessing technology to improve academic writing instruction in the secondary education context.

2. RESEARCH METHOD

2.1. Research Types

A quasi-experimental research method was employed to investigate the impact of Grammarly, a computer-mediated instruction tool, on the academic writing skills of Grade 11 students enrolled in Reading and Writing Skills. In this study, a true experiment was utilized involving the random assignment of participants to treatment or control groups [17]. Instead, these designs often rely on pre-existing groups or situations that are naturally occurring [18]. This study utilized a pretest-posttest design to assess the students' writing progress. The research was conducted at a National High School in Kabacan, Cotabato, which is one of the largest secondary schools in the region, with a student population of around 5,000. However, for the study's specific objectives, only one Grade 11 section, 11-HUMSS, was selected as the research cohort.

2.2. Respondent

The study involved 44 Grade 11 Humanities and Social Sciences (HUMSS) students enrolled in the Reading and Writing Skills course during the second semester of the 2023–2024 school year. These students were randomly assigned to either the experimental or control group through simple random sampling using the lottery technique. In total, 22 students were assigned to the experimental group, which used Grammarly as a writing tool, while the other 22 students were assigned to the control group, which followed traditional writing instruction methods.

2.3. Research Instrument

Two main instruments were used for data collection in this study. The first instrument was a validated pretest/posttest writing task, in which students were required to write a descriptive essay based on the Department of Education's (DepEd) Descriptive Writing Guide (see Appendix A). The second instrument was a 100-item achievement test, designed to assess students' academic performance (see Appendix B). Both instruments underwent content validation by a panel of experts prior to their administration. To ensure the validity and reliability of the instruments, statistical analysis was conducted using Cronbach's Alpha. Reliability testing was performed solely on the 60-item multiple-choice section of the achievement test, which yielded a Cronbach's Alpha value of 0.713, indicating an acceptable level of reliability for the given set of items. The remaining sections of the test, including the instructions and rubrics for scoring, were provided to the students. For 40 item writing assessment, a rubric based on the Basic Writing Rubric from iRubrics was used to evaluate the students' writing. The rubric assessed six key aspects of writing: grammar and sentence structure, punctuation and capitalization, fluency, the correct usage of "they," "their," and "they are," spelling and word usage, and the precision of language (see Appendix C).

2.4. Data Collection Techniques

Data collection occurred during the third quarter of the 2023–2024 school year. The researcher obtained permission from the school principal to conduct the study and distributed informed consent and assent forms to students under 17 years old. The pretest was administered over the course of one week. For both the experimental and control groups, students completed the writing task in one hour in the school's computer laboratory. They were asked to upload their essays to Grammarly for automated analysis and submit both the original paper and the report generated by the software. The following day, students took the achievement test for one hour in the same venue. The pretest outputs were evaluated by three inter-raters: two master teachers with expertise in English language teaching, and the researcher. One week was allocated for evaluating the pretest results.

The instructional treatment phase lasted six weeks. During this period, the experimental group received Grammarly-assisted writing instruction, while the control group followed traditional English writing instruction using the Self-Learning Module provided by the Department of Education. The Grammarly tool generated reports on student errors, which were used to guide instruction for the experimental group. The researcher used these error reports to design lessons aimed at helping students address their writing mistakes. For fairness, the names of the students whose errors were addressed were kept confidential. The control group, on the other hand, received conventional writing lessons based on the DepEd Self-Learning Module. Both groups were taught in parallel for the six weeks.

After the instructional period, the posttest was administered using the same instruments as the pretest. The posttest was given over a one-week period, and the students' outputs were evaluated by the same inter-raters. A week was allocated for the evaluation of the posttest. Once all data were collected, the researcher organized and prepared the data for statistical analysis.

2.5. Data Gathering Procedure

The data gathering procedure for this study was designed to ensure the systematic and ethical collection of data from Grade 11 students during the third quarter of the school year 2022–2023. The research aimed to assess the effectiveness of two different instructional methods—traditional instruction using Self-Learning Modules and computer-assisted writing instruction using Grammarly. Below are research procedures along with a research procedure flowchart.

2.6. Research Procedure

Before conducting the research, the researcher first submitted a request for permission to the principal by submitting an official application letter. This process was carried out in the third quarter of the 2022–2023 academic year, with research respondents coming from grade XI students. The purpose of this permit application is to ensure transparency, respect the authority of the school, and comply with ethical standards set by the institution and academic guidelines, as emphasized by Race and Vidal-Hall [19]. After obtaining permission, respondents were randomly assigned to control and experimental groups using a lottery technique, to ensure a fair and unbiased distribution of participants. Next, both groups underwent a pretest consisting of a writing task and an achievement test. This pretest is important in experimental research because it serves as baseline data that allows for accurate evaluation of the impact of the intervention after the posttest [20]. The writing task was completed within one hour in the high school computer lab, and the writing results were uploaded to Grammarly for automatic analysis. Each student was asked to submit the original version of their writing along with a report from Grammarly. The next day, the achievement test was carried out in the same place for one hour. The entire pretest process took one week. After the pretest was completed, all results were collected and evaluated by three assessors: two master teachers who were experts in English teaching and the researcher herself. Brookhart [21] emphasized that the involvement of experts as assessors increases credibility and accuracy in the evaluation process.

This study was conducted for six weeks with the implementation of two learning methods simultaneously. The experimental group received Grammarly-assisted writing learning, a computer-based instructional tool, while the control group used a conventional method based on the Department of Education (DepEd)'s Self-Learning Modules for the Reading and Writing Skills subject. Although the teaching methods were different, the content of the materials between the two groups was designed to be parallel to ensure consistency, as the use of the same instrument in the pretest and posttest increases the reliability in measuring changes due to the intervention [22]. The researcher utilized feedback from Grammarly to help students recognize and correct their errors. Learning sessions were adjusted based on the error patterns that emerged in the students' pretest results. Several excerpts from students' writings containing relevant errors were used as teaching materials with confidentiality to avoid discrimination.

After the six-week learning period was completed, a posttest was administered simultaneously to both groups using the same instrument as the pretest. The use of identical instruments maintains internal validity and allows for objective comparisons. The pretest–posttest control design is a standard method in experimental research used to assess the impact of an intervention by comparing data before and after treatment [23]. The posttest implementation process lasted for one week. All posttest results were then evaluated by the same team of assessors as the pretest, and this process took one week to ensure consistency and reliability of scores. As stated by Weigle [24], the use of multiple assessors and the establishment of inter-rater reliability are important steps in assessing subjective tasks such as writing or performance assessments. This is also supported by Cohen, Manion, and Morrison [25] who stated that assessors who are familiar with the assessment process and instruments will produce more valid and reliable assessments. In addition, the use of multiple assessors can also increase the fairness of scores by minimizing individual bias [26]. Once all data are available, the researchers organize and summarize the results for statistical analysis to facilitate interpretation and discussion of the research findings.

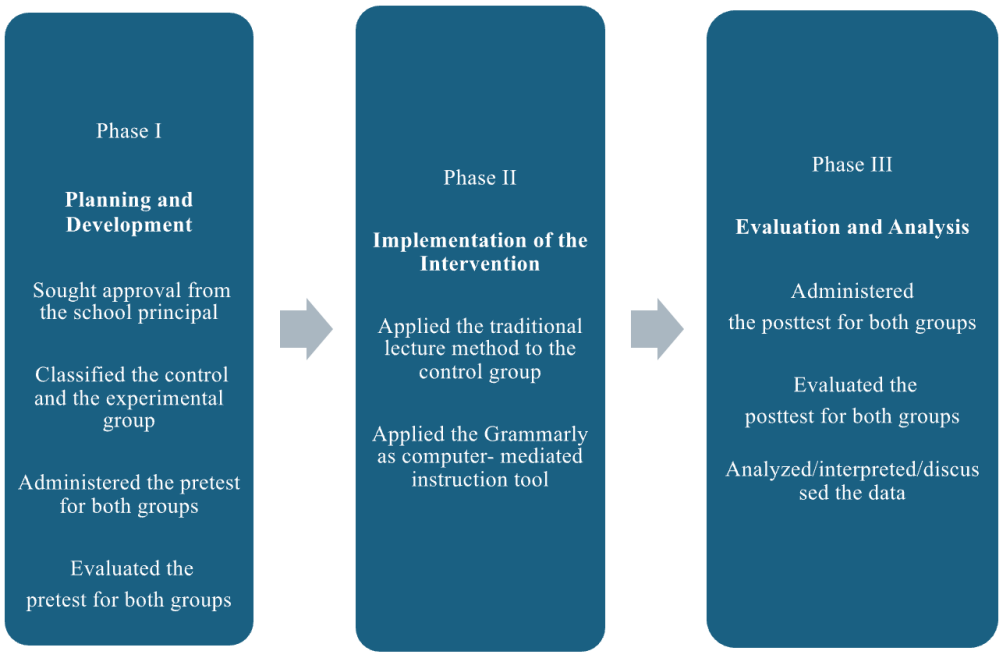

Figure 1. Procedures in the conduct of the study

2.7. Data Analysis Techniques

For the data analysis, the researcher employed a t-test for paired samples to assess the significant differences between the average pretest and posttest scores of the control and experimental groups. Additionally, an independent sample t-test was used to determine the differences between the average pretest scores, posttest scores, and gain scores of both groups. Descriptive statistics, including weighted means and standard deviations, were used to describe the students' academic writing skills before and after the treatment. These statistical analyses provided insight into the effectiveness of Grammarly as a tool for improving students' academic writing skills.

3. RESULTS AND DISCUSSION

Table 1. Test of difference on the pretest of the control and experimental group in terms of writing test.

Variables (Pre-test)	n	Mean	Mean Rank	Mann-Whitney U	p-value
Control	22	8.92	19.82	301.00^{ns}	.16
Experimental	22	9.32	25.18		

^{ns} not significant at 5% level

The implication of the findings in Table 1 suggests that both the control and experimental groups had similar baseline knowledge prior to the intervention, as evidenced by their comparable pretest scores. This lack of a significant difference (U = 301.00, p = .16) implies that any subsequent differences in performance can likely be attributed to the intervention or other factors, rather than pre-existing knowledge disparities. Furthermore, Kabacan National High School's practice of heterogeneous sectioning, which integrates students with diverse backgrounds, appears to create a balanced educational environment.

This consistent average performance across diverse sections highlights the school's commitment to providing equitable learning opportunities, ensuring that students, regardless of their individual backgrounds, have access to a comparable standard of education. This approach may help promote a more inclusive learning environment, where students can thrive based on the quality of instruction and support provided, rather than differences in prior knowledge or background [27].

Table 2. Test of difference on the pretest of the control and experimental group in terms of achievement test.

Variables (Pre-test)	n	Mean	Mean Difference	t-value	df	p-value
Control	22	44.77	0.27	-0.11[ns]	42	.91
Experimental	22	45.05				

[ns] not significant at 5% level

Table 2 displays the average pretest scores of between control and experimental groups concerning their achievement test. Based on the data presented using t-test for independent samples, the results showed that the pretest score of the controlled group (M = 44.77) was comparable to the pretest score of the experimental group (M = 45.05), $t(42)=-0.11$, $p = .91$. This indicates that both groups entered the study with comparable levels of prior knowledge regarding the topic, ensuring that any subsequent differences in performance are likely attributable to the intervention rather than pre-existing knowledge disparities.

Furthermore, the School's practice of heterogeneous sectioning, which accommodates students from various backgrounds, appears to foster an environment where performance levels are consistent across different groups. This suggests that the school effectively supports students with diverse academic backgrounds, maintaining a well-balanced educational environment that provides equitable learning opportunities. It underscores the importance of the school's inclusive approach, which ensures that students, regardless of their background, have similar opportunities to succeed, thereby promoting fairness and equality in academic outcomes. However, despite this diversity, the average performance level across the sections remains consistent, indicating a well-balanced educational environment for all students [28].

Table 3. Test of difference on the posttest of the control and experimental group in terms of writing test.

Variables (Post-test)	n	Mean	Mean Difference	t-value		p-value
Control	22	9.86	4.23	-11.22**	42	<.001
Experimental	22	14.09				

** highly significant at 5% level

The findings in Table 3 suggest that the experimental group, which used Grammarly as a computer-mediated instruction tool, significantly outperformed the control group on the posttest writing assessment (M = 14.09 vs. M = 9.86), with a statistically significant difference ($t(42) = -11.22$, $p < .001$). This demonstrates that the integration of Grammarly in the learning process positively impacted students' writing performance, supporting the effectiveness of this tool in enhancing writing skills.

The results imply that Grammarly is a valuable educational tool for improving writing outcomes, particularly in areas such as sentence structure and grammar. This aligns with the findings of Jayavalan and Razali [11], who also concluded that Grammarly enhances students' ability to produce grammatically correct and well-structured written work, particularly in narrative essays. The significant improvement in the experimental group highlights the potential of computer-assisted writing tools like Grammarly to support students in developing more effective writing skills, suggesting that such tools can play a crucial role in enhancing the quality of student writing, particularly for those struggling with grammar and structure.

Moreover, this supports the broader implication that integrating technology into education—particularly in language learning—can lead to more personalized, efficient, and effective learning experiences, ultimately contributing to improved student performance [29].

Table 4. Test of difference on the posttest of the control and experimental group in terms of achievement test.

Variables (Post-test)	n	Mean	Mean Difference	t-value	df	p-value
Control	22	48.23	17.00	-6.34**	42	<.001
Experimental	22	65.23				

** highly significant at 5% level

Table 4 shows the average posttest between control and experimental groups concerning their achievement test. Based on the data presented using t-test for independent samples, the experimental group (M = 65.23) showed better performance than the control group (M = 48.23), $t(42) = -6.34$, $p <.001$. Statistically, there is a significant difference between the posttest mean scores of control group and experimental group at 0.05 level of significance in terms of grammar achievement.

The results suggest that Grammarly, as a computer-mediated instruction tool, effectively supports learners in enhancing their writing proficiency, as measured by the achievement test. This finding is consistent with the conclusions of Nova [5], who highlighted that Grammarly not only assists teachers in tracking student progress but also plays a significant role in increasing students' awareness of their mistakes. By providing real-time feedback and suggesting corrections, Grammarly encourages students to take ownership of their writing development, leading to a deeper understanding of language use and improvement in writing skills [30].

Additionally, Grammarly's role extends beyond just being a tool for error correction; it helps raise students' awareness of common writing pitfalls, thereby fostering a more independent and reflective approach to learning. This aligns with the notion that technology, when integrated effectively in the classroom, can be a powerful tool for both teachers and students. For teachers, it provides valuable insights into student progress, while for students, it promotes self-correction and continuous improvement [31]. This suggests that incorporating such tools into the educational process can lead to more personalized learning experiences, where students not only receive immediate feedback but also develop a greater understanding of how to improve their writing over time [32].

Table 5. Test of difference on the pretest and posttest of the control group in terms of writing test.

Variables (Control)	n	Mean	Wilcoxon-signed rank test	p-value
Pre-test	22	8.92	198.00*	.02
Post-test	22	9.86		

* significant at 5% level

Table 5 presents the comparison of pretest and posttest scores within the control group, focusing on writing test as the variable of interest. Based on the data presented using Wilcoxon signed-rank test, results showed that the mean pretest score (M = 8.92) had lower mean than the posttest score (M = 9.86). A statistically significant difference was found (Z = 198.00, p = .02).

These results suggest that, while the intervention led to some improvement in the writing test scores, the extent of improvement remains relatively modest. This indicates that while Grammarly had a positive impact on the control group's writing proficiency, the tool alone may not be sufficient to achieve more substantial gains. Therefore, additional strategies or complementary instructional methods may be needed to further enhance students' writing skills.

This aligns with the findings of Ghufron and Rasyida [10], who reported that students whose work was graded by Grammarly made fewer errors compared to those whose work was manually assessed. Their study underscores the potential of Grammarly to provide more consistent and immediate feedback, which helps reduce errors over time. However, the relatively low degree of improvement in this study suggests that combining Grammarly with other instructional interventions, such as focused writing workshops or peer reviews, could yield more significant progress. In essence, while Grammarly can be a useful tool for error correction and writing support, a holistic approach that incorporates various strategies might be more effective in fostering substantial improvement in students' writing abilities [12].

Table 6. Test of difference on the pretest and posttest of the control group in terms of achievement test.

Variables (Control)	n	Mean	Mean Difference	t-value	df	p-value
Pre-test	22	44.77	3.45	2.31*	21	.03
Post-test	22	48.23				

* significant at 5% level

Table 6 presents the comparison of pretest and posttest scores within the control group, focusing on achievement test as the variable of interest. Based on the data presented using t-test for dependent samples, results showed that the mean pretest score (M = 44.77) had lower mean than the posttest score (M = 48.23), $t(21) = 2.31$, $p = .03$. Statistically, there is a significant difference between the pretest and posttest mean scores of control group and experimental group at .05 level of significance in terms of achievement test.

These results suggest that while the intervention led to some improvement in the achievement test scores, the degree of improvement in the control group's grammar proficiency remains relatively modest. This implies that while Grammarly had a positive impact, additional efforts may be needed to achieve more substantial improvements in students' grammar skills.

This finding is supported by Ghufron and Rasyida [10], who demonstrated that the use of Grammarly software resulted in a more significant reduction in students' errors compared to traditional teacher corrections. Their research highlights the effectiveness of Grammarly in providing consistent, immediate feedback that helps

students identify and correct errors more efficiently. However, the modest improvement observed in this study suggests that Grammarly, while beneficial, may need to be integrated with other teaching strategies—such as more targeted grammar instruction or collaborative learning opportunities—to achieve more significant progress. A multi-faceted approach combining technology with active teacher involvement may offer the most effective means for enhancing grammar proficiency in students [13].

Table 7. Test of difference on the pretest and posttest of the experimental group in terms of writing test.

Variables (Experimental)	n	Mean	Mean Difference	t-value	df	p-value
Pre-test	22	9.32	4.77	13.37**	21	<.001
Post-test	22	14.09				

** highly significant at 5% level

Table 7. presents the comparison of pretest and posttest scores within the experimental group, focusing on the writing test as the variable of interest. Based on the data presented using t-test for dependent samples, results showed that the mean posttest score (M = 14.09) showed better performance than the pretest score (M = 9.32), $t(21) = 13.37$, $p < .001$. Statistically, there is a significant difference between the pretest and posttest mean scores of control group and experimental group at .05 level of significance in terms of writing test.

These results indicate that the intervention had a significant positive impact on the experimental group's writing performance. The notable increase in scores following the intervention suggests that the approach was effective in enhancing students' writing skills. This demonstrates the potential of targeted, specific instruction—such as the one employed in this study—to substantially improve students' writing abilities.

This finding aligns with the conclusion of Ghufron and Rasyida [10], who highlighted that Grammarly can effectively detect errors related to spelling, grammar, and punctuation while offering detailed comments and corrections. The results of this study further emphasize the value of such automated tools in providing real-time feedback and personalized learning support. By helping students identify and correct errors on their own, Grammarly not only improves their writing but also encourages independent learning and critical thinking. These findings underscore the importance of integrating such tools into writing instruction, as they offer both immediate error correction and long-term skill development, ultimately helping students become more confident and competent writers.

Table 8. Test of difference on the pretest and posttest of the experimental group in terms of achievement test.

Variables (Experimental)	n	Mean	Mean Difference	t-value	df	p-value
Pre-test	22	45.05	20.18	10.90**	21	<.001
Post-test	22	65.23				

** highly significant at 5% level

Table 8 illustrates the comparison of pretest and posttest scores within the experimental group, focusing on achievement test as the variable of interest. Based on the data presented using t-test for dependent samples, results showed that the mean posttest score (M = 65.23) showed better performance than the pretest score (M = 45.05), $t(21) = 10.90$, $p < .001$. Statistically, there is a significant difference between the pretest and posttest mean scores of control group and experimental group at .05 level of significance in terms of achievement test.

These findings indicate that the intervention led to significant improvements in the experimental group's achievement test performance. The substantial increase in posttest scores further supports the effectiveness of the intervention in enhancing students' achievement. This suggests that the intervention not only improved students' test performance but also likely contributed to their overall understanding and application of the subject matter.

This result aligns with the conclusions of Shin & Kim [12], which highlighted that teachers can effectively use tools like the one employed in this study as instructional aides to explicitly teach grammar. The use of such tools in the classroom can provide targeted, personalized instruction, helping students improve specific areas of weakness. By integrating these tools into the teaching process, teachers can offer more precise and immediate feedback, reinforcing key grammatical concepts and enhancing students' overall language proficiency [33]. This reinforces the value of incorporating technology in education, as it allows for more dynamic, tailored learning experiences that can significantly boost student achievement [34].

Table 9. Test of difference on the gain scores of the control and experimental group in terms of writing test.

Variables (Gained Scores)	n	Mean	Mean Difference	t-value	df	p-value
Control	22	0.94	3.83	-6.82**	42	<.001
Experimental	22	4.77				

** highly significant at 5% level

Table 9 presents the comparison of gain scores between the experimental and control groups, focusing on writing test as variable of interest. Based on the data presented using t-test for independent samples, both groups had increased their mean scores from pretest to posttest. However, the experimental group (M = 4.77) had better performance than the control group (M = 0.94), $t(42) = -6.82$, $p < .001$. Statistically, there is a significant difference between the gain scores of control group and experimental group at .05 level of significance in terms of writing test.

These findings indicate that the experimental group demonstrated significantly greater improvements in writing achievement compared to the control group. This underscores the efficacy of targeted interventions in enhancing students' writing skills, highlighting the potential of specific instructional tools to yield meaningful academic gains.

Moreover, these results align with the findings of Barrot [13], whose quasi-experimental study revealed that students in the experimental group who used Grammarly experienced a significant improvement in the accuracy of their writing. This supports the notion that the integration of technology, such as Grammarly, can provide valuable real-time feedback, helping students refine their writing and correct errors more effectively [35]. The success observed in the experimental group suggests that incorporating such tools into writing instruction can be a powerful strategy for improving writing accuracy, fostering both better performance and greater student engagement in the writing process [36].

Table 10. Test of difference on the gain scores of the control and experimental group in terms of achievement test.

Variables (Gained Scores)	n	Mean	Mean Difference	t-value	df	p-value
Control	22	3.45	16.72	-7.03**	42	<.001
Experimental	22	20.18				

** highly significant at 5% level

Table 10 presents the comparison of gain scores between the control and experimental groups, focusing on achievement test as the variable of interest. Based on the data presented using t-test for independent samples, both groups had increased their mean scores from pretest to posttest. However, the experimental group (M = 20.18) had better performance than the control group (M = 3.45), $t(42) = -7.03$, $p < .001$. Statistically, there is a significant difference between the gain scores of control group and experimental group at 0.05 level of significance in terms of achievement test.

The data suggests that the experimental group showed a marked improvement in their achievement test performance compared to the control group. The significant difference in scores highlights the effectiveness of the intervention in helping the experimental group enhance their grammar skills. This demonstrates that focused, targeted instruction using Grammarly can significantly support students' progress in grammar and writing.

Additionally, these findings align with the research of Karyuatry et al. [14], who found that Grammarly is an effective tool for identifying and correcting grammar errors, as well as addressing potential stylistic issues. Their study emphasizes the value of incorporating Grammarly into the classroom as a pedagogical tool for teaching academic writing. By providing students with immediate, detailed feedback, Grammarly helps them recognize and correct their mistakes, leading to improved writing accuracy. This supports the idea that teachers should consider integrating such tools into their teaching strategies to enhance the quality of student writing, particularly in academic contexts [37].

Table 11. Mean and standard deviation of common errors of students in the control group before and after grammar instruction interventions.

Common Writing Errors	Pre-test		Post-test		Wilcoxon signed-rank	p-value
	Mean	SD	Mean	SD		
Incorrect verb forms	6.32	4.54	1.27	1.67	-3.643	<.001
Determiner use (a/an/the/this, etc.)	3.41	1.14	1.41	1.26	-3.700	<.001
Wrong or missing prepositions	3.14	2.12	0.77	1.45	-3.280	.001
Confused words	1.86	1.75	0.41	0.67	-2.866	.004
Pronoun use	1.41	1.37	0.41	0.80	-2.460	.01
Comma misuse within clauses	1.36	1.76	0.18	0.50	-2.887	.004
Conjunction use	0.91	0.92	0.18	0.50	-2.514	.01
Misspelled Words	0.82	1.71	0.00	0.00	-2.388	.02
Improper formatting	0.64	1.14	0.32	0.57	-.929	.35
Misue of Modifiers	0.55	0.96	0.09	0.29	-1.897	.06
Misuse of Quantifiers	0.14	0.35	0.05	0.21	-1.000	.32
Mixed dialects of English	0.14	0.35	0.05	0.21	-1.000	.32
Modal verbs	0.05	0.21	0.00	0.00	-1.000	.32
Faulty subject-verb agreement	1.77	2.47	2.09	2.60	-.637	.52
Wordy Sentences (Clarity)	0.82	0.80	1.14	1.17	-.765	.44
Incorrect Phrasing	0.32	0.89	0.82	0.85	-2.034	.04
Punctuation	0.27	0.88	1.27	1.83	-2.124	.03

Table 11 shows the common writing errors observed among students in the control group, both before and after the intervention. It specifically presents the results of the Wilcoxon signed-rank test, a non-parametric test used because the data were not normally distributed, for comparing the errors in the pretest and posttest. In the table above, errors highlighted in light blue show significant changes during the post-intervention period, whereas those in light orange show no significant changes.

Before the intervention (Pretest), students in the control group demonstrated several writing errors. Notably, errors related to incorrect verb forms notably decreased from an average of 6.32 to 1.27 errors post-intervention, indicating enhanced proficiency in verb conjugation. Furthermore, they struggled with determiner usage, averaging 3.41 errors, which significantly decreased to 1.41 errors post-intervention. Similarly, issues with wrong or missing prepositions decreased substantially from an average of 3.14 errors to 0.77 errors after the intervention. These improvements suggest a positive impact on students' understanding and application of grammatical structures.

Students also exhibited improvement in comma usage within clauses, with errors decreasing from 1.36 to 0.18. Pronoun usage errors reduced from 1.41 to 0.41, and instances of confused words decreased from 1.86 to 0.41, reflecting a clearer grasp of vocabulary and grammar. Additionally, errors associated with incorrect noun number significantly decreased from 2.23 to 0.45, indicating improved understanding of singular and plural forms. However, punctuation errors slightly increased from 0.27 to 1.27, though this change was deemed significant. Despite this, students demonstrated notable progress in conjunction use, with errors decreasing from 0.91 to 0.18. Furthermore, misspelled words significantly decreased from 0.82 to 0.00 errors, suggesting enhanced spelling proficiency. However, other aspects such as faulty subject-verb agreement, wordy sentences, incorrect phrasing, and punctuation did not exhibit significant changes post-intervention.

These findings suggest that the intervention had a positive impact on reducing common writing errors among students in the control group. However, the reduction of errors in certain areas remains relatively modest. This indicates that while the intervention was effective in addressing some aspects of writing, there are still challenges in overcoming more complex errors.

Furthermore, these results support the conclusion of Ghufron [10], who highlighted that various studies have shown the effectiveness of corrective feedback in improving writing. However, Ghufron also noted that certain issues can hinder the success of this approach. Specifically, students may struggle to fully comprehend and apply the corrections on their own, particularly when it comes to more complex linguistic errors. Without sufficient linguistic proficiency, students often find it difficult to manage and internalize the corrected feedback effectively [38]. This underscores the importance of combining corrective feedback with further instructional support to ensure that students can not only identify but also understand and address their mistakes. Teachers may need to provide additional guidance, such as targeted lessons or one-on-one discussions, to help students better utilize the feedback and improve their writing skills over time [39].

Table 12. Mean and standard deviation of common errors of students in the experimental group before and after grammar instruction interventions.

Common Writing Errors	Pre-test		Post-test		Wilcoxon signed-rank	p-value
	Mean	SD	Mean	SD		
Incorrect verb forms	6.73	4.32	1.27	1.91	-3.734	<.001
Incorrect noun number	3.57	4.01	0.64	1.09	-3.328	.001
Wrong or missing prepositions	3.45	2.72	0.82	1.05	-3.231	.001
Determiner use (a/an/the/this, etc.)	3.23	2.74	0.64	0.90	-3.261	.001
Faulty subject-verb agreement	2.14	1.83	1.86	2.46	-.614	.54
Pronoun use	1.77	2.00	0.36	0.66	-2.699	.01
Confused words	1.71	1.49	0.18	0.50	-3.327	.001
Comma misuse within clauses	1.71	1.31	0.36	0.66	-2.915	.004
Misspelled Words	1.50	1.26	0.27	0.46	-3.264	.001
Conjunction use	0.91	1.06	0.00	0.00	-3.134	.002
Improper formatting	0.68	1.73	0.05	0.21	-2.124	.03
Misuse of Quantifiers	0.27	0.46	0.00	0.00	-2.449	.01
Misue of Modifiers	0.23	0.43	0.05	0.21	-1.633	.10
Wordy Sentences (Clarity)	0.86	1.21	2.18	1.89	-2.607	.01
Punctuation	0.32	0.48	1.73	2.05	-2.994	.003
Incorrect Phrasing	0.09	0.29	0.95	1.13	-2.834	.005
Modal verbs	0.05	0.21	0.23	0.53	-1.414	.16
Mixed dialects of English	0.05	0.21	0.05	0.21	.000	1.00

Table 12 shows the common writing errors observed among students in the control group, both before and after the intervention. It specifically presents the results of the Wilcoxon signed-rank test, a non-parametric test used because the data were not normally distributed, for comparing the errors in the pretest and posttest. In the table above, errors highlighted in light blue show significant changes during the post-intervention period, whereas those in light orange show no significant changes.

Before the intervention (Pretest), students in the experimental group demonstrated various writing errors. Notably, errors related to incorrect verb forms notably decreased from an average of 6.73 to 1.27 errors post-intervention, indicating enhanced proficiency in verb conjugation. Furthermore, they exhibited challenges with determiner usage, averaging 3.23 errors, which significantly decreased to 0.64 errors post-intervention. Similarly, issues with wrong or missing prepositions decreased substantially from an average of 3.45 errors to 0.82 errors. Students also showed improvement in comma usage within clauses, with errors decreasing from 1.71 to 0.36. Pronoun usage errors reduced from 1.77 to 0.36, and instances of confused words decreased from 1.71 to 0.18, reflecting a clearer grasp of vocabulary and grammar.

Additionally, errors associated with incorrect noun number significantly decreased from 3.57 to 0.64, indicating improved understanding of singular and plural forms. Despite this, students demonstrated notable progress in conjunction use, with errors decreasing from 0.91 to 0.00. Furthermore, misspelled words significantly decreased from 1.50 to 0.27 errors, suggesting enhanced spelling proficiency. However, other aspects such as wordy sentences, punctuations, modal verbs, incorrect phrasing, and mixed dialects of English did not exhibit significant changes post-intervention.

These findings demonstrate the positive impact of the intervention on reducing common writing errors among students in the experimental group. This is consistent with the results of Japos [40], who used Grammarly as a coaching tool and found significant reductions in various grammatical errors, including spelling, commonly confused words, incorrect or missing prepositions, verb form errors, punctuation, and pronoun usage. Both studies indicate that Grammarly was effective in addressing many common writing mistakes.

However, while the results align in many areas, they also reveal a divergence. Similar to Japos's [40]study, the current study also found that Grammarly did not help students significantly reduce errors in modal verb usage and wordy phrases. This suggests that while Grammarly is highly effective in certain areas of grammar correction, there are still limitations in its ability to address more nuanced language issues. Furthermore, there is a discrepancy regarding errors in subject-verb agreement and modifier misuse. In Japos's study, Grammarly helped reduce these types of errors, whereas this study did not observe similar improvements [41].

This suggests that the effectiveness of Grammarly may vary depending on the type of error or the specific writing context, indicating that while the tool is useful for many aspects of grammar correction, it might not be equally effective for all types of linguistic challenges. Future research could explore how Grammarly might be further optimized or supplemented with other teaching methods to better address these specific areas of difficulty [32].

4. CONCLUSION

The findings of this study highlight the positive impact of Grammarly as a computer-mediated instruction tool for teaching writing. The results indicate that Grammarly is an effective intervention, significantly enhancing students' writing performance and overall achievement in writing tasks. This suggests that technology-based tools like Grammarly can play a crucial role in improving students' writing skills and grammatical accuracy.

Additionally, Grammarly was particularly effective in reducing common writing errors in students' descriptive essays, demonstrating the value of focused, technology-driven interventions in addressing specific areas of writing and grammar. These tools provide personalized feedback that helps students identify and correct mistakes, ultimately improving their writing proficiency.

However, despite these positive outcomes, issues such as errors with modal verbs and wordy sentences showed limited improvement after the intervention. This indicates that certain grammatical aspects still require further attention. To address these challenges, future interventions could focus on incorporating more targeted instruction specifically for modal verbs and sentence clarity. A more comprehensive approach, such as pairing Grammarly with additional grammar-focused lessons or workshops, may help address these persistent issues.

In conclusion, while Grammarly has proven to be a valuable aid in improving students' writing and grammar, further efforts should focus on refining interventions to target specific areas like modal verbs and sentence clarity. Additionally, integrating complementary instructional strategies, such as explicit grammar lessons or peer reviews, could further enhance the effectiveness of writing instruction and ensure comprehensive improvement in students' writing skills.

Although, The findings of this research contribute valuable insights into the integration of technology in language instruction, particularly in enhancing writing skills through tools like Grammarly. The study underscores the potential of digital platforms to support autonomous learning and provide immediate, individualized feedback, which is often difficult to achieve in traditional classroom settings. However, the research also has certain limitations. The scope of the study may have been influenced by a limited sample size or demographic, which could affect the generalizability of the results to broader student populations. Additionally, the reliance on Grammarly as the sole intervention may overlook the influence of other factors, such as students' prior knowledge, motivation, or exposure to other instructional materials. Future studies could benefit from a more diverse participant base and consider longitudinal approaches to assess the sustained impact of such tools on students' writing development over time.

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