

## The Role of AI-based Writing Tools on L2 Writing Competency: Evidence from Palestinian EFL Learners

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Received: 5/1/2024  
Revised: 7/2/2024  
Accepted: 30/6/2024  
Published online: 1/5/2025

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Citation: Abuhussein, H. F., & Badah, A. (2025). The Role of AI-based Writing Tools on L2 Writing Competency: Evidence from Palestinian EFL Learners . *Dirasat: Human and Social Sciences*, 52(5), 6566.  
<https://doi.org/10.35516/hum.v52i5.6566>



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### Abstract

**Objectives:** Recent research has reached a consensus on the potential impact of artificial intelligence (AI) on learning English as a foreign language (EFL). This paper aims at investigating the effectiveness of utilizing an AI-based tool (Grammarly) on enhancing EFL learners' writing aspects. It also aims at exploring EFL learners' perspectives towards the use of AI-based writing tools.

**Methods:** A mixed-methods approach was employed, incorporating both quantitative and qualitative data collection. The researchers adopted a quasi-experimental design, using a pretest-posttest methodology to examine participants' writing before and after using the AI-based tool. The participating students consisted of (73) students from different specializations and disciplines. The experimental group consisted of (38) students, while the control group consisted of (35) students.

**Results:** The findings revealed that there were statistically significant differences in some respects and mechanics of writing in favor of the experimental group. Additionally, interviews with (8) students from the experimental group indicated positive attitudes toward the AI-based tool, though some drawbacks were noted.

**Conclusions:** Based on the findings, some conclusions and recommendations are suggested.

**Keywords:** AI-based writing tools, L2 writing, Grammarly, EFL learners, writing competency.

### دور أدوات الكتابة القائمة على الذكاء الاصطناعي في إتقان الكتابة باللغة الثانية: أدلة من متعلمي اللغة الإنجليزية كلغة أجنبية الفلسطينيين

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#### ملخص

الأهداف: تظهر الأبحاث الحديثة أن هناك إجماعاً على الأثر المحتمل الذي يمكن أن يضيفه الذكاء الاصطناعي على تعلم اللغة الإنجليزية كلغة أجنبية. وفي هذا الصدد، تهدف هذه الورقة إلى استكشاف فعالية استخدام أداة قائمة على الذكاء الاصطناعي (Grammarly) لتعزيز جوانب الكتابة لدى متعلمي اللغة الإنجليزية كلغة أجنبية. كما تهدف إلى استكشاف وجهات نظر متعلمي اللغة الإنجليزية كلغة أجنبية حول استخدام أدوات الكتابة القائمة على الذكاء الاصطناعي.

المنهجية: للإجابة على أسئلة الدراسة، تم استخدام المنهج الكمي النوعي لجمع البيانات. ولهذا الغرض، اعتمد الباحثون تصميمًا شبه تجريبي لاستكشاف جوانب الكتابة المختلفة للمشاركين قبل وبعد استخدام أداة الكتابة القائمة على الذكاء الاصطناعي باستخدام منهجية الاختبار القبلي والبعدي. وتكون المشاركون الطلاب من (73) طالباً من تخصصات ومجالات مختلفة. وتكونت المجموعة التجريبية من (38) طالباً، بينما تكونت المجموعة الضابطة من (35) طالباً.

النتائج: كشفت النتائج عن وجود فروق ذات دلالة إحصائية في بعض جوانب وآليات الكتابة لصالح المجموعة التجريبية. وعلاوة على ذلك، تم أيضاً إجراء المقابلات مع (8) طلاب من المجموعة التجريبية لمعرفة وجهات نظرهم حول التدخل الجديد. وأظهرت المقابلات اتجاهات إيجابية نحو أداة الكتابة القائمة على الذكاء الاصطناعي من وجهات نظر طلاب المجموعة التجريبية. كما كشفت عن بعض العيوب التي اكتشفها المجيبون أثناء استخدام أداة الكتابة القائمة على الذكاء الاصطناعي.

الخلاصة: وفقاً لذلك، تم اقتراح بعض الاستنتاجات والتوصيات. الكلمات الدالة: أدوات الكتابة القائمة على الذكاء الاصطناعي، Grammarly، كتابة اللغة الثانية، متعلمو اللغة الإنجليزية كلغة أجنبية، كفاءة الكتابة.

## 1. Introduction

English instruction has witnessed dramatic changes in the last few years. The emergence of technology affected EFL teaching and learning worldwide. Novel approaches to teaching English as a foreign language (EFL) that utilize various technological advancements have replaced traditional methods (Cancino and Panes, 2021). As long as the writing skills are mentioned the use of AI-based writing tools has become increasingly popular in recent years, offering assistance to writers in various languages, including English as a foreign language (EFL). In the context of Palestinian EFL undergraduate learners, the impact of such tools on writing competency has been an area of interest for educators due to technology spread. Such tools can help students improve their grammar, spelling, and vocabulary, as well as provide feedback on sentence structure, coherence, and cohesion. Furthermore, the use of AI-based writing tools can also help students develop their writing skills in other ways. For example, some tools offer suggestions for sentence variation, which can help students improve their sentence structure and develop a more varied writing style. Additionally, some tools offer features that allow students to collaborate with other writers, providing opportunities for peer review and feedback.

There has been a growing tendency in Palestine to examine the role of technology on education across disciplines. The Palestinian educators and researchers have extensively investigated the role of technology on the educational process from different aspects. Tarteer et.al (2021), for example, examined the experiences of using of technology-based application which is Google Classroom in learning English as a foreign language. Other researchers examined the efficiency of using social media platforms on L2 writing. On the other hand, Itmeizeh & Farrah (2021) investigated the perceptions of both EFL instructors and learners of online education at two Palestinian universities. Despite the increasing body of research handling the role of technology in language learning and teaching, the researchers of this paper have not founded any study that investigated the role of AI-based writing assistants on EFL learners withing the Palestinian context. Further, it could be argued that the existing literature on writing in English in the Palestinian context is inadequate and much efforts need to be exerted to have more insightful view in this skill. In this vein, Hammad (2016) argues that the challenges faced by EFL students in Palestinian educational settings in terms of writing are relatively restricted.

Writing skills constitute a major obstacle for EFL learning as it is a demanding skill. Palestinian EFL learners face unique challenges in acquiring writing skills due to limited exposure to the language. Specifically, grammatical competency constitutes a significant challenge in the writing process. Proper grammar is an essential aspect in any piece of writing (Badah et al, 2024). With the advancement of technology and the emergence of AI-based writing assistants, it is worth examining the potential role of such assistants in improving the writing learning experience. This study therefore tries to shed light of L2 writing skills from an AI-based perspective. This study will not only provide the first attempt to examine the effectiveness and potential of AI-based writing assistants for improving writing proficiency among Palestinian EFL undergraduate learners, but it is also aimed to investigate the writing challenges among this large segment of EFL learners. Additionally, it is hoped that the current study can contribute to the ongoing discussions on the integration of technology in language education and inform the development of effective strategies for incorporating AI-based writing assistants into L2 writing instruction.

To achieve the intended goals, the current study therefore addresses the following questions:

1. How effective are AI-based writing tools in improving specific aspects of writing proficiency, such as grammar, spelling, and sentence structure?
2. What are aspects of writing that are improved the most by using AI-based writing tools?
3. What are the perceptions of Palestinian EFL undergraduate learners towards the use of AI-based writing tools for improving their writing aspects and mechanics?

## 2. Literature Review

Writing is a language productive skill. It is one of the most important yet most challenging skills in learning English as a foreign language. According to Graham, Harris & Mason (2005), writing is a tough skill for foreign learners to master. Most EFL learners struggle to turn their ideas into written text (Wolfersberger, 2003). This has consequently resulted in

seeking new methods in teaching and learning writing in EFL. Integrating technology in teaching and learning English as a second or foreign language has become basic. In this context, Computer Assisted Language Learning (CALL) has been observed by many professional and educational experts as a principal in promoting teaching and learning language skills (Bibauw, Francois, & Desmet, 2015; Peeters and Ludwig, 2017), including the writing skill. CALL has contributed to providing a wide range of technological applications and software programs that assist learners in getting quick and direct feedback on their writing.

During 1970s, the earliest versions of artificial intelligence (AI) tools appeared that were used then to help writers to avoid grammar and spelling mistakes (Peterson, 1980). However, since then technology and AI tools have been spreading in a massive trend (Zeng & Warschauer, 2017). The integration of artificial intelligence (AI) tools has contributed to more sophisticated assistants that can help learners to overcome the challenges they encounter (Gayed et. al., 2022). Such AI tools include apps like Grammarly and Microsoft Editor which are designed to provide EFL learners with instant feedback on some particular writing mechanisms, for example, grammar, spelling, punctuation and word choice. These apps present digital tools that are used by EFL learners to turn their thoughts into written texts by composing in English, yet with less errors in terms of writing mechanisms (Shaheen, 2009).

According to Fitria (2018) unintentionally, students commit many mistakes while writing in punctuation, spelling, and grammar. Therefore, AI-based writing tools can play an important role in guiding learners to minimize their writing mistakes. Mammadova (2019) and Bouchoux (2019) asserted the importance of AI-based writing tools to check for any grammar and spelling errors, in addition to its easiness and flexibility. One of the many digital and software tools that are widely spread among EFL writers is *Grammarly*. Grammarly is an AI platform that serves various assistance to EFL writers in different aspects including grammar, spelling, punctuation, coherence, and wordiness. It also provides other writing services related to plagiarism checking and style of writing. In addition, this app gives EFL writers correct and better alternative suggestions to enhance their writing. According to O'Sullivan (2016) Grammarly website can contribute to enhancing learners' understanding of using different concepts and words appropriately. Fitria (2021) stated that Grammarly can provide excellent help in detecting any grammar, spelling or sentence structure mistakes. Thus, it can contribute to enhance learning the correct writing rules and aspects when mistakes are found and corrected (Mubarak & Syafi'i, 2020). It also helps L2 teachers detect any plagiarism in students' work and assess EFL learners' writing in many aspects including word choice, grammar, spelling and punctuation.

### **Similar Studies**

Several studies have investigated the impact of AI-based applications on L2 writing proficiency. Gayed et.al (2022) developed a web application named "AI KAKU" which uses artificial intelligence to support EFL students in overcoming cognitive obstacles they experience when composing written English text, with the aim of improving the quality of their writing. The participants were Japanese EFL learners. The findings demonstrated that this tool could be valuable for individuals learning the English language who require more structured support than what is typically provided by conventional word processing software. The role of the widely used Google Translate has become in the interface as an AI-based application. Examining the writing output for sixty-one Chile EFL learners, Cancino and Panes (2021) investigated the impact of Google Translate on L2 writing quality. To measure the differences, the participants were randomly assigned into three groups: GT without instruction, GT with instruction, and a group with no access to GT. The findings indicated that the groups who had the opportunity to use GT had better scores in terms of both syntactic complexity and accuracy. The landscape of writing assessment setting has also been under investigation by researchers. Shin et.al (2021), for instance, examined whether the use of writing resources during a writing test could impact the writing proficiency of Korean EFL learners. The findings demonstrated that the group that was provided with online writing resources performed better compared to the group that did not have access to such resources. Another study was conducted by Ghufroon and Rosyida (2018) entitled *The Role of Grammarly in Assessing English as a Foreign Language (EFL) Writing* which aimed at evaluating the impact that Grammarly had on minimizing students' errors in EFL writing. The outcomes revealed a

significant decrease in students' errors that was assessed by using the AI-writing tool in comparison with students' writing evaluated by EFL teachers. Similarly, Dewi (2019); Karyuatry (2018); Fadhilah (2018) and Nova (2018) carried out different studies that investigated the effectiveness of Grammarly on students' writing quality. The results showed positive change in students' writing quality in favor of using the AI-based tool.

### **3. Methodology**

#### ***Research Design***

The current study aimed at investigating the effectiveness of utilizing AI-based tools on enhancing EFL learners' writing skills. It targeted examining any significant differences in EFL students' writing skills. It also aimed at exploring EFL learners' perspectives towards the use of AI-based writing tool (Grammarly). To answer the study's questions, quantitative and qualitative methods of data collection were followed in a mixed approach (Creswell, 2014). To this end, the researchers adopted a quasi-experimental design to examine participants' writing skills before and after using AI-based writing tools. Besides, the current study examined students' attitudes in the experimental group toward using AI-based writing tool. Semi-structured interviews were conducted with (8) students from the experimental group to find out their perspectives toward the new intervention.

#### ***Participants***

This study was conducted in the second semester of the academic year 2022-2023. A total of (73) BZU students, who were studying English as a foreign language, level A2, were selected based on a random simple draw sample to participate in this experiment. As mentioned earlier, two mixed-gender groups were randomly selected from one of the researchers' classes at Birzeit University. The participants were first-year university students enrolled in the Unlock instructional program intermediate course (A2). They consisted of (73) students from different specializations and disciplines. The experimental group consisted of (38) students, and the control group consisted of (35) students. As for the qualitative data, obtained data were collected by exploring the attitudes of (8) students from the experimental group toward using an AI-based writing tool while writing their English language assignments. The students in both experimental and control groups had to do a pre/posttest to investigate EFL learners' writing mechanics before and after the use of the AI-based writing tool (Grammarly).

#### ***Data Collection***

Data were obtained quantitatively and qualitatively following a mixed approach. As for the quantitative data, they were obtained through the implementation of a pre/posttest before and after the treatment. The students in the experimental group were asked to use the Grammarly online application while writing their assignments. In contrast, the students in the control group had to write their assignment away from the assistance of the online application of Grammarly. After eight weeks of using these two methods, both groups had to do the writing posttest to calculate and compare statistically the data before and after the treatment. In terms of the qualitative data, semi-structured interviews were conducted with (8) students from the experimental group who were selected randomly. The writing pre-test and posttest tasks were designed by the researchers to measure students' writing sub-skills and mechanics in four different aspects including: (a) word choice, (b) grammar, (c) spelling, and (d) punctuation.

#### ***Research Procedure***

To achieve the study's purpose, the researchers designed an instructional writing strategy for teaching EFL students writing sub-skills and mechanics. First, the students in the experimental group were asked to download and install the Grammarly app on their PCs so that it could assist them while writing their assignments. A new writing assignment was assigned and posted via Moodle platform at the end of each educational unit (four units in the semester). The assignments reflected instructional themes in learners' educational material. Students were given enough time to write their assignments and submit them via Moodle platform. The writing process was assisted by the Grammarly app. Students benefited from the assistance and guidance provided automatically from Grammarly to check and correct any errors while writing. These errors included sub-skills and mechanics of writing like word choice, grammar, spelling and punctuation. On the other

hand, the control group had to write their writing assignments in the conventional way without using any AI-based writing tools. The control group writing assignments also had to be submitted through Moodle. Pre-test and posttest writing tasks were assigned for both groups before starting the intervention and after it was completed.

As for the study instrument for this study, it consisted of writing tasks that were designed to measure the participants' writing sub-skills and mechanics. The tasks were designed to assess the participants' ability to use grammatical structures, appropriate vocabulary, spelling and punctuation rules in their writing. The writing tasks were administered as pre/posttest to measure the participants' writing proficiency before and after the intervention. The pre-test and posttest established the baseline writing competency of the participants, while the posttest measured any changes in writing proficiency after the intervention.

**Table (1): The procedure adopted for this study.**

	<b>Experimental Group</b>	<b>Control Group</b>
Week 1	Training on Grammarly	Usual Class Instruction
Week 2	Pre-test writing task	Pre-test writing task
Week 3	Writing Assignment using Grammarly	Writing Assignment without using Grammarly
Week 4	Assignment Submission via Moodle platform	Assignment Submission via Moodle platform
Week 5	Writing Assignment using Grammarly	Writing Assignment without using Grammarly
Week 6	Assignment Submission via Moodle platform	Assignment Submission via Moodle platform
Week 7	Writing Assignment using Grammarly	Writing Assignment without using Grammarly
Week 8	Assignment Submission via Moodle platform	Assignment Submission via Moodle platform
Week 9	Post-test Writing task	Post-test Writing task

#### ***Validity and Reliability of the Pre/Post-test***

To set the validity of the writing pre/posttest, it was given to a jury of experts from the Department of Languages and Translation at Birzeit University who confirmed its face and content validity. To evaluate the internal consistency (construct validity) of students' performance on the test, the test was piloted to a sample of 19 students, who were excluded from the sample of the study. Then, Pearson Correlation Coefficient between the writing proficiency aspect score and the total score of the test. Results revealed that the Pearson Correlation Coefficient between the writing proficiency aspect score and the total test score is higher than (0.35). These results indicate an acceptable degree of internal consistency of the test (Brown, 1981).

To evaluate the reliability of the writing proficiency test, Cronbach alpha coefficients and test-retest approach with two weeks between them was used. Results revealed that the Cronbach Alpha Coefficients for the four writing proficiency aspects and overall were (.77, .79, .79, .81, .74, and .78). Furthermore, the test-retest coefficients and overall were (.76, .79, .79, .77, .74, and .82) .70. As such, the test is reliable (Cronbach, 1951).

#### ***Validity of the Interviews***

- The interviews' questions were validated by two educational experts.
- Pilot interviews were conducted with volunteering students to ensure questions clarity and detect any vagueness or ambiguity.

#### ***Reliability of the Interviews***

To ascertain the reliability of the semi-structured interviews, the following steps were done:

- The researcher ensured that the interviewees were fully willing to conduct the interviews voluntarily.
- The researcher made sure that the interviewees understood the questions asked.
- The interviews were conducted in English language and the responses were also reported in English.
- After the interviews were conducted, the researcher summarized the interviewees' responses, then the responses were approved by the interviewees.

#### 4. Results of the Study

This section presents the results of the current study, which the potential role of AI-based Writing Tools on L2 Writing Competency: Evidence from Palestinian EFL Learners. The findings are presented and tabulated according to the two questions as follows:

##### 4.1 Results of the First Research Question:

The first question is: "How effective are AI-based writing tools in improving specific aspects of writing proficiency, such as word choice, grammar, spelling, and punctuation? To answer this question, means and standard deviations of the pre-/post-test scores of the overall four specific aspects of writing proficiency, which are: (word choice, grammar, spelling, and punctuation, for the experimental and control groups were calculated, as shown in Table 2.

**Table 2: Means and Standard Deviations of the Overall Specific Aspects of Writing Proficiency**

Group	Pre-test		Post-test	
	*Mean	S.D	*Mean	S.D
Experimental	13.45	1.22	15.80	1.14
Control	13.56	1.13	14.03	1.09
<b>Total</b>	13.50	1.17	14.94	1.42

\*The total score is 20

Table 2 shows that the mean of the post-scores of the overall four specific aspects of the writing proficiency of the experimental group (Mean = 15.80) is higher than the mean post-scores of the control group (Mean = 14.03) in the four specific aspects of writing proficiency.

To investigate the statistically significant effect of the AI-based writing tools in improving specific overall aspects of writing proficiency after controlling the effect of the pre-test scores, a one-way analysis of covariance (ANCOVA) was performed, as shown in Table 3.

**Table 3: The effect of AI-based writing tools in improving specific aspects of writing proficiency**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Pre-test (Covariate)	57.848	1	57.848	94.351	.000	.574
Writing Method	56.004	1	56.004	91.345	.000	.566
Error	42.918	70	.613			
Total	16361.360	73				
Corrected Total	151.650	72				

Table 3 shows a statistically significant difference between the two groups in the overall four specific aspects of writing proficiency after controlling the effect of the pre-test scores in favor of the experimental group. The partial eta squared value of (.566) indicates that the writing method explained 56.6% of the variance in overall four aspects of writing proficiency.

Furthermore, the means, standard errors, and standard deviations of the two groups in the overall writing proficiency before and after controlling the overall pre-test scores. Table 4 illustrates the results.

**Table 4: Adjusted and Unadjusted Means of the Overall Three Types of Writing**

Group	Unadjusted Mean		Adjusted Mean	
	Mean	S.D.	Mean	Std. Error
Experimental	15.70	1.28	15.74	.127
Control	14.03	1.09	13.99	.132

As shown in Table 4, there are observed differences between the two groups in the overall four specific aspects of writing proficiency after controlling the differences in the pre-test scores. As such, using AI-based writing tools enhanced the overall four specific aspects of writing proficiency of the experimental group.

#### 4.2 Results of the Second Research Question

*What are aspects of writing that are improved the most by using the AI-based writing tools?*

To answer this question, means and standard deviations of pre-/post-test scores in the four specific aspects of writing proficiency were calculated, as shown in Figure 1 and Table 5.

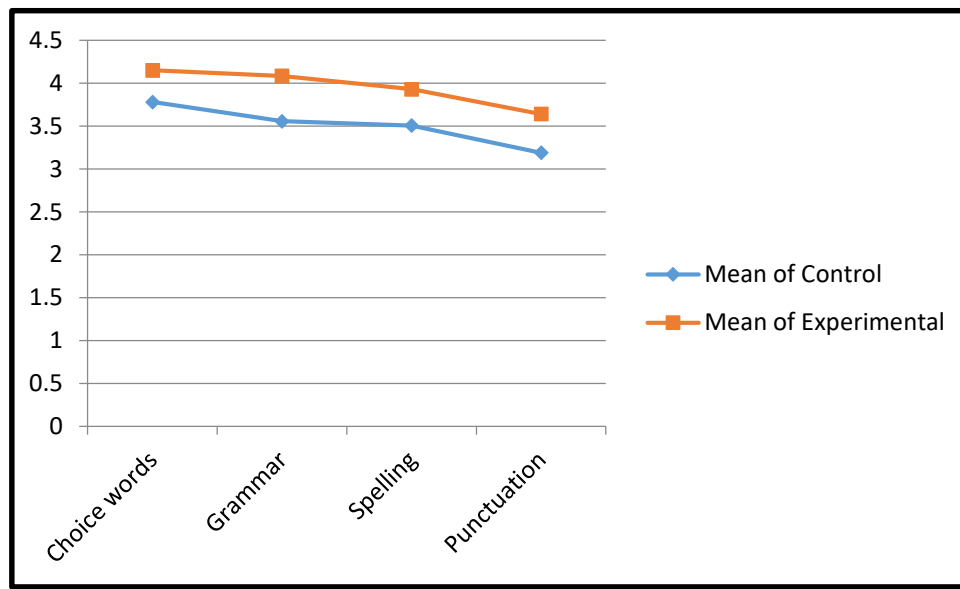


Figure 1: Means and Std of the four and overall specific aspects of writing proficiency.

*Alt Text: This figure shows the means of the four and overall specific aspects of writing proficiency for both the control and experimental groups. The figure shows that the post-test scores of the experimental groups are higher than the mean scores of the control group in the four specific aspects of writing proficiency.*

Table 5: Means and Standard Deviations of the Pre-Test and Post-Test Per-skill in the Four specific aspects of writing proficiency

Aspect of writing	Group	Maximum score	Pre-test		Post-test	
			Mean	S.D	Mean	S.D
Word Choice	Experimental	5	3.62	.46	4.15	.41
	Control		3.69	.44	3.78	.42
Grammar	Experimental	5	3.54	.49	4.08	.39
	Control		3.44	.47	3.56	.47
Spelling	Experimental	5	3.27	.48	3.93	.42
	Control		3.37	.44	3.51	.37
Punctuation	Experimental	5	2.99	.46	3.64	.49
	Control		3.06	.54	3.19	.52

Table 5 shows that the post-test scores of the experimental groups are higher than the mean scores of the control group in the four specific aspects of writing proficiency.

To investigate the effectiveness of the writing method (AI-based writing tool) on the linear combination of the four specific aspects of writing proficiency after controlling the effects of pre-test scores, a one-way multivariate analysis of covariance (one-way MANCOVA) using a multivariate test (Hotelling's Trace) was used, as shown in Table 6.

**Table 6: Results of Multivariate Test (Hotelling's Trace) for the Effect of the Writing Method on the four specific aspects of writing proficiency**

Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
The Writing Method	2.910	45.827	4.000	63.000	.000	.744

Table 6 shows that the main effect of the writing method was significant. This indicates that the student's performance in a linear combination of the four specific aspects of writing proficiency differs across the two groups. The partial eta square value of (.744) indicates that %74.4 of the variance in the linear combination of the four specific aspects of writing proficiency attributed to the writing method. Since the effect of the teaching method is significant, a follow-up univariate analysis (Follow-up ANCOVAs: Tests of between-subject effects) was conducted, as shown in Table 7.

**Table 7: The Effect of using AI-based writing tool on the four specific aspects of writing proficiency (Per-level) after Controlling the Effect of Pre-Test Scores**

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Covariate-1	Word Choice	8.497	1	8.497	152.929	.000	.699
Covariate-2	Grammar	7.527	1	7.527	132.967	.000	.668
Covariate-3	Spelling	6.942	1	6.942	133.257	.000	.669
Covariate-4	Punctuation	9.960	1	9.960	148.229	.000	.692
Using AI-based Writing Tool	Word Choice	3.079	1	3.079	55.425	.000	.456
	Grammar	3.660	1	3.660	64.659	.000	.495
	Spelling	4.030	1	4.030	77.353	.000	.540
	Punctuation	4.722	1	4.722	70.276	.000	.516
Error	Word Choice	3.667	66	.056			
	Grammar	3.736	66	.057			
	Spelling	3.438	66	.052			
	Punctuation	4.435	66	.067			
Corrected Total	Word Choice	14.713	71				
	Grammar	17.964	71				
	Spelling	14.350	71				
	Punctuation	21.499	71				

Table 6 shows that there were statistically significant differences between the two groups in the four specific aspects of writing proficiency in favor of the experimental group. The partial eta squared values of .456, .495, .540, and .516 indicated that the teaching method explained 45.6%, 49.5%, 54%, and 51.6% of the variance in word choice, spelling, grammar, and punctuation. As such, the highest effect size of the AI-based writing tools was at spelling, followed by the grammar, punctuation, and word choice.

Additionally, the means, standard errors, and standard deviations of the two groups in the four specific aspects of writing proficiency before and after controlling the pre-test scores were extracted, as shown in Table 8.

**Table 8: Adjusted and Unadjusted Means of the four specific aspects of writing proficiency**

Aspect of writing	Group	Unadjusted mean		Adjusted mean	
		Mean	S. D	Mean	S. E
Aspect of writing	Experimental	4.15	.41	4.15	.41
	Control	3.78	.42	3.78	.42
Word Choice	Experimental	4.08	.39	4.08	.39
	Control	3.56	.47	3.56	.47
Grammar	Experimental	3.93	.42	3.93	.42
	Control	3.51	.37	3.51	.37



Aspect of writing	Group	Unadjusted mean		Adjusted mean	
		Mean	S. D	Mean	S. E
Spelling	Experimental	3.64	.49	3.64	.49
	Control	3.19	.52	3.19	.52
Punctuation	Experimental	4.15	.41	4.15	.41
	Control	3.78	.42	3.78	.42

Table 8 shows that there are differences between the post-performance of the two groups on the four specific aspects of writing proficiency that remain after the differences in the pre-test scores are controlled. As such, using the AI-based Writing Tools enhanced students' performance in the four specific aspects of writing proficiency.

#### 4.3 Results of the Third Research Question:

*What are the perceptions of Palestinian EFL undergraduate learners towards the use of AI-based writing tools for improving their writing aspects and mechanics?*

In respect of the third question, semi-structured interviews were conducted with (8) students from the experimental group to investigate their perceptions towards the use of AI-based writing tools for improving writing skills. The obtained data from the interviews were analyzed according to the themes reflected by the interview questions stated below. The interviews have shown that the students had positives attitudes towards the AI-based writing tool (Grammarly). Three questions were asked to all the interviewees. These were:

- Describe your experience in using the AI-based writing tool (Grammarly)?
- What are the main advantages of using the AI-based writing tool (Grammarly)?
- Mention any difficulties you faced while using the AI-based writing tool (Grammarly)?

The interviewees responses revealed the positive attitudes they have toward the use of AI-based writing tool (Grammarly). The interviewed students stated that the AI-based writing tool (Grammarly) has had positive impacts on their writing competency. All the interviewees declared that the experience has gone in a wonderful way. One of the students said *"this was the first time I used an AI-based tool in writing. It was really good! I could learn many new things about my competence in writing. I also discovered very important rules about punctuation and spelling rules. It was a beneficial tool that I will keep using ahead!"*. Another student reflected on the experience in a different way, she said *"Grammarly was a new world that has led me to new horizons! I found out the importance of having correct grammatical structure of the sentence as it has a great impact on the meaning. I also enriched my linguistic stock as I discovered many new words that can give a more effective meaning to the sentence! This was an excellent experience!"*

The interviewees also reflected on the benefits of using the AI-based writing tool. One of the students responded to the second question by stating *"The AI-based writing tool (Grammarly) is a very nice application that helped me improve my writing on many sites that I did not pay attention to because of the speed, or even that I did not know before, such as the grammatical or spelling errors. In addition to this, what caught my attention and made this application special for me is that it also corrects punctuation marks and adds the forgotten ones, and for all this, the application is free!! Its use is super flexible and easy!"* Another student said that *"AI-based writing tool (Grammarly) has a long list of benefits. First, it has greatly improved my writing accuracy. It scans for everything, from simple spelling and punctuation errors to sentence structure, and appropriate choice of words, also it gives a diversity in writing style, and it is an easy application to follow and use."* One student added *"Using the AI-based writing tool is a useful and great application for improving your writing and avoiding spelling and grammar mistakes. One of the advantages of this tool is that it is easy to use and provides helpful suggestions for improving your writing, and expression errors in the texts you write. It can be used in various academic, professional, and personal work"*.

Finally, interviewees also stated that there have been a few drawbacks that they noticed while using the AI-based writing tool. The most common negative point was related to having to get an internet access to use the online AI-based tool. In addition, some students have pointed out that some advanced aspects of the online tool are not free. One student stated *"This AI-based has one negative in my opinion, you cannot use all of the benefits for free. Some of the advanced advantages*

*are charged.*” Such limitations were viewed unfavorably by some students since the internet access is a major challenge for them where they need to pay for it either at their universities or homes. One student expressed her concerns that relying on AI-based tools like Grammarly may have future negative impact on the deep understanding of writing aspects and mechanics, she said *“Despite the great help and benefits I found while using the AI-based writing tool of Grammarly, I am afraid that this reliance may result in lack of creativity and deep understanding of language and writing rules!”* Such reservation on the usage of AI-enhanced tools is relatively right as long as students rely on these tools without careful consideration of the corrective feedback. A final comment by one of the interviewees discloses her worries about the risks of losing her writing scripts when submitting them via the online app of Grammarly. She declared *“I was concerned while writing my original work online! I asked myself repeatedly ‘Is it secure to submit my work via an online app?’*

## 5. Discussion

The current study examines the effectiveness of AI-based writing tools are in improving specific aspects of writing proficiency, such as grammar, spelling, and sentence structure. It also aimed at finding out what aspects of writing were improved the most by using the AI-based writing tool. In addition, it also investigated the perceptions of Palestinian EFL undergraduate learners towards the use of AI-based writing tools for improving writing skills.

As shown previously, it can be concluded that there were statistically significant differences between the two groups in the overall four specific aspects of writing proficiency in favor of the experimental group. This result demonstrates the effectiveness of using the AI-based writing tool in enhancing EFL students’ writing proficiency in different aspects. EFL learners have benefited from the AI- automatic assistance provided by the AI-based writing tool. The features that Grammarly provides helped learners to spot the mistakes they made while writing. These included grammatical, spelling, punctuation, and word choice mistakes. It drew their attention repeatedly to correct their errors which has consequently resulted in a kind of an automatic and instant response to any stylistic issues they may have.

This result sounds promising in the field of technology-enhanced foreign language learning as more attention is being paid to the importance of technology integration in the field. The instant feedback provided by Grammarly on different writing aspects is valuable for EFL learners who do not have a direct connection with supervisors or native speakers for mistake correction. The instant corrections offered for such mistakes can help writers quickly discover these mistakes visually by highlighting those portions of text that need to be corrected. Therefore, this would enhance the user’s awareness as well as understanding of proper language usage in an interactive way. This result reflects that of Dizon & Gayed (2021) who found that when students use Grammarly in writing, they produce fewer grammatical errors and write with more lexical diversity. The reason for this is that automated feedback helped students decrease the number of treatable grammatical mistakes. Huang et al. (2020), also examined the effectiveness of using Grammarly on EFL writing among English-major sophomores. The results demonstrated that students’ writing abilities significantly improved after conducting the experimental treatment, suggesting the efficiency of using Grammarly in writing classes. Nugroho & Benecia (2022) confirmed such positive impact of Grammarly on the students’ writing performance. The study revealed that the automated writing corrective feedback had a more effective role in writing skills compared to that received by lecturers.

Concerning the writing aspects that were improved the most through using Grammarly, the results demonstrated that spelling and grammar were the most prominent areas of enhancement. It could be argued that these two writing areas are considered to be the most common errors the writers commit irrespective of their proficiency level. In a study conducted by Bailey & Lee (2020) examining errors frequency and types, it was found that spelling errors were the second most frequently occurring error type category recognized by Grammarly. Unsurprisingly, the current study revealed that the experimental group showed better performance in the post-test particularly in spelling and grammar aspects. When compared with other writing aspects such as word choice, spelling and grammar aspects are more rule-based. In other words, words are composed of specific letters and grammar compromises established rules. Such features make the acquisition process of spelling and grammar easier when compared with other writing aspects such as word choice. When it comes to word choice, ideas can be expressed differently using different vocabularies and structures. Additionally, word

choice is based on the tone and context and varies according to the cultures and communication goals. Grammarly, however, may not align with these nuances, making it challenging to offer alternatives in this writing area. Accordingly, Grammarly users would find greater advantage in the spelling and grammar suggestions compared with other writing aspects.

Although the existing literature has highlighted the positive impact that Grammarly plays in enhancing L2 learners' writing, it is important to consider that such effect may vary in other contexts. Fan (2023), for example, examined the role of automated feedback provided by Grammarly on EFL students. The results, however, showed that EFL students did not significantly benefit from this feedback in terms of the syntactic and lexical structures. The author attributed such finding to many reasons including students' unfamiliarity with Grammarly as well as their lower proficiency levels.

Concerning the third question which investigated students' perspectives and attitudes towards using the AI-based writing tool (Grammarly). It was clear that the students of the experimental group had positive attitudes towards their experience with using the AI-based writing tool. This can be attributed to several reasons. First, the version of Grammarly was the students used was available for free, thus, students didn't have to pay any extra money to make use of the wide range of benefits provided by the website. Additionally, the website provides diverse assistance to writers in an easy and flexible way. Once the program is installed, it appears instantly on the lower part of the screen allowing users to know the quality of their writing and what mistakes their work includes. Then, they can fix or change any errors and correct the underlined mistakes by just choosing the provided right alternative.

Students' favorable attitudes imputed to the built-in system of grammar, spelling, punctuation, and word choice that helps students feel confident and at ease while writing. The participating students are intermediate A2 level, which means they need more assistance in language skills. They need more assistance with writing accurately and correctly. Having an AI-based tool, which is based on a sophisticated AI system, a system that responds speedily by checking students' writing and providing instant and precise feedback with alternative appropriate options, has contributed greatly to enhancing students' self-confidence in using the language and practicing one of the most challenging language skills that is writing. Again, these interpretations go in line with previous studies that proved many significant benefits that can be gained from using AI-based writing tools like *Grammarly* (Dewi, 2019); (Karyuatry, 2018); (Fadhilah, 2018) and (Nova, 2018).

Nevertheless, some drawbacks were detected in students' responses. Such negative points could be attributed to the AI upgrade system that requires users to pay money so that they can enjoy premium and advanced services. In addition to the need to be connected to be able to access the website, which may not be available for all users in the Palestinian Territories. The internet access should be pre-paid, and some students can not afford the cost of internet lines, so they depend on the internet provided for free at their university campus. Such a result is consistent with what has been found in Fan (2023)'s study, where EFL students complained about the fees they need to pay for advanced feedback offered by Grammarly. Moreover, some students expressed their concerns about the over reliance on the AI-based writing tool and its negative influence on restricting their creativity and readiness to depend on self-learning. The easy and instant feedback that is offered by AI-based writing tools can be a source of concern and apprehension of lack of search and self-dependence among young learners, in addition to its impact on obtaining shallow and facile learning. Finally, the long debate on security issues while using online apps and websites has been raised by students who used the Grammarly website over the academic semester. Many users and students still have concerns about the chances of losing their original work when submitting it online. In this vein, *Grammarly* is an AI-based writing tool that is being used and highly recommended by millions of people around the world. However, most people still doubt the security of using online websites. They suspect their ability to keep their writings and original thoughts safe from hacking and online theft.

## **6. Conclusion**

### **6.1. Conclusions**

The current study contributes to the research on the impact of AI on L2 writing proficiency. The findings revealed that AI-enhanced tools have a potential role in improving writing skills of EFL learners in many aspects, particularly spelling and grammar. The study has laid the foundation for more research to be conducted in similar contexts so that the existing

gap that was created with the integration of technology in language learning could be filled.

## 6.2. Limitations

This study is limited to the following considerations. First, it was conducted throughout the second academic semester 2022/ 2023 at one of the Palestinian Universities. Therefore, a longer duration has the potential of different results. Another consideration is that it was restricted to investigate the impact that AI-based writing tool ‘Grammarly’ may have on EFL learners’ writing aspects limited to word choice, grammar, spelling and punctuation. Hence, it did not cover other aspects and competencies like coherence, cohesion, or style. Future research, for example, may address the impact of Grammarly on other L2 writing aspects for more insightful considerations. Finally, the AI-enhanced tools that was limited to only one application which is Grammarly. Other studies might examine the effect of other AI-enhanced tools like Quillbot so that a comparison could be drawn.

## 6.3. Pedagogical implications

Despite the above limitations, the current study could offer some implications. First, the usage of AI-based writing tools such as Grammarly is highly advised for EFL teachers and learners when writing in the second language. The instant and precise feedback provided by the app contributed to improving EFL learners’ writing quality as it was shown in the posttest results. Second, FL teachers are highly recommended to integrate AI-based tools in teaching the language, but with well-structured and organized methods and activities so that they can amplify the positive outcomes and minimize any potential drawbacks. In this vein, policy makers and curriculum designers need to consider integrating such tools into curricula so that L2 writing proficiency is enhanced. Practically, they need to review research findings to identify technological tools have been founded useful in improving L2 writing skills. This can include considering tools like, writing applications, grammar checkers, and language learning software. Most importantly, policymakers must provide educators with development opportunities to familiarize themselves with AI-enhanced tools. This can be implemented through delivering workshops and trainings to the target educators. Finally, policymakers need to ensure that schools have good infrastructure and resources that support the usage of technology with the classrooms. This can mainly include offering consistent internet access with good speed at the university campus so that students can use technological tools efficiently.

## Ethical Clearance

No ethical clearance was required from the institution (Birzeit University).

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