



## Examining the impact of artificial intelligence (AI) tools on Saudi Arabian ESL students' writing skills

Samah Abduljawad<sup>✉1</sup>

<sup>1</sup>Royal Commission for Yanbu Colleges and Institutes, Saudi Arabia

✉E-mail: [samahabduljawad@gmail.com](mailto:samahabduljawad@gmail.com) (corresponding author)

### ABSTRACT

The present study aims to determine the impact of the Artificial Intelligence (AI) tool on ESL students' writing skills in Saudi Arabia. A mixed-method approach was designed in this study. A t-test approach was used for the quantitative research. The mean of the pre-test was 51.8, while the mean of the post-test was 79.46. The significant difference in the scores highlighted the positive influential effect of the AI tools on the ESL students' writing skills. A focus group interview of five students was conducted for the qualitative analysis. The focus group participants discussed the following codes: AI's impact on content organization, grammar, and vocabulary, as well as the strengths and weaknesses of the AI tools. The interview highlighted that AI tools benefited students' learning by providing chances in writing patterns, their improvement, and their structures to show the flow of coherent patterns. There were also disparities in AI tool use, which included the possibility of coming up with content not being referred to as human-like, failure to recognize creativity, and capacity to cheat. This research can help future researchers and instructors explore how to use AI tools for writing effectively, enhancing the strengths and diminishing the possible weaknesses.

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## Introduction

In the ever-evolving realm of foreign language learning and teaching, integrating artificial intelligence (AI) is one of the crucial trends that has created the basis for deep and pragmatic improvements in pedagogical approaches and strategies (Ali, 2023). The advent of contemporary digital technologies, including the metaverse, AI agents, and ambient intelligence, has initiated a novel epoch characterized by profound inquiries (Aljabr, 2023). One example of this change is demonstrated by the rise of ChatGPT in 2023. This technology may not always be precise, but it can even outperform humans in many possible spheres, disrupting the science and academic worlds (Allehyani & Algamdi, 2023; Zhao, 2023). This AI-

platform may threaten academic honesty and the writing department (Firaina & Sulisworo, 2023).

Other AI technologies that have enhanced writing skills include Grammarly and Quillbot. QuillBot has several useful tools: a summary, paraphrase, citation, grammar checker, and plagiarism checker. Additionally, QuillBot provides a company application where AI-supported generators can write, reference, and perform many tasks (Nurmayanti & Suryadi, 2023). On the other hand, Grammarly employs its resources for synchronising overall writing aid; this includes checking grammar, modes, tones and so on. It also offers other features like plagiarism check and citation of the paper to be made (Daroina et al., 2022). Grammarly primarily offers electronic feedback on the mechanical aspects and styles of student writing, including, but not limited to, sentence structure, punctuation, capitalisation, word selection, variation, and diction (Boughaba et al., 2022).

Ginting and Fithriani (2022) believe that QuillBot is an AI application that assists students in paraphrasing the text and overcoming the challenges associated with the task. Thus, it acts as a formative assessment tool. QuillBot provides teachers and students with opportunities for professional development through individualised learning experiences. The AI tool reduces the likelihood of human error and teaches many skills (Ginting & Fithriani, 2022). Through QuillBot, teachers can get professional development. This way, every student can have their computer and receive one-on-one care in the classroom. This methodology has notably elevated the students' aptitudes for paraphrasing and bolstered their dispositions towards employing QuillBot (Prentice & Kinden, 2018).

The advances in AI have significantly impacted society due to its exponential growth in recent years. The advanced application of AI technology has also influenced the revolution of learning English as a Second Language (ESL). It has been shown that the use of AI enhances aspects like the linguistic proficiency of the students to a great extent (Dahri et al., 2024). From the literature, Zia et al. (2019) stated that formative feedback plays a crucial role in enhancing students' writing skills in the context of ESL. It often includes methods for self-assessment as well as peer assessment. It gives directions on content, organization, vocabulary, language, and writing to focus on serving students' needs. Nevertheless, the approach does not scale well to large classrooms in developing and underdeveloped nations, making it time-consuming and difficult to implement (Zia et al., 2019).

Computer-mediated feedback is a potential solution for providing feedback in higher education institutions with an internet connection and portable computers (Cowling et al., 2023). Learners can obtain substantial writing pieces from AI and customize the textual complexity to their level, translate texts, and provide learners with guided writing (Baidoo-Anu & Ansah, 2023). However, adopting formative feedback within large classrooms is challenging (Baidoo-Anu & Ansah, 2023).

AI automated input, used in various countries, is one trend that will stand out. Sophisticated AI writing tools like Grammarly and GPT-4 are based on a big language model for generating meaningful samples of written material, sorting texts in terms of their difficulty level, commenting on the structure of the texts, and translating text material; also, for writing prompts and tutorials (Mahapatra, 2024). These software features help students advance their independence, and they wanted this response by providing helpful assistance in production, categorizing, focusing, and selecting words (Rad et al., 2023). Their usage can

aid in capacity and confidence while writing, like a teacher would do while teaching a class (Tai et al., 2023).

This research aims to evaluate the impact of implementing AI tools on the academic writing capabilities of Saudi Arabian ESL students. This paper finds out, in detail, if using AI as an instrumental formative feedback tool affects ESL learners' writing proficiency in Saudi Arabia. There is much research to prove that AI enhances ESL students' academic writing skills globally (Aladini, 2023; Fitria, 2021; Nazari et al., 2021). Still, more in-depth studies should be produced to target Saudi Arabian ESL students specifically. The research fills the gap by focusing on the particular situations of ESL learners from Saudi Arabia and presenting how AI tools could assist them in enhancing their writing skills.

The research is significant as it proves, through a small real-world sample size, how AI tools can help ESL students in Saudi Arabia enhance their academic writing skills. The research can help improve understanding of the practical issues associated with AI tools as a feedback tool in ESL classes. It also considered the benefits AI tools might bring to ESL students in Saudi Arabia.

The research adopted a mixed methods approach, using a t-test to compare the difference between English writing using the traditional approach and English writing after gaining feedback from AI tools, including ChatGPT, Grammarly, and QuillBot. Learning about the influence of AI tools on ESL learners' academic writing abilities could help refine the creation of tailored practices and techniques. Furthermore, this research can provide educators and policymakers with information indicating the feasibility and effectiveness of incorporating AI tools in ESL teaching in Saudi Arabia. The outcome would be improved student outcomes and teaching.

## **Method**

### ***Research design***

This research is based on a mixed methodology approach. A mixed methodology approach helps the researcher perform qualitative and quantitative analyses within the same research. In this research, the quantitative approach helps determine the impact of AI tools, including ChatGPT, Grammarly, and QuillBot, on ESL students' learning. Furthermore, the qualitative approach helps provide further validity by gaining students' insights regarding the effectiveness of AI tools in their English writing ability (Ali et al., 2023).

### ***Research setting and participants***

One of Saudi Arabia's universities has been targeted for data collection. First-year first-semester students were chosen randomly for the data collection because they had yet to use AI tools. The overall strength of first-year first-semester students was 130. They all were approached for performing the quantitative analysis. For the focus group interview, five students were randomly selected from 130 students.

All the students were educated regarding the nature of participation in the experiment. They were asked to fill out voluntary forms to ensure their written consent. They were also

informed that they could withdraw from the research. These students are between 18 and 20 years old and have already studied ESL in their schools.

A pre-and post-test was conducted on the students to evaluate the impact of the AI tools on enhancing their writing ability. In the pre-test, students were not allowed to use any AI tools. The students traditionally solved the test. After that, these students were given one month of training on effectively using AI tools to enhance their English writing ability. After one month, a post-test was conducted. In the post-test, these students were allowed to use AI tools, including Grammarly, ChatGPT, and QuillBot. Both tests assess the three ESL elements: organization, grammar, and vocabulary.

### ***Data collection***

In this research, the data was collected through the pre-and post-test assessments. The results of the pre-test scores were compared with those of the post-test scores. The tasks in the test focus on analyzing students' grammar, vocabulary, and organization, as attached in Appendix No. 1. A specific rubric was designed with the help of the researchers and the subject teachers that consisted of the marking criteria of each test. A group of panels composed of five teachers checked the test with the help of the rubric criteria. For the qualitative analysis, a focus group interview was conducted physically. The focus group discussion was based on analyzing the impact of the AI tools on the student's ESL performance.

### ***Data analysis***

The research questions were addressed by triangulating the quantitative and qualitative data, which was examined independently. The quantitative data was analyzed through statistical analysis, including t-tests on SPSS. The aim was to identify the mean differences in pre- and post-scores and determine the impact of AI tools on enhancing English. For the qualitative interview, the transcript of the focus group interview was coded. The methodology was deemed appropriate due to the inductive nature of the coding process, which was concurrently guided by the themes that surfaced from the literature review and a limited number of established patterns.

## **Results and discussion**

### ***Paired samples statistics and t-test of before and after curriculum implementation***

Paired sample statistics and one sample test have been used to compare the differences between the pre-test and post-test. The Paired Samples "T" Test looks at the differences between the means of two values taken from the same person, thing, or similar units. The descriptive statistics for the test scores of 130 first-semester first-year ESL students are presented in Table 2. The analysis compares the students' performance before and after integrating AI tools. Before the implementation of AI, the average score on the assessment was 51.81, accompanied by a standard deviation of 7.72 and a mean standard error of 0.68. This suggests the students' ratings exhibited moderate variability before implementing the AI tools.

The average test score increased substantially to 79.95 after integrating AI technologies. A decrease in standard deviation to 6.07 was accompanied by a mean standard error of 0.53. Overall, student performance has increased, and performance across the group has become more stable. This is shown by a drop in both standard deviation and standard error, along with an increase in mean scores. The utilization of AI tools, including Grammarly, QuillBot, and ChatGPT, evidently enhanced the English writing proficiency of the students, as evidenced by the substantial rise in mean scores in Table 1.

**Table 1***Paired Samples Statistics*

		Mean	N	Std. deviation	Std. error mean
Pair 1	Test before AI implementation	51.8077	130	7.72201	.67726
	Test after AI implementation	79.9462	130	6.06721	.53213

**Table 2***One-Sample Test*

	Test value = 0					
	t	df	Sig. (2-tailed)	Mean difference	95% Confidence interval of the difference	
					Lower	Upper
Test before AI implementation	76.495	129	.000	51.80769	50.4677	53.1477
Test after AI implementation	150.238	129	.000	79.94615	78.8933	80.9990

Table 2 reveals that the significance of the test scores before and after integrating AI tools are evaluated using one and zero values obtained from the one-sample t-test. The t-value for the test conducted before the implementation of AI is 76.495, with 129 degrees of freedom (df). The two-tailed significance value is 0.000, which signifies that the result is statistically significant. The mean difference from the test result is 51.81, and the 95% confidence interval ranges from 50.47 to 53.15. These numbers show that the student's average score before using AI tools was better than 0.

The t-value for the test after AI was used is 150.238 with 129 degrees of freedom, and the significance (2-tailed) value is 000, again confirming that the result was statistically significant. With a 95% confidence level, the mean and test values differ between 78.89 and 81.00. The result indicates that the pupils' average score is considerably greater than zero after utilizing AI tools, with a highly accurate estimate backed up by a narrow confidence interval. Thus, overall, the table shows substantial improvement in the results after implementing the AI tools since the post-test value t value (150.238) and the mean difference (97.946) are greater than the pre-test.

The first research question of this mixed-methods intervention study examined how AI tools, as an initial feedback tool, affected the academic writing skills of first-year ESL

students. It also gathered students' opinions on how AI tools changed their writing, which was covered through the second research question. A quasi-experimental approach was used to determine the impact of AI tools on students' writing skills. While conducting the insight, a focus group interview was held.

According to the quantitative analyses, the results highlighted that the students had significantly higher scores in writing after integrating AI tools. The average score before the test was 51.81, and the average score after the test was 79.95, showing a big improvement in writing skills after AI tool implementations. Several empirical investigations have also revealed that language learning interventions based on artificial intelligence can aid English language learners in improving diverse aspects of their written work. Multiple studies suggest that implementing AI increases students' engagement in learning and facilitates greater efficiency in writing assignments. These researches prove that when ESL students are encouraged to use AI tools instead of employing them in writing language, they have more positivism about it (Mahapatra, 2024; Malik et al., 2023; Song & Song, 2023). Also, the study by Parra and Calero (2019) investigated the effectiveness of free AI tools on the writing performances of English teacher training program students and their writing competence levels. Parra and Calero S (2019) observed positive effects on students' writing improvement. The present work also revealed better writing performance by students after using AI tools (Parra & Calero, 2019).

### ***Thematic analysis***

The focus group interview was conducted in person at the college library. Five students were randomly selected for the interview. During the interview, the students were asked different questions. These questions were divided into various themes: organization, grammar, and vocabulary of English writing, as well as the strengths and weaknesses of AI tools. The main purpose of conducting this thematic interview is to gain students' understanding of how AI tools impact their English writing performances.

### ***Sentence organization***

To assess the impact of the improvement of the AI tools in enhancing the performance of the English content organization, the following questions have been asked from the focus group: "How do AI tools help you in organizing your writing content?"

Students in focus group interviews have appreciated that AI tools, including Grammarly, QuillBot, and ChatGPT, have improved their writing organization. During the interview, one of the students mentioned that "Using Grammarly has improved my writing structure and flow. It helps me identify areas where I can easily organize my ideas." Similarly, another student mentioned that the "QuillBot paraphrase tool helps me regenerate sentences so that an article could have consistency and flow. The tool suggests a better form of the words that address the coherence and logic problems in the author's argument."

One of the participants also mentioned the crucial role in organizing the content. Students said, "When I asked the ChatGPT to write an essay on Education in the 21st Century, I provided them with the basic details, including the topic sentence, details and the concluding sentences. Then, I asked the ChatGPT to provide feedback regarding whether my

topic sentence, details, and concluding remarks were appropriate. The Chat GPT has provided me with all my errors. With the help of that feedback, I will organize my essay again.

### *Grammar mistakes recognition*

To assess the impact of the improvement of the AI tools in enhancing the performance of the English content organization, the following questions have been asked from the focus group: "How has using the AI tool helped you reduce grammatical errors?"

All the focus group interview students agreed that the AI tools acted as proofreaders, determining their errors and making the content grammatically error-free. A student in a focus group interview mentioned, "ChatGPT has also been significantly helpful in this aspect of writing as a tool that helps with how well one controls their spelling. It performs as an online copy editor, pointing out mistakes people fail to notice and providing solutions. ChatGPT's ability to provide feedback immediately helps enhance my writing and ensures correct grammar."

One of the students appreciated Grammarly for improving grammar errors. He said, "Grammarly has proven to be a vital instrument in my endeavors to detect and rectify grammar errors. The system examines my writing and indicates deficiencies, providing concise explanations and illustrative examples to aid comprehension of the mistakes." Moreover, another student said, "AI writing tools have helped me think of new ways to organize my work when I use them to revise and improve my work. ChatGPT and QuillBot helped me check the information given, the work's accuracy, and its respect for higher-quality language rules. As a result, I could produce higher-quality writing in less time than I had initially thought. This is because these writing tools can spot mistakes and suggest how to improve them."

### *Vocabulary enhancement*

AI tools have also played a critical role in improving the vocabulary of English writing content. The following question was asked of the students to determine the role of the AI tools in enhancing the vocabulary: "How do you think AI tools have changed how you choose words and use them in your writing?"

One of the students responded, "Ever since I got a chance to use tools such as Grammarly and QuillBot for drafting my work, I have greatly transformed how I select words to use in my copy. These tools have assisted me in expressing my ideas clearly and enriching my vocabulary as the tools recommend other words to use and words similar to the ones I type. I now consciously try to use words and work more effectively to write in an advanced and easily understandable way." Another student also mentioned, "AI tools have changed how I write by giving me immediate feedback on the words I use. For example, Grammarly's contextual vocabulary improvement tool tells me to swap out everyday words for stronger ones, which makes my work sound smarter. I now feel more comfortable trying new words and writing interesting material."

Furthermore, one of the focus group participants mentioned, "AI tools have greatly changed how I choose and use words in my work. These tools have helped me improve my language skills and the depth of my writing by providing synonyms, making sentence

patterns better, and giving me more words to use. I now think about each word I use, hoping to make my writing more interesting and powerful.”

### *Strength of AI tools*

Students were also asked about the benefits of using AI tools for writing. They were asked: “What are the strengths of the AI tool for improving their English writing skills?”

One of the students mentioned, “One strength of AI technologies is that they offer contextual suggestions on what words to change. This has assisted me in enhancing my writing by offering me better options for proper words and phrases. These tools have enabled me to write more engaging content, enhancing my language understanding.” Another student agreed with the last student’s point of view and mentioned, “AI writing tools are particularly helpful in providing me with custom recommendations to help me improve the argumentation and coherence of my writing. Thus, these tools assist me in providing essential data regarding the purpose of my writing and the setting, as well as advising on all the aspects of the choice of sentences, their readability, and even overall style, which contributes to the persuasive intent of the further writing.”

Furthermore, one of the students mentioned, “AI tools are very effective in offering recommendations and suggestions about improving my writing and making it less confusing and more coherent. These tools let me know some basics about writing, particularly where my writing fits in the scope of purpose and specific setting. Therefore, they enable me to write better and impress readers effectively.

### *Weakness of AI tools*

In the focus group interview, the weaknesses of AI tools have also been discussed. The following question was asked of the students: “According to you, what are a weakness of AI tools?”

One of the focus group students replied, “Despite the impressive progression made by the AI instruments in my work, I noticed that they sometimes could not grasp the context and outlook that a live editor can offer me. These tools might not always deliver the work’s content or the intended tone because they rely on algorithms to detect errors during correction. Now, I have learned that even if an AI creates the feedback, I still have to review it properly to ensure that it aligns with the goals I have set for my writing.” Another student agreed that AI tools sometimes provide wrong suggestions. He added, “One weakness associated with using these AI writing tools is that they might not fully comprehend or appreciate the creative aspects of writing. From my experience as a student, I have observed that some of these resources focus more on several aspects of writing, such as clarity and grammar than the creativity and flair of the writing. While I know that I can benefit from using AI to enhance the quality of my writing, I am arguing that overdependence on AI would only restrict my creativity and individuality in expressing myself through writing.”

Furthermore, one student highlighted AI’s weaknesses. He added, “AI writing tools may encourage cheating and compromise academic paper writing, one of their biggest weaknesses. Such tools can teach syntax and grammar, but I fear some students may use them to write essays and articles and outsource the writing to AI. Its overuse reduces critical

thinking, research, and self-expression. As a student, I can only say that while programming using AI technologies, one must be extremely cautious and have a strong ethical foundation.”

The open interview with a focus group was useful in understanding AI tools' role in students' writing practices. Specific AI tools that students used to improve writing organisation, grammar, and vocabulary preferences were appreciated. They noted that AI tools like Grammarly, Quillbot, and ChatGPT assisted in constructing flow and structure, as well as steady paraphrasing and word choice recommendations. AI tools have found appreciation in their ability to serve as proofreading assistants, pointing out mistakes and suggesting corrections for writing to be grammatically correct. Similarly, previous research on the subject has pointed to the generally positive approach that English language learners have towards integrating AI tools into writing, which is in line with the findings of this study. Some studies have shown that AI tools such as those developed by Nazari et al. (2021), Su et al. (2023), and Yan (2023) have benefits in improving learners' writing proficiencies and their interest (Escalante et al., 2023; Malik et al., 2023; Song & Song, 2023). Moreover, Grammarly application is a digital utility utilised to verify punctuation, grammar, and spelling throughout the writing process. Grammarly, an application utilised to check for errors as they occur, is widely regarded as the most popular tool for correcting more than 150 error styles, including spelling, hitting, phrase patterns, and sentence form (Gilroy-Ware, 2020).

The students categorized the strength of AI tools as the ability to provide contextual suggestions, maintain coherence and strengthen arguments, and provide recommendations for modifying its purpose, comprehensibility, and approach to writing. Furthermore, Barrot considers AI tools to be intelligent writing assisting tools that prompt immediate, individualised feedback to learners while they advance through different essay creation stages. According to the theory, the real power of this bot is to customise its input to students' needs and help them build their writing skills (Barrot, 2023). AI tool's benefits on formative assessment, including dialogue creation, student engagement, and student learning outcomes improvement within academic writing, lie within these theoretical frameworks. However, the weakness of AI tools was also discussed. The major argument that was put forward in the discussion was that AI tools were limitations in interpreting the tone and the context and over-dependency, which may, in turn, hinder creativity or uniqueness in writing. The advancement of AI tools makes today's students rely on them to help them with writing. According to several past types of research, this tool stands out from the other AI tools since it emphasises the needs of the students and admittedly goes out of its way to offer students more tailor-made assistance (Hawanti & Zubaydulloevna, 2023; Taecharungroj, 2023; Vargas-Murillo et al., 2023).

Malik et al. (2023) also mentioned the strength of AI tools. They noted that AI writing tools can provide context-suggested writing, facilitate better argument structuring, and enhance textualization. It highlights how proper application of the tools driven by artificial intelligence can greatly boost writing performance and efficiency. The papers also highlight the feasibility and effectiveness of AI's ability to generate language in various styles, accurate styles, and tones (Malik et al., 2023). On the other hand, past papers have also analyzed the weaknesses of AI tools. These researches explain how AI writing tools may face certain issues when interpreting tone and context, reaching wrong conclusions, and limiting understanding of written language complexities. Also, the papers discourage the over-reliance on AI tools in the development of overall writing skills as it limits the creativity process of the writers. The

following statement aligns with the students' discussions surrounding the drawbacks and implications of relying heavily on AI tools (Nelson et al., 2020; Noguerol et al., 2019; Rex et al., 2022).

## Conclusion

This research has played a vital role in highlighting the crucial role of Artificial Intelligence (AI) in enhancing students' writing skills. A mixed-method approach has been utilized for this. Quantitative analysis indicated that students' formative feedback has significantly improved after using AI tools, including Grammarly, QuillBot, and Chat GPT, instead of the traditional feedback approach. The qualitative research helped gain insights from the students regarding how these AI tools helped them improve their overall organization of the content, grammar, and vocabulary. Utilizing these AI tools enhances the students' writing in terms of consistency, content progression, and overall organization. These AI tools empower students to generate content that exhibits consistency in both logic and structure. The primary contribution of this researcher is demonstrating the beneficial impact of AI tools on enhancing students' writing abilities. This research can assist educators and students in developing efficacious strategies that guarantee the appropriate application of AI tools to enhance writing.

There are numerous implications for the future of academia and educational practice related to the conclusions made in this research. It highlights the applicability of AI tools like Grammarly and QuillBot or even enhanced Chat GPT to improve the writing skills of ESL students. It shows the importance of integrating technology into teaching and learning languages. Further studies may explore the long-term impact of AI tool use on writing abilities and identify the optimal combination of the tools for various aspects of writing. According to the study's findings, AI applications must be incorporated into language learning programs to help learners improve their writing organization, grammar, and vocabulary within a learning context. It is suggested that Teachers can apply AI solutions to provide individual feedback and enhance students' self-reading skills. This, in turn, can foster effective and engaging writing practices in ESL classrooms. In addition, it would be advisable for professional development programs designed for teachers to focus on using AI tools to improve the writing process and enhance students' learning outcomes.

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## Appendix

### 1) Organization

Task 1 (Essay Writing): Students have been provided with two essay topics to assess their writing structure ability.

Task 2 (Paragraph Coherences): Students were given a jumbled set of sentences and asked to arrange them into a coherent paragraph.

Task 3 (Outline Creation): Students were given a thesis statement and asked to design the essay outline using it.

### 2) Grammar

Task 1 (Sentence Correction): Students were given three paragraphs of different grammatical errors and asked to correct the sentences.

Task 2 (Grammar Related MCQS): To analyse their grammar knowledge, the student was given different MCQs regarding verbs, subject-verb agreement, and sentence structure.

Task 3 (Error Identification): Several paragraphs were given to the students, and they were asked to detect the mistakes.

### 3) Vocabulary

Task 1 (Contextual Usage): Ask the students to read the passage, replace the underlined words with more suitable or advanced vocabulary, and write a short paragraph explaining why they chose each replacement.

Task 2 (Specific Vocabulary Requirement): Provide a list of the vocabulary to the students, and ask them to write an essay with the help of it.

Task 3 (Critical Analysis): Ask the students to read the following excerpt from a scholarly article. Identify and analyse the advanced vocabulary words used in the text. Explain the meaning of each word and discuss how it contributes to the overall argument or narrative of the passage.