

## The Impact of Ai in Creating Writing Skills in English Language Learners

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**ABSTRACT:** This study explores how undergraduate students' growth of their English writing skills is impacted by artificial intelligence (AI) technologies. This study addresses the key topic of whether AI-assisted writing instruction enhances undergraduate students' positive evaluations of the learning process, reduces anxiety, and improves writing skills as the significance of proficient academic writing grows. The study employed a mixed-methods design with two groups of fifteen University of Sebha, Libya students each: the experimental group and the control group. In terms of method, data was obtained through pre and post-tests and writing examples that took place over 16 weeks. A control group made use of conventional approaches toward writing, while the experimental group used AI technologies during writing. The writing samples were qualitatively scored by expert raters while statistically comparing the test scores. In addition, the experimental group showed improvement in writing quality, grammatical complexity, and vocabulary. These findings confirm the positive effect of AI on writing skills. AI-assisted education enhances writing skills, increases confidence, and decreases anxiety. These findings suggest that using AI in writing classes can effectively aid language acquisition, benefiting teachers and curriculum developers.

**KEYWORDS:** Artificial Intelligence, writing proficiency, vocabulary development, syntactical complexity, English language learning.

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### 1. INTRODUCTION

#### 1.1 Background of the Study

English language proficiency is a prerequisite for success in social, academic, and professional areas in the modern globally integrated society. Among the most critical competencies for developing academic writing ability is important for English language learners (ELLs), as it enables them to access both academic and professional opportunities (Rusmiyanto et al., 2023). Especially when it comes to writing, it is a very challenging task for ELLs, since it demands a much stronger command of syntax and vocabulary but also the ability to structure ideas in a logical sequence. Pupils must write essays or articles for almost all university courses, which call for a great deal of reading analysis and critical thinking. However, writing quality essays is a difficult task that takes time, energy, and a lot of instructional assistance. Teachers' responsibility of grading and giving comments on students' writing is made more difficult by the time-consuming nature of the process. For students to comprehend their strengths and shortcomings and to enhance their writing abilities, timely and useful feedback is essential.

These difficulties in language acquisition may now be effectively addressed by artificial intelligence (AI). Writing apps with AI capabilities, including Grammarly, ProWritingAid, and PaperRater, have transformed traditional teaching methods by providing students with individualized learning experiences and real-time feedback (Jati, 2022). These tools assist improve writing style and tone, making the content more logical and suited for academic settings. They also identify grammatical problems and offer sentence restructuring suggestions (Anthonius & Aryusmar, 2024). Because AI can give immediate feedback, students may learn through continuous formative evaluation, which changes the emphasis from only correcting mistakes to encouraging general language growth (Black & Wiliam, 2018). AI also improves learning by enabling differentiated training, which adjusts to the particular requirements and skill levels of each learner. AI relieves the teacher from error detection and grading, the monotony of these tasks, therefore allowing teachers to concentrate on the higher-order constituents of writing training, which includes content development and creativity (Zawacki-Richter et al., 2019). In the future, when developed fully, AI will increasingly assist ELLs in the English language, toward more proficient writing with more efficiency in customization. Focusing on the impact of AI-driven tools on grammar, vocabulary, and overall writing proficiency, this research aims to investigate how these instruments can be used to enhance the writing skills of English language learners.

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## 2. REVIEW OF LITERATURE

### 2.1 Statement of the Problem

Writing is one of the most challenging elements of learning a language, as per to several studies that have been conducted on both pupils and educators (Reichelt, 2012; Massa, 1997 ; Farooq, 2012; Ramzan, 2023; Baskara, 2023). Writing evaluations are a major challenge for teachers since they take a lot of time, effort, and skill, and they can be done in small classrooms or on a huge scale for exams. Feedback systems are frequently impacted by summative methods, which place a strong emphasis on finding mistakes and rating the finished work. The potential for meaningful language development may be constrained by this conventional error- and product-centered approach (William et al., 2004). According to research, rather than encouraging a more comprehensive approach to writing teaching, many teachers focus primarily on their students' language problems, particularly on written mistakes (Ferris, 2014; Hyland & Hyland, 2006). Although there is an increasing number of technology tools available to improve English language learning, developing efficient and long-lasting writing skills improvement solutions is still a major problem. Traditional approaches fall short of fully utilizing technology to assist students acquire writing skills thoroughly and interestingly when paired with a shortage of personalized feedback (Shaari, 2022). As a result, there is an obvious gap in the knowledge of how to use artificial intelligence (AI) to deliver formative feedback in real time that not only fixes mistakes but also encourages the creation of efficient writing techniques.

### 2.2 Significance of the Study

According to the researcher's findings, students in the English Department at the Faculty of Education, Zuwila, continue to struggle with several aspects of their academic writing. As a result, some of the grammatical constructs in their works are incorrect, which lowers the overall quality of their writing. The advancement of artificial intelligence as a writing tool is quite advantageous to them. According to Kessler et al. (2017), technology development offers hitherto unheard-of opportunities for authentic and fascinating cross-cultural and cross-linguistic communication. There hasn't been any thorough study on the effectiveness and possible uses of AI technology in EFL classes because instructors have just recently had access to them (Ross et al., 2019). Examining the applications of these AI-assisted writing apps is intriguing. This study will thus provide insight into how AI may assist undergraduate students in developing their academic writing skills.

### 2.2 Research Questions

The purpose of this project is to investigate the following research questions:

1. Can the use of AI tools improve and increase the accuracy of students' writing in terms of vocabulary, grammar, and sentence structure based on pre and post-test results?
2. What are the opinions of undergraduate students on the use of AI technologies for writing instruction?
3. How can AI techniques impact writing-related anxiety in undergraduate students?

### 2.3 Definition of AI

There is currently no accepted definition of artificial intelligence in the scientific community. The term, which has become widely used, encompasses a wide range of fields, ideas, and techniques with the ultimate objective of having a computer simulate human cognitive abilities. Accordingly, the term may be used to describe any computerization resulting from this technology as well as specialized technologies such as deep learning or artificial intelligence based on neural networks (Trimble, 2023). Neurology, informatics, psychology, sociology, mathematics, engineering, and other scientific fields are all combined in the field of artificial intelligence. On the one hand, it aims to produce an electronic counterpart of human intelligence; on the other hand, it develops autonomous intelligent systems with algorithms that are capable of performing tasks that have previously only been completed by humans, or that can help, make decisions, or learn independently from the available data (Leslie et al., 2021). According to Bostrom (2006), a lot of advanced AI has been incorporated into regular systems, often without being called AI since anything that becomes sufficiently useful and extensively used is no longer referred to as AI.

### 2.5 Previous Studies

Nazari et al., (2021) did a study that examined how well second-postgraduate English learners used group-format writing software powered by AI when writing in English for academic purposes. The results suggest that AI-powered writing tools might be a useful tool for helping non-native postgraduate students write academic papers in English while also fostering their attitude and disposition toward adopting technology through formative assessment and feedback. Another study by Amyatun and Kholis, (2023) emphasizes the use of QuillBot to improve writing abilities. This project aims to enhance eleventh-grade students' proficiency in writing hortatory expositions using AI QuillBot. The "Kemmis, McTaggart, and Nixon paradigm" was used in the two stages of "Classroom Action Research" (CAR), which consisted of three sessions each. Each process included planning, carrying out, tracking, and evaluating. The findings demonstrated that using QuillBot in the writing classroom greatly improved the students' writing skills. According to the students' writing exam scores, the employment of QuillBot AI had an impact on their ability to create hortatory exposition texts.

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The study "The impact of AI writing tools on the content and organization of students' writing: EFL teachers' perspective" examined the range of AI writing tools available and assessed how EFL teachers believe they influence students' writing, particularly about structure and content. By gathering data from four English as a Foreign Language professors at three different Indonesian colleges, the study shed light on the variety of AI writing tools utilized in EFL courses. These applications included "QuillBot, WordTune, Jenni, Chat-GPT, Paperpal, Copy.ai, and Essay Writer." Furthermore, all of these teachers agreed that the AI writing tools improved the quality of their students' work, particularly in terms of subject and structure (Marzuki et al., 2023). According to Al Mahmud (2023), AI-powered writing tools, such as Grammarly and Wordtune, are increasingly being used in L2 writing. Although these online tools are becoming more and more important, few studies have examined the impact of AI-driven applications on writing in Saudi English as a Foreign Language. By establishing to what extent Wordtune aids Saudi students in their writing, his study aimed to bridge the gap. The results showed that the experimental group's students did better than the control group's while using Wordtune. Quantitative findings demonstrated that using Wordtune helped the experimental group write better and outperform the control group on the final writing test. The experimental group's writing gains using Wordtune were moderate in both the lexical and syntactic areas, according to qualitative assessments. While lexical expansions included the use of more particular nouns, expressive adjectives, and precise verbs, sentence-structure gains included the increasing use of complex phrases, compound sentences, and intricate expressions. Finally, Wordtune had the same impact on respondents' writing quality whether they were male or female. Through a smartphone application, students may communicate with "Replika," an AI chatbot, and send messages. It can understand the thoughts and feelings of the students and have real conversations. Shaari (2022) conducted research on AI chatbots as a way for participants to hone their writing skills by giving each conversation with the AI a topic. Finding out how successfully AI chatbots can enhance students' writing skills was the aim of the study. It also aimed to find out how the students felt about using artificial intelligence to learn English. The research, which employed the flipped classroom pedagogical technique—in which students performed writing projects during class time and practiced their writing outside of it—involved twenty vocational college students. People were given questionnaires to complete to get the findings. Another research called "Language learning tools and improvements in speaking and writing skills" sought to show a link between students' frequent use of AI resources and their increased proficiency in speaking and writing foreign languages. More than 80% of participants stated that QuillBot, Grammarly, and ChatGPT are excellent tools for enhancing writing skills in other languages. The hypotheses under investigation support the link between the consistent use of AI technology and the development of spoken and writing proficiency in foreign languages. Consequently, they conclude that improving one's writing and speaking skills in other languages requires the use of AI-driven tools (Alkhalwaleh & Khasawneh, 2023).

### **3. METHODOLOGY**

#### **3.1 Design of Research**

This study employed a multiple methods research technique (Creswell, 2013). Quantitative data were first collected. Pretests and posttests were given to the experimental and control groups to achieve this. The qualitative data, which evaluated the impact of AI methods on the participants' writing abilities, was then gathered through a textual analysis of writing samples that some respondents had supplied. This served to validate the quantitative findings.

#### **3.2 Population and the Setting**

Thirty undergraduate students in their seventh semester at the University of Sebha, more precisely at its branch of College of Education, in Zuwila, a major university in southwest Libya made up the participants. Every participant was pursuing English as a foreign language (EFL). Their placement test results before the research indicated that they were between intermediate and upper-intermediate in language skills. Since none of the students had ever used AI tools for academic writing before, it was possible to separate the effects of AI as a novel intervention. The research was done in the university's English Language Department, which provides a variety of courses including advanced writing classes and basic language skills meant for enhancing students' competency in the language. Two groups of seventh-semester students from a writing-focused course were selected for this study. The department offers this course as part of its curriculum to assist students enhance their academic writing skills, which will be crucial for both their future academic and professional endeavors. One of the most important aspects of the course that the students completed was an evaluation or writing work that was in line with the learning objectives. The purpose of the test was to assess their ability to write essays that were cohesive, well-structured, and grammatically accurate. The task probably required pupils to show that they were proficient in a variety of academic writing structures, including organization, argumentation etc., all of which are essential for the university level. More broadly, this study was carried out in an area where English is not widely spoken, and fluency in the language is essential for success in education. English proficiency provides academic and professional prospects, especially in international domains, in Libya, where Arabic is the primary language. This emphasizes the significance of the research, which aims to investigate efficient instructional techniques for enhancing students' writing abilities. The study's methodology, which included a control and an experimental group, sought to compare more conventional teaching strategies with cutting-edge ones, including using technology or alternative teaching methods, to improve writing learning outcomes. Grammarly and ProWritingAid,

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among other AI-assisted writing tools, were employed to guide the experimental group. During the first week of class, these tools were presented and students were instructed on how to use the AI capabilities to improve their writing through guided teaching. Students utilized these tools to perform five major writing tasks throughout the course of the 16-week session. In order to assist students in comprehending the errors and proposed changes, the AI feedback was reviewed in class. The AI tools were utilized for some in-class activities, but in order to ensure that students gained practical experience, the use of AI was optional for homework assignments. The outcomes of this study could have wider implications for language instruction in EFL (English as a Foreign Language) settings in Libya and other regions with comparable linguistic settings.

### **3.3 Research Tools**

The participants' writing skill was measured using AI technologies before and after the intervention through the administration of pre-and post-tests. Students had to write brief, educational essays on predetermined subjects for the tests. The evaluation criteria for these activities included coherence, syntax, sentence structure, and vocabulary usage, among other characteristics of writing. Writing assignments featured specific subjects like "The Importance of Health Care" and "Coeducation," which required students to make coherent arguments and arrange their ideas rationally. Three trained raters scored the essays according to a scoring rubric provided. The rubric consisted of five major dimensions, including Task Accomplishment-or how well the student responded to the prompt and developed the topic; Cohesion and Coherence-or how well the essay flowed and made sense; and Resource-or the range and appropriateness of vocabulary used along with the use of relevant and exemplifying ideas. Grammatical Range and Accuracy: The correct usage of simple, compound, and complex sentence structures. Syntactic complexity refers to the ability to use varied sentence types and structures. The holistic rubrics ensured that results from both the pre-test and the post-test showed very clearly the extent to which the students had achieved a lot in the crucial aspects of academic writing.

### **3.4 Assessment of Information**

The data was analyzed using both quantitative and qualitative methods. The quantitative data, which included the students' pretest and posttest scores, was analyzed using SPSS. The standard deviations and averages of the student-submitted written texts were calculated to ascertain the general characteristics of the score distribution. To quantify the data, t-tests were used for both independent and paired samples. While paired-sample t-tests were employed to assess the effectiveness of the teaching strategies, an independent sample t-test was employed to ascertain if written grades differed between the experimental and control groups. The qualitative data, which included the students' written examples, was assessed by three human raters: a lecturer from South Africa, a lecturer from the UK, and a lecturer from Canada. All three raters had more than ten years of experience teaching English in Omani universities. Written samples were examined using the assessment rubrics, which assign scores based on the written texts' lexical creative capacity, grammatical accuracy and range, cohesion and coherence, and task completion.

### **3.5 Procedure**

This sixteen-week research was carried out at the University of Sebha's Faculty of Education, Zuwila, during the second semester of 2023–2024. One class from the second semester was selected to collect data. In the second semester, two groups of fifteen students each were selected at random. There were fifteen pupils in the experimental group and fifteen in the control group. For sixteen weeks, each group studied writing strategies, spending two hours a week in two sessions to fully grasp the content of their designated curriculum. While the control group received lessons using traditional teaching techniques, the experimental group received instructions using the AI program. Each group received a pre-test at the beginning of the semester. After the semester, each group was given a post-test. The data was stored and statistically assessed using SPSS. In addition to collecting student writing samples five times at the start and finish of the term, the researcher also gave out the initial and final exams. A qualitative examination of these written examples was then carried out to determine whether and to what extent the use of AI technologies improved the participants' writing. It also highlighted the pupils' problems and weaknesses and demonstrated how much their writing had improved.

### **3.6 Ethical Considerations**

All respondents in this study gave their informed permission, confirming that they understood the objectives of the research and methods and that they could withdraw from it at any moment. The investigator committed to carrying out the research ethically and with integrity. The researcher undertook several actions to ensure the validity and fairness of the study. First, the author created a control group receiving standard treatment, ensuring that all respondents had an equal chance of benefiting from the intervention. To reduce the possibility of selection bias, the researcher also used a random allocation system for the intervention and control groups. To ensure the impartiality of assessing the results, the author has finally put in place a blinding process in which neither the participants nor the reviewers can know about group allocations. The author tried to follow these ethical standards to ensure the protection and privacy of all respondents.

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## 4. RESULTS

### 4.1 Framework for Data Analysis and Interpretation of Statistical Findings

Using a rubric based on the Hyland's (2006) model of writing development that measures syntactic complexity, lexical ability, coherence and grammatical accuracy a qualitative analysis of the writing samples was carried out. Other linguistic markers such as the existence of complex sentence structures, a wide range of vocabulary and the frequency of error were examined in the writing samples. The methodology selected made it possible for this researcher to evaluate the differences shown in the experimental versus the control group over some time. The results given, when compared with a control group, showed significantly higher post-test outcomes: specifically, in the number of vocabulary usage and issues regarding grammatical accuracy. One would assume that AI technologies aid not only in helping a student understand the mechanisms required when writing but also in producing fewer errors. Increased use of compound and complex sentence structures, marking an increase in syntactic complexity, provides even further corroboration for this supposition: the contributions of AI technologies did improve writing. These results address the study issue about the influence of AI on writing progress by confirming that AI-assisted teaching can serve as an effective pedagogical instrument for improving particular areas of writing skills.

### 4.2 Phase 1: Quantitative Analysis

**Table 1: Control Group Pre Test Writing Skills**

Respondent	Task number (Each 10 Marks)					Total
	1	2	3	4	5	
R1	6	7	7	8	7	35
R2	8	7	6	8	7	36
R3	6	7	6	7	8	31
R4	5	5	4	6	7	27
R5	7	5	7	6	8	33
R6	7	7	6	7	7	33
R7	8	8	8	9	9	42
R8	7	8	6	8	8	37
R9	7	7	8	8	9	39
R10	8	8	7	8	9	40
R11	7	6	8	8	7	36
R12	8	7	8	9	8	40
R13	7	7	6	8	8	36
R14	7	8	8	8	9	40
R15	8	8	9	9	9	43
Total						548
Mean						36.53333
Standard Deviation						4.340

**Table 2: Control Group Post Test Writing Skills**

Respondent	Task number (Each 10 Marks)					Total
	1	2	3	4	5	
R1	7	8	8	8	8	39
R2	8	8	7	8	8	39
R3	6	7	6	7	8	34
R4	6	6	6	8	8	34
R5	7	6	7	7	8	35
R6	7	8	7	8	8	38
R7	8	8	8	9	9	42
R8	7	8	7	8	9	39
R9	8	8	8	8	9	41
R10	8	8	8	8	9	41
R11	7	7	8	8	8	38
R12	8	7	8	9	8	40
R13	7	8	7	8	8	38
R14	7	8	8	8	9	40

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R15	8	8	9	9	9	43
Total						581
Mean						38.73333
Standard Deviation						2.712

**Table 3: Control Group T-Test of Writing Skills**

	N	Mean	Standard Deviation
Pre Control	15	36.53333	4.340
Post Control	15	38.73333	2.712

The average and standard deviation for the 15 respondents in the control group are shown in Table 3, along with the results of their writing skills tests both before and after they received regular classroom instruction. The beneficial impact of conventional mode instruction on learners' writing skills was evaluated using paired-sample t-tests. The researcher's particular goal was to determine if writing skills were similar between pre-handling conventional method instruction (M = 36.53333, SD = 4.340) and post-handling conventional style teaching (M = 38.73333, SD = 2.712).

**Table 4: Control Group T-Test Paired Differences of Writing Skills**

	Mean	Standard Deviation	95% Confidence Interval		T	DF	Sig
			Upper Value	Lower Value			
Paired Sample	2.2	1.628	4.7899	.3899	2.145	14	0.26

Table 4 above displays the results of the paired-sample t-test. It shows that after traditionally receiving instruction, pupils often did better. A statistically significant rise in value was observed [ $t(14) = 2.145, p = .026 < .05$ ]. The mean variance was significant between the sample means, with a 95% "confidence interval" ranging from .3899 to 4.7899.

The experimental group consists of 15 students, as shown by means and standard deviations, as well as the outcomes of their writing skills tests before (in Table 5) and after (in Table 6) applying AI means. The study question, if the averages of written abilities before (Mean = 36.3686, Standard Deviation = 3.7771) and after (Mean = 40.8666, Standard Deviation = 3.2484) using the AI tools were equal, was evaluated using paired samples t-tests. The tests were designed to determine whether and to what extent AI improves students' writing abilities.

**Table 5: Experimental Group Pre-Test Writing Skills**

Respondent	Task number (Each 10 Marks)					Total
	1	2	3	4	5	
R1	7	6	7	7	8	35
R2	6	8	7	7	7	35
R3	7	6	7	6	8	34
R4	6	6	6	5	7	30
R5	6	7	6	7	6	36
R6	6	6	6	8	6	32
R7	7	7	6	7	7	34
R8	8	7	5	8	9	37
R9	6	8	7	8	8	37
R10	7	7	8	9	8	39
R11	7	7	7	9	8	38
R12	7	8	7	8	9	39
R13	8	8	7	9	9	41
R14	8	8	9	8	9	42
R15	9	8	9	9	9	44
Total						553
Mean						36.8666
Standard Deviation						3.77712

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**Table 6: Experimental Group Post Test Writing Skills**

Respondent	Task number (Each 10 Marks)					Total
	1	2	3	4	5	
R1	7	7	7	8	8	37
R2	7	8	8	8	8	39
R3	8	7	8	7	9	39
R4	7	7	7	7	8	35
R5	6	8	7	8	8	37
R6	7	7	8	8	8	38
R7	7	8	8	8	9	40
R8	8	8	7	9	9	41
R9	8	9	8	9	9	43
R10	8	8	9	9	9	43
R11	8	9	9	9	9	44
R12	8	9	9	9	9	44
R13	9	8	9	9	8	43
R14	9	9	9	9	9	45
R15	9	9	9	9	9	45
Total						613
Mean						40.86666
Standard Deviation						3.2484

**Table 7: Experimental Group T-Test Paired Differences of Writing Skills**

	Mean	Standard Deviation	95% Confidence Interval		T	DF	Sig
			Upper Value	Lower Value			
Paired Sample	4.0	0.5287	4.26755	3.73245	2.145	14	0.025

Table 7 presents the findings of the paired-sample t-test. It demonstrates that, on average, students employed AI technology more successfully. There was a notable improvement [ $t(14) = 2.145, p = 0.025 < .01$ ]. A statistically significant difference was shown by the 95% confidence interval range for the mean variance between the samples' averages, which was [3.73245 to 4.26755]. The final evaluation results were examined using an independent trial t-test. Table 8 displays the descriptive statistics for each group. The results showed that the experimental group performed better than the control group ( $M = 38.73333, SD = 2.712$ ;  $M = 40.86666, SD = 3.2484$ ).

**Table 8: Group statistics for students' using the AI tools**

	N	Mean	Standard Deviation
Control Group	15	2.2	1.628
Experimental Group	15	4.0	0.5287

To find out if the written grades of the experimental and control groups differed, an independent trials t-test was conducted.

**Table 9: Independent T-Test of the students' use of the AI applications**

	Mean	Standard Deviation	95% Confidence Interval		T	DF	Sig
			Upper Value	Lower Value			
Independent Sample	1.8	1.09	2.19004	1.40996	2.04	29	0.039

The difference between the control and experimental groups is statistically significant [ $t(29) 2.04, p = 0.039 < .05$ ], as shown in Table 9 above. The 95% confidence interval (CI) of the mean variance, which ranged from 1.40996 to 2.19004, showed a significant difference between the sample averages.

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### 4.3 The Second Phase: Qualitative Research

#### 4.3.1 Lexical Advantages

A noticeable improvement in the experimental groups' effective vocabulary was one benefit of incorporating AI technologies into the writing process. The examination of the written samples that respondents submitted revealed that the essays produced following their practice writing with AI tools used lexical resources—specifically, identifiers, qualifiers, and indicators—more correctly and accurately than the literary samples produced without any prior experience with AI Tools.

The analysis of written samples revealed that as the students' texts progressed from the first to the last samples, they used identifiers, qualifiers, and indicators that were more precise, understandable, and pertinent to the context than those in the original text samples. This claim is supported by the following quotes from the literary examples:

*Sample A:* It is noticeable that the vocabulary used in the phrases is somewhat little. An article submitted by member 4 of the control group served as the basis for this.

Title: The Importance of Health Care

Good health is very key for all of us. Though governments take care of public health care better, the advanced country people's physical health is still decreasing. This essay will discuss the details for this and significances of it.

There are two details why health is bad. First, some people eat bad food. For example, consuming fast food and oily food can make us sickening. Additional, some individuals don't do bodybuilding enough. Instead of having regular walk and spending outside, they spend most of time playing with mobile phones. So, because of this, it makes us bodies not good.

Their bodies will become weak when they don't eat good food and do bodybuilding. For example, we will be having weak bodies if we don't consume fruits and vegetables. Another reason is our muscles won't be strong and we soon become impatient when don't have regular physical activates.

In conclusion, not bodybuilding and eating oily food and junk food are the two details why health is going down. It is significant to have good food and spend outside playing to be strong. In my opinion, we should attempt having fruits and vegetable and spend time outside. This manner, we can get good health.

*Sample B:* The vocabulary level has obviously developed. One of the respondents provided a writing extract at the end of the series of writing trials used to assess the improvement, from which this conclusion was derived.

Title: The Importance of Health Care

Good health is very important for all of us. Though governments take care of public health care better, the advanced country people's physical health is still decreasing. This essay will discuss the reasons for this and the consequences of it.

There are two reasons why health is not improving. First, some people do not eat healthy diet. For example, eating fast food and oily food can make us sick. Second, some individuals don't do enough physical exercise. Instead of having regular walk and spending outside, they spend most of time playing with mobile phones. So, they become weak.

Their bodies will become weak when they don't eat good food and do physical exercise. For example, we will have weak bodies if we don't eat fruits and vegetables. Another reason is our muscles won't be strong and we soon become lazy when we don't have regular physical activates.

In conclusion, not doing physical exercises and eating oily food and junk food are the two reasons why people are not healthy. It is important to have good food and spend outside playing to be healthy. In my opinion, we should try to eat more fruits and vegetables and spend time playing outside. This manner, we can get good health.

Because extract A employs imprecise adjectives (key, bad, sickening, impatient), in applicable nouns (details, significances, body building), and imperfect verbs (attempt, having), it clearly lacks lexical originality. However, extract B has a little higher degree of lexical creativity, with better verbs (try, eat), acceptable nouns (reasons, consequences, exercises), and appropriate adjectives (important, sick, lazy).

#### 4.3.2 Syntactic Advantages

Both language and sentence structure were improved. Texts produced during the first writing test phases had fewer syntactic structures than texts produced following repeated writing practice using AI tools, according to written sample assessments (more combined and embedded clauses and phrasal complexity in the sentence). The samples listed below support this conclusion:

*Sample A:* It is clear that the sentence structure is poorly organized. In the second writing sample phase, this was taken from respondent 6, who was a part of the experimental group.

Title: Coeducation

Coeducation, is a subject of debate and implementation worldwide. Coeducation is when male and female students are educated in the same setting. I shall examine the benefits and drawbacks of coeducation in this article.

The advantages of coeducation are it encourages respect for one another. The collaborative learning environment encourages the development of interpersonal skills. Coeducation provides a platform for the exchange of diverse perspectives, enhancing the overall learning experience. Clearly, mutual respect and collaborative learning are the main benefits of coeducation.



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The disadvantages of coeducation. The drawback of coeducation is it causes distraction. For instance, romantic relationships or peer pressure create disruptions. Another demerit of coeducation is potential gender bias. For example, the teacher unintentionally tends to direct more challenging questions to some specific gender students. Distraction and gender bias are the major limitations of coeducation.

In conclusion, there are positive and negative sides of coeducation. The positives, in my opinion, exceed the drawbacks. It is crucial that we control coeducation. as a significant step towards fostering equality and preparing students for a better world.

Sample B: The sentence structure is clearly better now. This was based on respondent 15's written test from the final phase of essay samples, who was a member of the experimental group.

Title: Coeducation

Coeducation, the practice of educating both male and female students within the same educational institution, has been a subject of debate and implementation globally. Coeducation is when male and female students are educated in the same setting. I shall examine the pros and cons of coeducation in this article.

Let's look at the benefits of coeducation first. The main advantage of coeducation is it encourages respect for one another and equality among pupils by removing gender assumptions. The collaborative learning environment encourages the development of interpersonal skills, preparing students for the diverse and integrated workplaces they are likely to encounter in their future careers. Furthermore, coeducation provides a platform for the exchange of diverse perspectives, enhancing the overall learning experience. Clearly, mutual respect and collaborative learning are the main benefits of coeducation.

Let us explore the disadvantages of coeducation. The primary drawback of coeducation it causes distraction and a lack of concentration, particularly in teenagers. For instance, romantic relationships or peer pressure can create disruptions in the learning environment. Another demerit of coeducation is there are concerns about potential gender bias in classroom interactions and unequal participation. For example, the teacher unintentionally tends to direct more challenging questions to some specific gender students. Undoubtedly, distraction and gender bias are the major limitations of coeducation.

In conclusion, coeducation has advantages as well as disadvantages. I've considered all sides, and I think the positives exceed the drawbacks. It is crucial that we monitor coeducation. as a significant step towards fostering equality and preparing students for a better world.

A look at the two passages about syntactic development shows that Snippet A has more straightforward or simple sentences compared to the latter, an indication that it is more of a text that can be considered as a gathering of fragments. Snippet A consists only of basic simple sentences with a few added simple phrases and clauses. Still, it can be said that Snippet B is significantly an improvement from Snippet A. Sample B uses a greater variety of more complex ("Another demerit of coeducation is there are concerns about potential gender bias in classroom interactions and unequal participation") and compound sentences ("Coeducation is when male and female students are educated in the same setting" and "The collaborative learning environment encourages the development of interpersonal skills, preparing students for the diverse and integrated workplaces they are likely to encounter in their future careers"). It also has more descriptive phrasal constructs ("the practice of educating both male and female students within the same educational institution" and "encourages respect for one another and equality among pupils by removing gender assumptions").

## 5. DISCUSSION

This study sought to determine if and to what extent the use of AI technologies had enhanced participants' academic writing. To do this, the data were analyzed statistically using quantitative analysis in SPSS and holistically by using human raters to assess the writing samples. Reexamining the proposed research questions of the study, summarizing the findings, and placing them within the framework of the relevant body of existing literature on the subject.

According to pre and post-test data, Research Question 1 explores if employing AI tools to teach writing assists students in writing better, particularly in terms of vocabulary, grammar, and sentence structure. The study adopted a mixed-methods approach to address this, gathering data in two ways: quantitatively, through pre and post-test scores, and qualitatively, through examination of written samples. Three main areas were tested on the pre and post-tests: sentence structure complexity, grammatical accuracy, and vocabulary usage. To find statistically significant differences between the experimental group (which used AI technologies) and the control group (which did not), the findings were evaluated. The experimental group revealed a statistically significant increase in writing quality, notably in the incorporation of complex sentence structures, suitable vocabulary, and fewer grammatical errors, as demonstrated by the comparison of pre and post-test scores. It will be challenging to determine, though, if this progress resulted from real learning or just from the pupils depending on AI tools for correction. Rather than concentrating just on the final post-test results, the study triangulated the data to address this problem by investigating how the students' writing changed over time. Five writing examples that were gathered throughout the course of the 16-week period revealed a steady trend of development. The qualitative examination of these examples revealed that students started to integrate the AI tools' comments as the study went on, demonstrating autonomous writing improvement. While the latter samples showed more accurate and complex sentence

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constructions even in regions where AI input was limited, the earlier versions primarily depended on AI corrections. This suggests that the students were learning to apply the corrections on their own.

Moreover, the study ensured that post-test achievements were not exclusively attributable to dependence on AI for corrections by outlawing the implementation of AI technologies during in-class tests. It was necessary to take this analytical step in order to separate the learning impact from simple tool dependency. In these conditions, the experimental group continued to outperform the control group, supporting the idea that the students' improved vocabulary, grammar, and sentence structure came from their learning process assisted by AI rather than from their passive reliance on the technology. These results are consistent with research on the usefulness of digital writing aids for enhancing students' writing abilities by Barrot (2022), Rad et al. (2023), and Choo and Li (2017). The findings of this study also confirm Barrot's (2022) review of the influence of sentence structure on students' papers' accuracy and intelligibility. Moreover, after the analysis of the results coming from the writing post-test, it showed that the treatment group did significantly better compared to the control group. Barrot (2022) qualitatively concluded that participants could integrate grammatical concepts through the metalinguistic explanations given with the feedback coming from Grammarly.

The purpose of the second study question was to find out what undergraduate students thought about using AI technologies to improve their writing. According to the results, writing skills, especially vocabulary and sentence structure, significantly improved for students in the experimental group who employed AI tools during the research. But in order to offer a thorough comprehension of the outcomes, it's critical to include a precise methodology for evaluating the qualitative and quantitative data. Both quantitative and qualitative methods were used in the investigation. Paired-sample t-tests were employed to evaluate the quantitative data obtained from pre and post-tests. The results showed that the experimental group outperformed the control group statistically significantly. In particular, the experimental group showed higher grammatical correctness, more complex sentence structures, and greater vocabulary utilization. The idea that AI technologies can substantially enhance students' writing is supported by these statistical results. However, a methodical framework must also be used to understand the results. The study analyzed writing within the framework of a cognitive writing development model (Hyland, 2006), emphasizing coherence, syntactic complexity, and lexical complexity as critical indicators of writing proficiency.

To learn more about how AI technologies affected students' writing, a qualitative study of written samples was done in addition to the quantitative analysis. In analyzing the written samples, the researcher looked for three main characteristics: (1) lexical competence, (2) syntactic complexity, and (3) coherence and cohesiveness. A rubric was used to carefully examine the written samples. It graded the overall clarity of concepts, the difficulty of sentence structures (compound and complex sentences), and the correctness, diversity, and appropriateness of terminology. When Sample A (the control group) and Sample B (the experimental group) were compared, for example, it was found that the experimental group consistently employed a more explicit vocabulary, choosing stronger verbs like "try" and "eat" rather than ambiguous options like "attempt" and "having." Also, Sample B's nouns and adjectives were more suited for the context, substituting words like "exercises," "consequences," and "important" for Sample A's less appropriate choices. The experimental group's lexical choices greatly improved, as seen by this systematic evaluation, which is consistent with the statistical data from the pre and post-tests.

The statistical advancements in sentence structure and vocabulary were essential in determining how students felt about AI technologies. The experimental group's notable superiority over the control group in terms of both lexical and syntactic originality indicates that students were pleased with the AI tools' capacity to improve their writing. Writing has improved as a result of the learning process that AI technologies enabled, and this achievement probably assisted in creating a favorable opinion of the tools. More nuanced and complex structures in later writing examples demonstrated that students in the experimental group were not only depending on the AI tools to correct their mistakes. Rather, the data indicated that they integrated the feedback and utilized it to enhance their writing on their own. The students' enhanced writing abilities, as seen by their post-test results and qualitative evaluations, suggest that they probably formed a favorable opinion of AI technologies. Since students who succeed are more likely to prefer the strategies that assisted them succeed, the experimental group's growth in writing proficiency indicates that they saw AI as a useful teaching tool. Additionally, the fact that they were able to provide writing examples that were more polished and error-free implies that students' anxiety around academic writing assignments decreased as they became more confident in their writing skills. This assurance probably led to a more optimistic view of the application of AI technologies in the writing process.

The last research question was to investigate the impact of AI technologies on writing-related anxiety in undergraduate students. The results of the study indicate that by improving students' vocabulary, sentence construction, and general writing fluency, AI writing assistants reduced lower writing anxiety. However, a defined analytical framework and methodical data interpretation are required to better comprehend the association between AI technologies and decreased anxiety. The study examined how AI tools influenced students' writing anxiety using a cognitive writing development paradigm, namely Hyland's (2006) writing model. This paradigm focuses on how students' writing develops over time in terms of coherence, grammatical complexity, and lexical complexity. Paired-sample t-tests were used to examine the pre and post-test results. The results showed that the experimental group's writing performance had improved statistically significantly. The capacity of the students to employ more complex sentence structures and exact vocabulary—two major markers of decreased writing anxiety—was strongly correlated with these increases.

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These conclusions were further validated by the qualitative examination of written samples. Lexical variety, syntactic complexity, and grammatical structural correctness were the three main linguistic indicators that were used to systematically assess the written instances. The objective was to see if students could regularly and accurately write more complex sentences and a wider variety of language, which would lessen their anxiety related to writing assignments. According to the statistical results, there was a notable decrease in writing mistakes in the experimental group—which employed AI tools—when compared to the control group. Students felt more secure in their ability to write compositions that were clear and grammatically correct, which likely contributed to a decrease in anxiety. Another important component in lowering anxiety was the growth in compound and complex sentences, which indicates an improvement in language complexity. Students' overall anxiety levels likely decreased as a result of feeling more capable of addressing difficult writing assignments when they could handle more complex sentence constructions.

After applying AI technologies, pupils in the experimental group were able to use a more accurate and varied vocabulary, according to the qualitative study. For instance, the post-test samples' verbs and adjectives were more precise and suitable for the context, showing that students had more control over their lexical choices. Students were also able to create more complex and nuanced compound sentences, which enhanced the writing's coherence and logical flow. This increase in grammatical complexity made writing easier, which probably helped people feel less anxious about their work. The research also revealed grammatical areas of difficulty for the students, even in spite of their gains in sentence construction. Although a large number of pupils in the experimental group could construct complex sentences, others had trouble ensuring grammatical accuracy. This implies that while AI systems reduced anxiety by offering prompt feedback and ideas for enhancement, students still required time to completely integrate these changes. The inconsistent outcomes about grammar accuracy show that while AI technologies can help, they cannot entirely eliminate the difficulties students encounter while learning intricate writing processes. The conclusion that using AI tools to improve students' accuracy and fluency in writing reduced writing anxiety is supported by the methodical study of both quantitative and qualitative data. Students' confidence grew as they became proficient at creating complex sentences and selecting the right words, which resulted in a more positive mindset about writing assignments. Students felt more in control of their writing process since they could correct errors on their own due to the instantaneous feedback given by AI technologies. Writing anxiety was probably lessened as a result of this autonomy and better results.

### 6. IMPLICATIONS AND FUTURE PROSPECTS

The study's conclusions have important implications for technology-assisted EFL writing. Since AI technologies provide instant feedback on written texts, they can help students learn how to write successfully by identifying writing issues and coming up with suitable remedies (Al Mahmud, 2023). According to certain studies, human-chatbot communication has a much lower lexical richness than human-to-human communication (Alshumaimeri & Alshememry, 2023). Furthermore, there are issues with training foreign languages utilizing AI technologies such as chatbots and online platforms/apps (Mageira et al., 2022). According to Lotze, (2018), interactions with chatbots may become unexpected, confusing, and prone to mistakes if teachers or students do not submit questions and responses that the system's developers may have anticipated. According to Lotze, (2018), this implies that the gadgets are not helpful as role models for students learning foreign languages. Lotze, (2018) argues that before AI dialogic systems can fully replace human language teachers, they still need to meet several conditions, such as common understanding, originality, and impromptu improvisation.

It is important to acknowledge the current state of technical limitations and the fact that AI is not yet prepared to replace educators, according to openici and Kerr (2017). However, they went on to say that if AI's full potential is utilized, human capacities and prospects for research, teaching, and learning will increase. Therefore, integrating AI into language acquisition requires a strong educational perspective, where technologies must work in partnership with strong principles and thoughts (Missett et al., 2014). The study simply looked at the opinions of the students; it didn't measure how much the use of these AI tools improved students' writing skills or consider the opinions of the instructors. As such, it might not provide a good picture of how students' writing standards are impacted by AI writing tools. Furthermore, the study did not examine the potential negative effects of students being too reliant on AI tools or the long-term effects of using these resources on students' writing abilities, despite worries raised by some educators. To completely understand the effects and potential drawbacks of utilizing AI writing tools in EFL classrooms, more studies must include these limitations (Al Mahmud, 2023). Because the results and conclusions of the current research are based on a relatively small experimental sample, it would be advantageous if studies used larger participant numbers to examine the extent of the supportive effect of the most recent and updated AI tools with more user-friendly writing tools in the second language setting. The breadth of English writing skills may be assessed with the use of these studies. Additionally, to determine if and to what extent the length of AI-enabled writing activities influences the development of writing abilities, future research may employ different study periods. The field of AI-assisted writing in second language instruction might benefit from studies evaluating the relative merits of different digital writing tools. Additionally, future studies should link teachers' and students' assessments of the value of AI tools in enhancing the writing skills of English as a foreign language learners to help participants view these important online programs from two different perspectives (Al Mahmud, 2023).

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## 7. CONCLUSION

In the digital age, technical advancements have forced the present generation to adapt to and cope with the changes (Nisak & Ishlahiyah, 2023). Predictive texts and AI-based learning agents in general are therefore becoming more and more popular in education ( Fung, 2010; Abrams and Davis, 2016; Waldron et al., 2017). The findings demonstrated the advantages of syntactic competence and lexical inventiveness in the formulation of complex sentences, as well as the considerable improvement in undergraduate students' writing skills following the adoption of AI techniques. This study highlights the need to address students' mental health and skill development in the quickly evolving field of AI-assisted education, with wide-ranging consequences for educators and policymakers. To provide engaging and motivating writing tasks supported by AI, EFL instructors and teachers may consider developing specific AI-assisted language learning packages (Song & Song, 2023).

## Competing Interests

The author declares no competing interests. This research was conducted independently, and there are no financial or other relationships that could potentially bias the interpretation or presentation of the findings.

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