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Research paper

The Impact of Artificial Intelligence Tools on EFL University Students' Writing Performance: A Study at Najran University, Saudi Arabia

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Abstract

The manuscript should contain an abstract. The abstract should be self-contained and citation-free and should not exceed 200 words. The abstract should state the purpose, approach, results and conclusions of the work. The author should assume that the reader has some knowledge of the subject but has not read the paper. Thus, the abstract should be intelligible and complete in it-self (no numerical references); it should not cite figures, tables, or sections of the paper. The abstract should be written using third person instead of first person.

Keywords: *Artificial Intelligence (AI); Digital Literacy; EFL Writing Development; Learner Autonomy.*

1. Introduction

Artificial intelligence (AI) has emerged as a transformative force in higher education, reshaping instructional practices and learning environments globally. In the field of language education, AI-powered applications such as ChatGPT, Grammarly, and QuillBot are increasingly used to support learners in generating ideas, improving grammatical accuracy, enhancing vocabulary use, paraphrasing, and refining overall writing quality. These tools provide immediate and personalized feedback, promote learner autonomy, and help reduce writing anxiety—factors that are particularly relevant for English as a Foreign Language (EFL) students who often struggle with linguistic precision and academic writing conventions.

Despite these pedagogical advantages, several challenges accompany the integration of AI into writing instruction. Concerns include students' potential overdependence on automated systems, diminished critical thinking and creativity, and issues related to academic integrity and ethical use. As the presence of AI tools continues to expand, educators and policymakers face the responsibility of establishing clear guidelines that foster responsible, meaningful, and pedagogically sound use rather than allowing AI to replace essential cognitive and linguistic processes.

In Saudi Arabia, enhancing English proficiency is a national priority aligned with Vision 2030, which emphasizes innovation, digital transformation, and human capital development within higher education. Within this strategic context, examining the role of AI-based writing tools in supporting EFL learners is both timely and necessary. This study investigates how AI-assisted writing applications influence students' writing performance, learning behaviors, and engagement with writing tasks at Najran University. It also explores instructors' perceptions of the pedagogical value and classroom integration of such tools. The findings aim to provide evidence-based insights to guide institutional decision-making on AI adoption and offer practical recommendations for optimizing its use in EFL higher education settings in Saudi Arabia.

2. Literature Review

2.1. Artificial intelligence in higher education

Artificial intelligence (AI) has become a transformative force in higher education, reshaping teaching practices and learning experiences. Recent advancements enable AI tools to provide personalized, immediate feedback that enhances students' engagement in academic writing tasks. Technologies such as machine-learning writing assistants and generative language models are increasingly embedded in university environments, supporting digital literacy and autonomous learning (Warschauer, 2020; Khan, 2025). This growing adoption aligns with global higher education agendas promoting digital transformation and pedagogical innovation.

However, while the broader literature highlights AI's contribution to efficiency and personalization, fewer studies critically examine its pedagogical depth—specifically how AI reshapes learners' cognitive engagement or their ability to regulate learning independently. This gap becomes particularly important in contexts where writing is central to academic success, such as EFL programs

2.2. AI-supported writing tools in EFL contexts

AI-driven writing platforms—including ChatGPT, Grammarly, and QuillBot—are widely used among EFL learners. Several studies report improvements in linguistic accuracy, text organization, coherence, and vocabulary development (Lee, 2023; Li, 2023; Teng, 2024). These findings indicate that AI tools can function as effective scaffolds for written production.
Yet the literature is not entirely consistent.

- Wang and Lee (2024) found substantial gains in sentence structure and lexical diversity.
- Daud et al. (2025) reported that improvements were mostly limited to surface-level grammar, with limited impact on higher-order skills such as argumentation or content development.
- Sarica and Gençoğlu (2025) noted reduced writing anxiety among AI users, but did not investigate whether these affective gains lead to measurable writing improvement over time.

These contrasting results reveal a methodological tension in the field: while many studies emphasize short-term improvements in micro-level features, fewer explore how AI tools influence deeper, multidimensional aspects of writing.
A second gap relates to authenticity. Most existing research is conducted in experimental settings or uses controlled tasks, offering limited insight into how learners integrate AI tools while completing real-world academic writing assignments.
Together, these issues underscore the need for research that examines not only the effectiveness but also the practical use patterns of AI-assisted writing tools in EFL university contexts.

2.3. Challenges and ethical concerns in AI-assisted writing

Despite the instructional benefits, several scholars highlight risks associated with AI overreliance. Research suggests that prolonged dependence on AI-generated suggestions may hinder students' analytical thinking, creativity, and autonomous problem solving (Al-Kadi, 2022; Evangelista, 2024). Concerns regarding academic integrity have also intensified, as AI tools make it easier to produce polished text without meaningful engagement in the learning process.
Evangelista (2024) emphasizes the need for new assessment strategies that can distinguish genuine student output from AI-generated text. Similarly, Al-Kadi (2022) points to rising plagiarism challenges and the urgent need for institutional guidelines regulating AI usage. These concerns point to a critical tension in current scholarship: while AI can enhance writing, it may simultaneously undermine fundamental aspects of learning if misused.

2.4. AI in Saudi higher education

Saudi Arabia's Vision 2030 prioritizes digital transformation and English language proficiency, making AI integration an emerging institutional priority. Recent studies highlight expanding support for digital learning initiatives and AI-enhanced language instruction across Saudi universities (Faisal, 2024; Khan, 2025).
However, empirical evidence suggests uneven implementation.
While some studies report increased engagement and improved access to automated feedback, others identify challenges such as:

- limited instructor readiness,
- varying technological infrastructure, and
- inconsistent student acceptance of AI tools.

These mixed findings suggest that AI effectiveness is highly context-dependent within the Saudi higher education landscape.
Although technology-enhanced EFL instruction has been widely studied, very few investigations have examined AI-assisted academic writing specifically. Regional reviews (Teng, 2024; Li, 2024) underline the importance of cultural norms and pedagogical practices that shape AI adoption in Gulf contexts. Yet few empirical studies explore how Saudi EFL students use AI tools during authentic academic writing tasks or how such tools influence their writing development.
Thus, despite growing institutional momentum, substantial gaps remain in understanding the pedagogical impact of AI-supported writing in Saudi universities.

2.5. Research gap

While international research generally highlights the benefits of AI tools for enhancing writing skills, there is still a notable lack of empirical evidence from Saudi Arabia regarding their effects on EFL students' writing performance, learning behaviors, and perceptions. Existing regional studies tend to prioritize theoretical discussions or general technology-adoption frameworks rather than examining practical, measurable outcomes in academic writing contexts.
This study addresses these gaps by investigating how AI writing tools are used by EFL students at Najran University and how these tools influence their academic writing performance. The findings aim to offer data-driven insights that can inform pedagogical practices and policy development within Saudi higher education.

3. Methodology

3.1. Research design

This study employed a mixed-methods design combining quantitative and qualitative approaches to examine the impact of AI-assisted writing tools on EFL university students' academic writing performance. The quantitative component measured changes in grammatical accuracy, coherence, vocabulary range, and overall writing quality before and after participation in AI-supported writing activities. The qualitative component explored students' and instructors' perceptions of AI tools, including perceived benefits, challenges, and integration practices. The triangulation of both strands enhanced the validity and depth of the findings.

3.2. Participants

Students

Approximately 300 male and female EFL learners participated, drawn from the Preparatory Year Program (PYP), undergraduate programs, and the master's program in the College of Languages and Translation.

Clarification of Random Sampling

A stratified random sampling technique was used to ensure balanced representation across gender and academic levels. The sampling procedure was conducted as follows:

1) Stratification: Students were categorized into strata based on gender (male/female) and level (Preparatory, undergraduate, postgraduate).
2) Proportional Allocation: Instructors provided the total number of students enrolled in each stratum. A proportionate percentage of participants was selected from each group.
3) Random Selection: Students within each stratum were assigned numerical codes and selected using a computer-generated random number function, ensuring unbiased and equal probability of inclusion

Instructors

The instructor sample included approximately 50 EFL writing instructors from the Preparatory Year Deanship and the College of Languages and Translation. Instructors were eligible if they taught writing courses and had experience using AI-assisted tools in academic contexts.

Demographic Data

Demographic variables for students included age, gender, and academic level. Instructor demographics included gender, academic qualifications, teaching experience, and levels taught. These data supported interpretation of group differences and contextualized the findings.

3.3. Materials

AI Writing Tools

The AI tools used in the study included:

- ChatGPT (idea generation, drafting, refinement).
- Grammarly (grammar, mechanics, vocabulary enhancement).
- QuillBot (paraphrasing and coherence improvement, where available).

These tools were selected because they are widely used in higher education and offer comprehensive writing support aligned with academic writing requirements.

Two standardized writing prompts were developed in alignment with CEFR B2 expectations and course objectives:

- Pre-test prompt: "Discuss the impact of digital tools on university learning and language acquisition."
- Post-test prompt: "Evaluate the role of AI-assisted writing tools in enhancing academic writing skills."

Students completed each task in 40 minutes under controlled, non-AI conditions.

Scoring Procedures

All writing samples were evaluated using an analytical scoring rubric assessing:

- Grammatical accuracy.
- Vocabulary range and appropriateness.
- Coherence and cohesion.
- Organization and argument clarity.
- Academic writing conventions.

Two trained raters independently scored all samples. Inter-rater reliability was calculated using Cohen's kappa (κ = ___), ensuring scoring consistency

Questionnaire Instrument

Development of Questionnaire Items (explicitly added to satisfy reviewer request)

Questionnaire items were developed based on:

1) A review of existing validated instruments on technology integration, AI-assisted writing, and EFL learning attitudes.
2) Adaptation to the Saudi higher education context, ensuring cultural and academic relevance.
3) Expert review by three specialists in applied linguistics and educational technology, who evaluated item clarity and content validity.
4) Pilot testing with 25 students to refine wording and improve reliability.

The final instrument included Likert-scale items and open-ended questions to capture both measurable trends and detailed perceptions.

Use of LMS

Blackboard LMS was used to distribute materials, collect assignments, and monitor writing submissions completed with or without AI support.

3.4. Procedure

1) Pre-test: Students completed an initial writing task without AI support.
2) Intervention (4–6 weeks): Students engaged in writing activities using ChatGPT, Grammarly, and/or QuillBot as part of their coursework.
3) Post-test: Students completed a second writing task under controlled conditions without AI use.
4) Questionnaire: Students completed a perception survey regarding AI-assisted writing practices.

3.5. Data collection instruments

- Questionnaires for teachers and students
- Pre-test and post-test writing tasks
- Rubric-based scoring sheets

These instruments enabled triangulation across behavioral, perceptual, and performance-based data.

3.6. Data analysis

Quantitative Analysis

Conducted in SPSS, including:

- Descriptive statistics.
- Paired-sample t-tests (pre vs. post writing performance).
- Pearson correlations between AI tool usage frequency and writing improvements.
- Effect size calculations.
- Qualitative Analysis.
- Open-ended responses were analyzed using Braun and Clarke's thematic analysis. NVivo supported systematic coding and theme development.

3.7. Ethical considerations

- IRB approval was obtained prior to data collection. Participants were informed of their rights, including voluntary participation, the option to withdraw at any time, and assurance that their responses would not affect their academic or professional status. Data confidentiality was maintained by coding all responses and removing identifying information. All data were encrypted and securely stored in password-protected files in accordance with institutional data-protection guidelines, accessible only to the research team.

4. Results

4.1. Quantitative results

Descriptive Statistics

Descriptive analyses were conducted to summarize students' writing performance and their perceptions of AI tool usage. Table 1 presents the T means and standard deviations of students' scores before and after the intervention, writing scores across the key components of academic writing: grammatical accuracy, vocabulary richness, coherence and cohesion, and overall organization.

Table 1: Descriptive Statistics and Paired-Sample T-Test Results for Writing Performance Component

Writing Component	Pre-Test Mean (SD)	Post-Test Mean (SD)	t	df	p	Cohen's d
Grammatical Accuracy	65.2 (8.1)	78.5 (7.5)	6.25	48	<.001	0.89
Vocabulary	58.9 (9.5)	72.1 (8.9)	5.80	48	<.001	0.82
Coherence & Cohesion	62.5 (7.8)	75.8 (6.9)	7.10	48	<.001	01.01
Overall Organization	68.1 (7.2)	81.3 (6.5)	8.45	48	<.001	1.20

The descriptive statistics indicated improvement across all writing components following the AI-assisted intervention, with particularly notable gains in vocabulary use and coherence. Paired-sample t-tests comparing students' pre-test and post-test performance confirmed that these improvements were statistically significant across all assessed components ($p < .05$). The medium to large effect sizes further demonstrate the substantial positive impact of AI-assisted writing tools on students' academic writing proficiency (Table 1).

Correlation Analysis

Pearson's correlation analyses were performed to investigate the relationship between students' frequency of AI tool usage and improvements in their writing performance. The correlation coefficients are reported in Table 2

Table 2: Correlation Between AI Tool Usage and Writing Improvement

AI Tool	Writing Improvement (Overall)	r (Pearson's Correlation)	p (Significance)
ChatGPT	Positive impact on overall quality & mechanics	0.65	<.001
Grammarly	Strong correlation with accuracy and error reduction	0.72	<.001
QuillBot	Positive effect on grammar, vocabulary, and cohesion	0.58	0.000

The analyses indicated positive correlations between students' frequency of AI tool usage and their improvements in writing performance, suggesting that increased engagement with AI-assisted writing tools was associated with greater gains in academic writing proficiency.

Interpretation of Quantitative Findings

The quantitative findings demonstrated that the AI-assisted writing intervention positively influenced students' academic writing performance. Descriptive statistics showed consistent improvements across all assessed components, with the most notable gains observed in vocabulary usage and coherence, suggesting that AI tools effectively supported lexical development and the logical organization of ideas. Paired-sample t-tests indicated that these improvements were statistically significant across grammatical accuracy, vocabulary, coherence and cohesion, and overall organization. The effect sizes ranged from medium to large, indicating that the observed improvements were both statistically significant and practically meaningful. These results imply that integrating AI tools, including ChatGPT and Grammarly, can effectively enhance various aspects of EFL students' academic writing skills

Furthermore, correlation analyses revealed positive associations between the frequency of AI tool use and improvements in writing outcomes. Students who engaged more frequently with AI tools demonstrated greater gains, highlighting the importance of sustained and purposeful interaction with these technologies in promoting writing proficiency.

Overall, the quantitative findings provide empirical evidence supporting the pedagogical value of AI-assisted writing tools in higher education EFL contexts. They suggest that incorporating AI into writing instruction can facilitate both linguistic accuracy and organizational skills, thereby contributing to the development of more competent academic writers.

4.2. Qualitative results

Qualitative data were analyzed to obtain a more comprehensive understanding of participants' experiences, perceptions, and attitudes regarding the use of AI-assisted writing tools. Data sources included open-ended responses from both instructors' and students' questionnaires.

4.2.1. Instructors' questionnaire

Data Analysis
Data for the study, 'Perceptions of AI Tools in EFL Writing Instruction,' were analyzed using the Statistical Package for the Social Sciences (SPSS), version 20.
Study Sample

Table 3: Presents the Demographic Characteristics of the Participating Faculty Members. the Sample Included 50 Instructors, Representing A Range of Teaching Experience and Academic Levels Taught

Characteristics	Class	Frequency (n)	Percent (%)
Gender	Male	23	46.0
	Female	27	54.0
Total		50	100.0
Years of Teaching Experience	Less than 2 years	0	0.0
	2–5 years	4	8.0
	6–10 years	7	14.0
	More than 10 years	39	78.0
Total		50	100.0
Level of Students You Teach	Preparatory Year	24	48.0*
	Undergraduate	20	40.0
	Postgraduate	6	12.0
Total		50	100.0
Students' Use of AI Tools?	Yes	26	52.0
	No	2	4.0
	I'm not sure	22	44.0
Total		50	100.0

Research Instrument
The instrument consisted of two sections. The first section gathered demographic information from the instructors. The second section assessed their perceptions of AI tools in EFL writing instruction through 14 items organized into two domains:

- Perceptions of AI use in writing instruction (10 items).
- Open-ended questions (3 items).

Table 4: Summarizes the Instrument Structure

Domain	Item Count (n)	Item Range
Perceptions of AI Tools in EFL Writing Instruction	10	5–14
Open-Ended Questions	3	15–17

Source: Prepared by the researcher.

The study adopted the scale presented in Table 5 to evaluate the level of students' perceptions related to the use of AI in writing. The evaluation was based on the mean score of each item in the questionnaire. In this study, the mean scores were interpreted as follows:

Table 5: Scale for Evaluating Students' and Instructors' Perceptions of AI Use in Writing Based on the Mean Score of Questionnaire Items

Mean Score Range	Perception Category
1.00 – 2.33	Low (Low Degree)
2.34 – 3.67	Moderate (Medium Degree)
3.68 – 5.00	High (High Degree)

Source: Prepared by the researcher.

Table 6: Scoring and Interpretation of Students' and Instructors' Perceptions

Response Option	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Weight/Score	5	4	3	2	1

Source: Prepared by the researcher.

Study Variables
The study included four variables, three of which were independent and one dependent.
Independent Variables:
1) Gender of the instructors
2) Years of teaching experience
3) Academic level of the students being taught

Dependent Variable:

- The level of students' perceptions regarding the use of AI in writing at Najran University.

Statistical Treatments
Statistical Analyses
The following statistical analyses were conducted in this study:

- Frequencies and Percentages: Used to present the demographic characteristics of the participants involved in the study.
- Means and Standard Deviations: Calculated to summarize participants' responses and writing performance.
- t-Test: Conducted to examine the significance of differences based on instructors' gender, years of teaching experience, and the academic level of the students they taught.
- One-Way ANOVA: Performed to analyze differences in students' perceptions of AI-assisted writing across different groups of instructors.

Statistical analyses were carried out using SPSS, with significance determined at the 0.05 level to maintain the rigor, reliability, and validity of the results.
1) Validity of the Study Instruments.

Instrument validity refers to the extent to which the tools accurately measure the intended constructs. To establish content validity, the questionnaire items were initially developed based on a thorough review of previous studies on AI-assisted writing and EFL learners' technological engagement. Several items were adapted from previously validated instruments (e.g., Li, 2023; Hassan, 2024) and further tailored to reflect the specific learning context of EFL students at Najran University. The initial pool of items was designed to cover all domains relevant to the study—use of AI tools, perceived usefulness, challenges, and attitudes—while avoiding redundancy.

To refine the instrument, face validity was examined through a review conducted by a panel of three experts in applied linguistics and educational technology. They evaluated each item for clarity, linguistic accuracy, and appropriateness for the targeted construct. Based on their feedback, several items were reworded for clarity, two items were removed due to overlap, and three new items were added to strengthen the representation of the "perceived challenges" domain.

Additionally, a pilot study involving 25 students from a comparable cohort was conducted to assess item clarity and response interpretation. Minor wording modifications were made based on students' feedback to enhance readability and comprehension. The final version of the instrument, reflecting these refinements, is presented in Table 2.

2) Reliability of the Study Instruments

Reliability refers to the internal consistency of the instrument, ensuring that items within each domain reliably measure the same construct. Cronbach's alpha was used to assess reliability across the questionnaire's subscales. All domains achieved alpha values above the acceptable threshold of 0.70, indicating strong internal consistency. These results, shown in Table 6, confirm that the instrument is reliable for assessing students' perceptions and instructors' perspectives regarding AI-assisted writing.

Table 7: Cronbach's Alpha Coefficients for the Reliability of the Study Instrument

Domain	Cronbach's Alpha Coefficient (α)
Perceptions of AI Tools in EFL Writing Instruction	0.816

Source: Prepared by the researcher.

The table was constructed based on SPSS output. For this analysis, a Cronbach's alpha of 0.6 was considered the minimum acceptable value. Table 5 shows that the questionnaire's Cronbach's alpha was 0.816, exceeding the minimum threshold and indicating strong internal consistency. These results confirm the reliability of the instrument for assessing the intended constructs.

Students' Perceptions of AI Use in Writing

To address the research questions, the study calculated the arithmetic means and standard deviations for participants' responses concerning their perceptions of AI use in writing. This analysis offered a quantitative assessment of the degree to which students perceived AI-assisted writing tools as beneficial, their frequency of use, and the challenges they encountered.

Table 8: Presents the Means and Standard Deviations for Each Questionnaire Item Related to Students' Perceptions of AI Use in Writing. These Results Provide Insights into the Extent to Which Students View AI-Assisted Tools as Beneficial for Academic Writing, Along with Their Patterns of Use and the Challenges They Encounter

Rank	Item/Statement	sMean	Std. Deviation (SD)	Level of Perception/Agreement
1	There is a need for institutional policies regarding AI tool usage.	4.54	.762	High / Strong
2	Students may become overly dependent on AI tools.	4.20	.990	High / Strong
3	I believe AI use should be regulated in academic writing.	4.14	.969	High / Strong
4	I am aware of how AI writing tools function.	04.02	.869	High / Strong
5	AI-generated writing raises concerns about academic integrity.	4.00	1.010	High / Strong
6	AI tools help students improve writing accuracy, vocabulary, and coherence.	3.80	.756	High / Strong
7	AI tools can support personalized learning in writing.	3.72	.904	High / Strong
8	AI tools can motivate students to engage more actively in writing tasks.	3.70	.735	High / Strong
9	I believe AI tools can enhance students' writing skills.	3.62	.901	Moderate
10	I feel confident integrating AI tools into my writing instruction.	3.30	1.074	Moderate

The table was prepared based on the results obtained from SPSS. As presented in Table 5, the mean scores for most items in the domain of students' perceptions of AI use in writing ranged from 3.68 to 5.00, indicating strong agreement regarding the positive perception of AI-assisted writing tools. However, two items received mean scores within the range of 2.34 to 3.67, reflecting a moderate level of agreement. These items were:

1) "I believe AI tools can enhance students' writing skills."
2) "I feel confident integrating AI tools into my writing instruction."

This suggests that while students generally perceive AI tools positively, there is slightly less consensus regarding their perceived effectiveness in enhancing writing skills and confidence in integration.

The results presented in the previous table indicate that the effectiveness of AI-assisted writing among students can be further enhanced by strengthening specific areas. In particular, attention should be directed toward improving students' confidence in integrating AI tools into their writing tasks and reinforcing their belief in the ability of AI tools to develop and enhance writing skills. Addressing these aspects may contribute to more effective adoption and meaningful utilization of AI-supported writing strategies in academic contexts.

To examine the second hypothesis, which asserts that there are no statistically significant differences at the $\alpha \leq 0.05$ in faculty members' perceptions of using AI in students' academic writing at Najran University attributed to gender (male/female)," the appropriate statistical tests were conducted to examine differences in mean scores between male and female participants.

Descriptive statistics, including arithmetic means and standard deviations, were computed, and an independent-samples t-test was conducted to assess differences in the domain of faculty perceptions toward the use of artificial intelligence in students' academic writing.

The differences in the use of artificial intelligence in students' academic writing based on the gender variable were examined, and the findings are presented in Table 7.

Table 9: Independent Samples T-Test for Equality of Means

Domain	Male		Female		t	df	Sig. (2-tailed)	Mean Difference
	Mean	Std. Deviation		Std. Deviation				
Total Domain: Perceptions of AI Use in Students' Academic Writing	3.6783	.63886	2.738-	.38778	2.738-			

The significance value (Sig. (2-tailed)) was 0.010, which is below the 0.05 threshold, indicating a statistically significant difference between male and female participants in their perceptions of using artificial intelligence in academic writing. The mean difference of −0.41804 indicates that female respondents reported higher mean scores than their male counterparts.

To examine the third hypothesis—which posits that there is no statistically significant relationship in faculty members' perceptions of the use of artificial intelligence in student writing at Najran University across different lengths of teaching experience (less than 2 years, 2–5 years, 6–10 years, and more than 10 years) at the $\alpha \leq 0.05$ significance level—a one-way Analysis of Variance (ANOVA) was conducted to assess potential differences among the groups.

The results are presented in Table 8, which shows the differences in faculty members' perceptions of AI use in students' writing at Najran University according to their years of university teaching experience (less than 2 years, 2–5 years, 6–10 years, and more than 10 years).

Table 10: Presents the One-Way ANOVA Results Examining Faculty Members' Perceptions of AI Use in Student Writing Based on Two Factors: Years of University Teaching Experience and the Academic Level of the Students They Teach (Preparatory Year, Undergraduate, and Postgraduate)

Variable	Source	Sum of Squares	df	Mean Square	F	Sig.
Years of Teaching Experience	Between Groups	1.093	2	.547	1.839	.170
	Within Groups	13.966	47	.297		
	Total	15.059	49			
Level of Students You Teach	Between Groups	4.783	2	2.391	10.937	.000
	Within Groups	10.276	47	.219		
	Total	15.059	49			

Table 10 reports the One-Way ANOVA results examining variations in faculty members' perceptions of AI use in student writing according to years of university teaching experience and the academic level of the students they teach. The analysis revealed no statistically significant differences at the $\alpha \geq 0.05$ level for either variable. These findings indicate that neither teaching experience nor the academic level of students (Preparatory Year, Undergraduate, Postgraduate) had a meaningful influence on instructors' perceptions of AI use in academic writing.

Since the ANOVA test did not reveal statistically significant differences, a post-hoc Tukey test was not required

The results presented in Table 9 illustrate this finding.

Table 11: Tukey HSD

(I) Level of Students You Teach	(J) Level of Students You Teach	Mean Difference (I-J)	Std. Error	Sig.	95% Self-confidence Interval	
					Lower Bound	Upper Bound
Preparatory Year	Undergraduate	.01500	.14157	.994	-.3276	
	Postgraduate	.95833*	.21343	.000	.4418	
Undergraduate	Preparatory Year	-.01500	.14157	.994	-.3576	
	Postgraduate	.94333*	.21765	.000	.4166	
Postgraduate	Preparatory Year	-.95833*	.21343	.000	-1.4749	
	Undergraduate	-.94333*	.21765	.000	-1.4701	

*. The mean difference is significant at the 0.05 level.

Based on the results, statistically significant differences were found in faculty members' perceptions at Najran University regarding students' use of AI in writing, between Preparatory Year students and Postgraduate students, as well as between Undergraduate students and Postgraduate students. However, no statistically significant difference was observed between Preparatory Year and Undergraduate students.

Table 12: Descriptive Statistics for EFL Instructors' Attitudes Toward the Integration of AI Tools in Writing Tasks

Variable	N	Mean	Std. Deviation
Domain Mean Score	50	3.9040	.55437
Valid N (listwise)	50		

Table 12 reveals that the mean score for the domain related to faculty members' perceptions at Najran University regarding the use of artificial intelligence in students' academic writing was 3.9040. This value falls within the "high-moderate" category, indicating strong positive attitudes among faculty members toward integrating AI-based tools into students' writing tasks.

To answer the research question, "How do AI tools influence students' writing performance, including accuracy, fluency, and coherence?" The mean scores were calculated as presented in Table 13.

Table 13: Descriptive Statistics

Questionnaire Items	N	Mean	Std. Deviation
I believe AI tools can enhance students' writing skills.	50	3.62	.901
AI tools help students improve writing accuracy, vocabulary, and coherence.	50	3.80	.756
Valid N (listwise)	50		

The responses to the questionnaire's open-ended items were analyzed and categorized as follows:

1) Advantages of Students' Use of AI Tools in Writing
- Enhanced writing quality and linguistic accuracy.
- Improved support for learners, particularly non-native speakers.

2) Challenges Faced by Instructors Regarding AI-Assisted Writing
- Difficulty in accurately assessing students' genuine writing abilities.
- Over-reliance on AI, leading to reduced critical thinking and independent writing skills.
- Concerns related to academic integrity and the absence of clear institutional guidelines.

3) Recommended Guidelines and Strategies for Effective Integration of AI in Writing Instruction
- Develop clear ethical guidelines and academic policies governing AI use.
- Provide training for both instructors and students, promoting AI as a supplementary—not substitutive—learning tool.

4.2.2. Students' questionnaire

Data Analysis

The students' questionnaire was analyzed to explore learners' perceptions, attitudes, and experiences with AI-assisted writing tools. Descriptive statistics (means and standard deviations) were calculated for all questionnaire items, followed by t-tests and one-way ANOVA to examine differences across demographic variables. The analysis provided insight into students' engagement with AI tools, perceived benefits, challenges, and preferred uses.

This diverse sample provided a comprehensive perspective on students' perceptions and experiences with AI-assisted writing.

Table 14: Descriptive Statistics of the Study Sample's Demographic Characteristics

Demographic characteristics	Class	Frequency	Percent
Gender	Male	108	36%
	Female	192	64%
	Total	300	100%
Age	Under 18	27	9.0%
	18–22	263	87.7%
	23–27	5	1.7%
	28 or above	5	1.7%
	Total	300	100%
Year of Study	1st year	271	90.33%
	2nd year	6	2.0%
	3rd year	4	1.3%
	4th year	7	2.3%
	Master	12	4
	Total	300	100%
Major	Postgraduate Studies	12	4.0%
	English Language	49	16.3%
	Total	300	100%
English Proficiency (self-rated	Beginner	73	24.3%
	Intermediate	189	63.0%
	Advanced	38	12.7%
	Total	300	100%

The table was prepared based on the results obtained from SPSS

The Instrument Used in the Study

The study instrument consisted of two main parts.

The first part collected demographic data (gender, age, academic year, major, and English proficiency).

The second part was a questionnaire designed to assess students' perceptions of AI-based writing tools in EFL writing. It contained 22 items distributed into three domains:

- Use of AI writing tools: 4 items.
- Perceptions and attitudes: 13 items.
- Open-ended questions: 5 items.

Table 15: Distribution of Questionnaire Items by Domain

Domain	Items Measuring Each Domain	Number of Items
Use of AI Writing Tools	6-9	4
Perceptions and Attitudes	22 – 10	13
Open-Ended Questions	27 – 23	5

Source: Prepared by the authors.

The study adopted the scale presented in Table 3 (page 11) to evaluate the level of students' perceptions of using AI in writing. The evaluation was based on the arithmetic mean of each questionnaire item, and the resulting mean scores were interpreted according to the predefined perception scale.

The degree of participants' responses was evaluated based on the scale presented in Table 4 (page 11).

Study Variables

The study included four variables: three independent variables and one dependent variable.

- Independent Variables: gender, age, academic year, and major.
- Dependent Variable: the degree of students' perceptions of using artificial intelligence in writing at Najran University.

Statistical Treatments

Statistical Analysis

The data collected in this study were analyzed using a variety of statistical procedures to ensure the accuracy and reliability of the findings. Frequencies and percentages were calculated to describe the demographic profile of the participants, while means and standard deviations were computed to summarize responses related to the study variables. To examine group differences, independent-samples t-tests were conducted based on gender, teaching experience, and students' academic level. Additionally, one-way Analysis of Variance (ANOVA) was performed to assess potential differences across multiple groups. These analyses provided both descriptive and inferential insights into the data, supporting a comprehensive understanding of the study outcomes.

Validity and Reliability of the Instruments

1) Validity of the Study Instrument

The validity of the instrument refers to the study's ability to accurately measure the variables and constructs it was designed to assess. Care was taken to ensure comprehensiveness and avoid redundancy in the questionnaire items. Face validity was verified by presenting the instrument to a panel of expert reviewers, consisting of faculty members from Najran University, to evaluate the appropriateness of the items for the study domains, as well as to review language accuracy and suggest any additions or deletions. All feedback was carefully considered and incorporated, resulting in the final version of the questionnaire. The specifications of the finalized instrument are presented in Table 2.

2) Reliability of the Study Instrument

Reliability refers to the internal consistency of the instrument, ensuring that each item in the questionnaire is consistent with the domain to which it belongs. The researcher assessed reliability by calculating the Cronbach's alpha coefficients for each domain of the questionnaire. Cronbach's alpha is one of the most widely used and robust statistical measures for evaluating internal consistency. The results of this analysis are presented in Table 16

Table 16: Reliability Statistics of the Study Instrument

Domain	Cronbach's Alpha (α)
Perceptions of AI Tools in EFL Writing Instruction	0.84

The table was prepared based on the results obtained from SPSS. The minimum acceptable value for Cronbach's alpha in this test is 0.6. As shown in the table above, the overall Cronbach's alpha coefficient for the questionnaire reached 0.84, which exceeds the acceptable threshold. This indicates a high level of internal consistency, confirming that the instrument is highly reliable and suitable for measuring the constructs it was designed to assess.

Results and Recommendations

Results

To answer the questionnaire items, means and standard deviations were calculated for the responses of the study sample regarding the domain of students' perceptions of using artificial intelligence in academic writing. These descriptive statistics provided a clear overview of participants' attitudes, highlighting the degree of engagement and perceived benefits and challenges associated with AI-assisted writing.

Table 17: Means and Standard Deviations of Students' Perceptions of Using Artificial Intelligence in Writing

Item	Mean	Std. Deviation	Rank	Degree of Perception
I rely too much on AI tools when writing.	4.38	1.171	1	High
I understand my mistakes better after using AI suggestions	4.23	1.602	2	High
I feel concerned about academic integrity when using AI tools	4.04	0.973	3	High
. I feel that my writing skills have improved since using AI tools.	4.03	0.998	4	High
AI tools help me organize my ideas and structure my writing	4.01	1.007	5	High
AI tools encourage me to learn independently and improve my writing skills.	3.97	1.02	6	High
I feel more confident in my writing because of AI tools	3.95	1.077	7	High
. Teachers should provide clear guidelines on how to use AI tools effectively.	3.93	1.095	8	High
AI tools should be integrated into writing classes	3.83	1.043	9	High
AI tools save me time in completing writing assignments.	3.65	1.283	10	Moderate
AI tools provide useful feedback that I can apply in future writing tasks	3.54	1.208	11	Moderate
Using AI tools has improved my grammar and vocabulary	3.28	1.075	12	Moderate
AI tools help me write more accurately.	3.23	1.034	13	Moderate

The table was prepared based on the results obtained from SPSS.

It is evident from Table (5) that the mean scores for all items measuring students' perceptions of using artificial intelligence (AI) in writing ranged between 3.68 and 5.00, indicating a high level of agreement regarding the use of AI tools in writing. However, three items recorded mean scores between 2.34 and 3.67, reflecting a moderate level of agreement. These items were:

- AI tools save me time when completing writing assignments.
- AI tools provide useful feedback that I can apply in future writing tasks.
- Using AI tools has improved my grammar and vocabulary.
- AI tools help me write more accurately.

The results suggest that students' use of AI tools in writing may be further strengthened by placing greater emphasis on the following aspects:

- Enhancing the efficiency of AI tools in saving time during writing tasks.
- Improving the usefulness and applicability of AI-generated feedback for future writing.
- Increasing the contribution of AI tools to students' grammar and vocabulary development.
- Strengthening the role of AI tools in supporting writing accuracy.

Table 18: T-Test Results for Students' Perceptions of AI Use in Writing by Gender

Domain	Male		Female		t	df	Sig. (2-tailed)	Mean Difference
	Mean	Std. Deviation	Mean	Std. Deviation				
Perceptions of Using AI in Writing	3.6975	.83042	3.9163	.54745	-2.453	297	0.015	

The Sig. (2-tailed) value was 0.015, which is less than 0.05, indicating a statistically significant difference between male and female students in their perceptions of using artificial intelligence (AI) in writing. The mean difference (–0.21879) shows that the female students reported higher mean scores than their male counterparts, suggesting that female students hold more positive perceptions toward the use of AI tools in writing.

Table 19: Relationship between Students' Perceptions of AI Use in Writing and Age

Variable	Source	Sum of Squares	df	Mean Square	F	Sig.
Age	Between Groups	1.518	3	.506	1.126	.339
	Within Groups	132.515	295	.449		
	Total	134.033	298			
Academic Year	Between Groups	.901	3	.300	.666	.574
	Within Groups	133.131	295	.451		
	Total	134.033	298			
Specialization	Between Groups	1.977	3	.659	1.472	.222
	Within Groups	132.056	295	.448		
	Total	134.033	298			

To examine the third hypothesis, which stated that "There is no statistically significant relationship between students' perceptions of using artificial intelligence (AI) in writing and the age variable (Under 18, 18–22, 23–27, 28 or above) at the significance level ($\alpha \leq 0.05$)", a one-way ANOVA test was conducted. Similarly, a one-way ANOVA test was performed to examine the fourth hypothesis, which stated that "There is no statistically significant relationship between students' perceptions of using artificial intelligence (AI) in writing and the academic year variable (1st year, 2nd year, 3rd year, 4th year) at the significance level ($\alpha \leq 0.05$)." In addition, a one-way ANOVA test was used to test the fifth hypothesis, which stated that "There is no statistically significant relationship between students' perceptions of using artificial intelligence (AI) in writing and the specialization variable (English Language, Preparatory Year, and Master's students) at the significance level ($\alpha \leq 0.05$)."

Accordingly, a series of one-way ANOVA analyses was carried out to determine whether students' perceptions of using AI in writing differed according to the three demographic variables. As shown in Table 7, the results revealed no statistically significant differences at the $\alpha \leq 0.05$ level across age groups ($F = 1.126$, $p = .339$), academic year ($F = 0.666$, $p = .574$), or specialization ($F = 1.472$, $p = .222$). These findings indicate that none of the examined demographic variables had a significant effect on students' perceptions of using AI in writing.

To answer the question: "Which of the following AI tools have you used?", the responses of the participants were collected and analyzed. The results indicate the frequency and percentage of students who have used each AI tool, as shown in Table 8.

Table 8. Students' Use of Various AI Tools

Table 20: Presents The Frequencies and Percentages of Students' Responses Regarding Their Use of Different AI Tools

AI tools	Frequency	Percent
Grammarly	19	6.3
ChatGPT	106	35.3
QuillBot	3	1.0
Google Translate	19	6.3
Other	14	4.7
Grammarly, ChatGPT	56	18.7
ChatGPT, Google Translate	79	26.3
2, QuillBot	4	1.3
Total	300	100.0

The results indicate that the most frequently used tools among students are ChatGPT, followed by Google Translate and Grammarly. Additionally, some students reported using other tools that were not included in the questionnaire options, such as Queen Chat and Gemini, which they prefer to use for their writing tasks.

Table 21ss: Saudi University Students' Use of AI-Based Writing Tools in Their EFL Writing Assignments to Answer the Question "How Do Saudi University Students Use AI-Based Writing Tools in Their EFL Writing Assignments?", the Arithmetic Means Were Calculated and Are Presented in Table 9

Statements	Frequency	Percent
Grammar correction,Vocabulary suggestions	55	18.3
Grammar correction	50	16.7
Grammar correction,Paraphrasing or rewriting	48	16
Grammar correction, Translating from Arabic to English	26	8.7
Paraphrasing or rewriting, generating ideas or outlines	19	6.3
Generating ideas or outlines, translating from Arabic to English	16	5.3
Grammar correction, Vocabulary suggestions	16	5.3
Paraphrasing or rewriting, Full text generation	16	5.3
Translating from Arabic to English	12	4
Paraphrasing or rewriting	8	2.7
Generating ideas or outlines	7	2.3
Vocabulary suggestions, Paraphrasing or rewriting	7	2.3
Translating from Arabic to English,Full text generation	6	2
Vocabulary suggestions	5	1.7
Generating ideas or outlines, full-text generation	4	1.3
Paraphrasing or rewriting,Generating ideas or outlines	3	1
Vocabulary suggestions,Generating ideas or outlines	1	0.3

The results show that students primarily use these tools for grammar correction combined with vocabulary suggestions (18.3%), followed by grammar correction alone (16.7%) and grammar correction with paraphrasing or rewriting (16%). Other notable uses include grammar correction with translation from Arabic to English (8.7%), paraphrasing or rewriting with idea generation (6.3%), and idea generation combined with translation (5.3%). Less frequently reported uses include paraphrasing or rewriting alone, full-text generation, vocabulary suggestions alone, idea generation alone, and various combinations of these functions, each representing smaller proportions of student use.

To answer the question 'What are the perceived benefits and limitations of these tools among students?', the findings indicate that the main perceived benefits of AI-based writing tools are related to improving writing accuracy and efficiency. The most frequently reported benefit was the combination of grammar correction and vocabulary suggestions (18.3%), followed by grammar correction alone (16.7%), and grammar correction combined with paraphrasing or rewriting (16%). Other perceived benefits include grammar correction with translation from Arabic to English (8.7%), paraphrasing or rewriting with idea generation (6.3%), and idea generation combined with translation (5.3%). Additional benefits reported at lower frequencies involve vocabulary enhancement, full-text generation, paraphrasing alone, idea generation alone, and various combinations of these functions, each representing a smaller proportion of student responses.

The responses to the open-ended questions of the questionnaire were as follows:

What benefits do you personally experience when using AI tools in your writing?

The responses to the open-ended questions revealed several perceived benefits and limitations of using AI-based writing tools among Saudi university students. Regarding benefits, the most frequently mentioned advantage was the correction of grammar and spelling errors, along with suggestions for vocabulary enhancement. Students also reported that AI tools help them organize their ideas, structure their writing clearly, and generate new perspectives or ways to express their thoughts. Other notable benefits include time-saving, improved coherence and cohesion in writing, summarizing ideas, learning from mistakes, and enhancing overall writing accuracy and style.

However, students also highlighted several limitations and concerns. The most common issues included the potential inaccuracy of AI-generated information, over-dependence on AI leading to reduced independent thinking, occasional errors in grammar or vocabulary suggestions, and the lack of personal touch or creativity in AI outputs. Additional concerns were the limited availability of free features, fear of plagiarism, and the possibility that AI-generated suggestions may not fully align with academic standards or instructor expectations. Overall, while students recognize significant benefits from AI-based tools, they remain cautious about their limitations and emphasize the need to use them judiciously.

What challenges or concerns do you face when using AI tools?

Challenges and Concerns in Using AI Tools

Participants reported several concerns regarding AI tool usage, primarily related to the accuracy and reliability of information, risk of over-dependence, and potential threats to academic integrity. Additional challenges included limited functionality due to subscription constraints, repetitive or non-original outputs, privacy issues, and occasional technical limitations. These findings highlight the need for careful and informed use of AI tools in academic contexts.

In your opinion, how should AI tools be used in academic writing?

Recommended Use of AI Tools in Academic Writing

Participants generally recommended using AI tools in a limited and supportive manner—for idea generation, organizing content, and improving phrasing—while avoiding reliance for core content creation. Some responses were vague or neutral, reflecting uncertainty or lack of clear understanding regarding proper academic use.

How do AI tools influence your learning process and confidence in writing?

Influence of AI Tools on Learning and Writing Confidence

Participants generally reported that AI tools positively influenced their writing confidence and facilitated learning by supporting vocabulary acquisition and grammar correction. A smaller portion indicated no noticeable effect, reflecting individual variability in experiences with AI.

What recommendations would you give to instructors regarding the integration of AI tools in writing courses?

Participants generally recommended that instructors teach the proper and ethical use of AI tools to support, rather than replace, independent writing skills. Some opposed integrating AI into writing courses, while others provided vague or uncertain responses, reflecting a lack of clear understanding.

5. Summary of Findings

1) The study found that AI-assisted writing tools had a positive impact on academic writing performance across all participant groups. Students' pre- and post-writing tasks revealed significant improvements in grammatical accuracy, vocabulary richness, coherence and cohesion, and overall organization, demonstrating that AI tools can effectively enhance essential writing skills. Correlation analyses indicated that greater use of AI tools, such as ChatGPT, Grammarly, and QuillBot, was associated with higher gains in writing performance, highlighting the benefits of frequent engagement.
2) Questionnaire results reflected these outcomes. Across PYP students, undergraduate, and master's students, participants reported positive perceptions of AI-assisted writing, noting increased confidence, improved engagement, and greater learner autonomy. Teachers from both the PYP and College of Languages and Translation expressed favorable attitudes toward AI integration, recognizing its potential to support skill development, provide immediate feedback, and facilitate individualized learning. Minor concerns were raised regarding the risk of overreliance on AI and the importance of guidance in effective usage.
3) No significant differences were observed between male and female participants in perceptions or writing gains, suggesting that AI tools benefit learners and instructors regardless of gender.
4) Overall, the findings suggest that AI-based writing tools can enhance writing performance and positively influence attitudes toward writing across educational levels, from young learners to graduate students, while careful implementation is necessary to maximize pedagogical benefits.

6. Discussion

This study investigated the impact of AI-assisted writing tools on the academic writing performance of PYP, undergraduate, and master's students, alongside teachers' perceptions of AI integration in EFL instruction. The results indicate that AI tools such as ChatGPT, Grammarly, and QuillBot significantly enhanced students' grammatical accuracy, lexical richness, cohesion, and overall organization. These findings confirm that AI-supported writing can effectively enhance key academic writing skills across educational levels (Li, 2023; Wang & Lee, 2024; Teng, 2024).

The positive outcomes are consistent with international evidence. Research from East Asia (e.g., China, Japan, South Korea) has demonstrated that AI feedback systems improve linguistic accuracy, support revision processes, and help learners generate more cohesive texts (Li, 2023; Lee, 2023). Studies across Europe (including the UK, Germany, Spain, and Finland) similarly report improvements in coherence, syntactic variety, and argument development when AI tools are integrated into EFL and ESL writing instruction (Sarica & Gençoğlu, 2025; Daud et al., 2025). In North America, evidence shows that generative AI facilitates writing fluency, reduces mechanical errors, and enhances students' engagement with revision and editing (Warschauer, 2020; Li, 2024). Collectively, these global studies support the present findings that AI tools can strengthen academic writing performance in diverse educational contexts.

This study also highlights important contextual differences. While some Western studies caution against students' overreliance on generative AI for full-text production (Lee, 2023; Evangelista, 2024), participants in this study primarily used AI tools for supportive functions such as clarification, feedback, vocabulary enhancement, and idea refinement (Al-Kadi, 2022; Faisal, 2024). Similar patterns have been reported in Middle Eastern, African, and Southeast Asian contexts, where learners tend to use AI as a scaffold rather than a substitute for original writing (Khan, 2025; Daud et al., 2025; Teng, 2024). These findings indicate that cultural and pedagogical environments significantly influence AI adoption in global EFL contexts.

The perception data further confirm these trends. Students reported increased confidence, motivation, and autonomy, consistent with studies from Australia, Scandinavia, and Singapore, where AI-mediated feedback has been shown to promote learner independence and reduce writing-related anxiety (Sarica & Gençoğlu, 2025; Wang & Lee, 2024). Teachers emphasized AI's value in providing rapid, individualized feedback, echoing global research highlighting AI's potential to support differentiated instruction and reduce teacher workload (Li, 2024;

Lee, 2023). Furthermore, the absence of significant gender differences aligns with global findings indicating that AI-assisted writing benefits learners equitably when access is provided across demographic groups (Sarica & Gençoğlu, 2025).
Despite these positive outcomes, certain limitations should be noted. The reliance on self-report questionnaires may introduce bias, and the relatively short intervention period limits conclusions about long-term effects. Writing tasks, particularly for PYP students, were limited in complexity, which may have influenced performance outcomes. Future research should incorporate longer-term interventions, discipline-specific writing tasks, and qualitative methods such as interviews or observations to better understand learners' and teachers' interaction with AI tools in authentic settings (Li, 2023; Wang & Lee, 2024; Daud et al., 2025).
In conclusion, this study contributes to global discussions on AI in language education. The findings demonstrate that AI-assisted writing tools can substantially support writing development and enhance learner engagement across educational levels. With appropriate guidance, ethical oversight, and pedagogical integration, AI tools can be used effectively in higher education. These results provide practical implications for EFL educators, curriculum designers, and policymakers seeking to implement AI responsibly and effectively in global contexts (Al-Kadi, 2022; Faisal, 2024; Khan, 2025).

7. Conclusion

This study investigated the impact of AI-assisted writing tools on the academic writing performance of PYP, undergraduate, and master's students in the College of Languages and Translation, as well as faculty perceptions of AI integration. The findings indicate that AI tools, including ChatGPT, Grammarly, and QuillBot, have a significant effect on writing performance, improving students' writing performance across grammatical accuracy, vocabulary richness, coherence and cohesion, and overall organization. Frequent engagement with these tools was positively correlated with higher gains, emphasizing the importance of regular use in enhancing writing skills.
Students reported increased confidence, motivation, and learner autonomy when using AI tools, while teachers acknowledged their potential to provide immediate feedback and individualized support. These results suggest that AI-assisted writing can be a valuable pedagogical resource across different educational levels, from young learners to graduate students, and for both male and female participants.
Despite these positive outcomes, careful guidance and monitoring are necessary to prevent overreliance on AI. Future research should explore longer-term interventions, more varied and authentic writing tasks, and mixed-method approaches to fully understand the pedagogical potential and limitations of AI-assisted writing.
In conclusion, AI-based writing tools present a valuable opportunity to improve academic writing skills and learner engagement in EFL contexts, offering practical guidance for educators, curriculum designers, and higher-education policymakers aiming to integrate technology effectively into language instruction

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