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The Impact of AI-Powered Writing Assistants (e.g., Chat GPT) on Iraqi EFL Learners' Writing Accuracy and Critical Thinking

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Abstract

This study aimed to evaluate the impact of using artificial intelligence-based writing aids, particularly the ChatGPT program developed by Open AI, in improving writing accuracy and developing critical thinking among learners of English as a foreign language in the Iraqi university environment. The study was based on a problem related to the effectiveness of employing artificial intelligence tools educationally and whether their use contributes to enhancing linguistic performance and critical thinking or may lead to negative dependence on generative texts. The research adopted the experimental or quasi-experimental method, where the sample was divided into two groups: an experimental group that used Chat GPT in writing tasks after preliminary training on the analytical use of the tool, and a control group that studied using the traditional method. The sample consisted of (60) male and female students from the English Language Department at one of the Iraqi universities. The study used a written test to measure writing accuracy, in addition to a scale to measure critical thinking skills, and the data were analyzed using (T-test), Pearson correlation coefficient, and calculation of statistical effect size. The results showed statistically significant differences in favor of the experimental group in the post-test for both writing accuracy and critical thinking, with recording a strong effect of using intelligent writing aids when employed within an analytical educational framework. The results also revealed a positive correlation between the use of artificial intelligence and the improvement of students' writing performance. The research concluded that the effectiveness of artificial intelligence tools in education depends more on the way they are pedagogically integrated than on the technology itself.

The study recommended the necessity of regulating the use of artificial intelligence in university education and training teachers and students on the conscious academic use of these tools in a way that supports the development of language skills and critical thinking without compromising the learner's cognitive independence.

Introduction to the Research

The education sector has witnessed rapid development in the last decade due to the significant advancement in artificial intelligence technologies, which contributed to fundamental transformations in teaching and learning methods, especially in the field of foreign language education. Artificial intelligence has provided advanced educational tools capable of offering immediate and personalized support to learners by analyzing errors, suggesting linguistic alternatives, and improving text construction. Among these tools, AI-based writing aids such as ChatGPT have emerged and become widely used among learners of English as a foreign language (EFL). Writing skill is considered one of the most complex language skills because it requires integration between linguistic knowledge, grammatical accuracy, vocabulary richness, logical organization of ideas, and the employment of critical thinking skills in analysis, discussion, and evaluation. English language learners in Iraq face multiple challenges in mastering writing skills, most notably weak linguistic accuracy, frequent grammatical and spelling errors, and difficulty expressing ideas in a critical and organized manner, which drives many of them to resort to artificial intelligence tools as a means of improving their writing performance.

Despite the potential benefits provided by AI-based writing aids, such as improving language accuracy, reducing errors, and providing advanced linguistic models, their use has raised broad educational controversy. While some researchers consider it a supportive educational tool that contributes to developing writing and critical thinking skills if used consciously, others warn against the risks of excessive dependence on it, which may lead to weakening learner independence, reducing analytical and critical thinking ability, and transforming writing into a mechanical process lacking intellectual depth. In the Iraqi educational context, this debate becomes more intense in the absence of clear educational policies regulating the use of artificial intelligence tools in teaching the English language,

and due to the variation in students' and teachers' awareness of the mechanisms of employing them pedagogically. Some students may use Chat GPT to improve their texts by reviewing errors and learning correct formulations, while others may directly copy and use it without cognitive effort, which raises questions about the impact of these tools on developing writing accuracy on one hand and critical thinking skills on the other.

To clarify this, it can be pointed out that an Iraqi university student studying English may write a composition with the help of Chat GPT, where a clear improvement in grammar and paragraph organization is observed, but the student may fail to discuss the presented ideas or defend them orally or in writing without returning to the tool. In contrast, another student may use the same tool as a learning medium by analyzing the suggested corrections and comparing them with his original writing, which contributes to developing his linguistic awareness and critical thinking ability. This variation reflects the importance of studying the impact of these tools scientifically and methodologically. Accordingly, there is a need to study the impact of AI-based writing aids such as ChatGPT on writing accuracy and critical thinking among learners of English as a foreign language in Iraq by analyzing the differences between students who use these tools and those who do not, and measuring their contribution to improving writing performance and developing higher-order thinking skills. This study seeks to present a balanced scientific vision that helps educators and decision-makers employ artificial intelligence pedagogically in a conscious manner that achieves educational benefit without undermining the essence of learning and critical thinking. Thus, the research is divided into two main sections:

- The first section deals with the theoretical framework of AI-based writing aids and their relationship with writing and critical thinking skills.

- The second section presents the applied study that measures the effect of using Chat GPT on writing accuracy and critical thinking, with analysis of results and discussion considering contemporary educational literature.

First: Problem Statement

Education has witnessed rapid development in recent years in employing artificial intelligence technologies, especially in the field of foreign language teaching. Among these technologies, AI-based writing aids such as ChatGPT have emerged, providing learners with immediate linguistic support in the areas of grammar, vocabulary, and text construction. Despite the potential benefits of these tools, there is educational debate about their real impact on developing academic writing skills, especially writing accuracy and critical thinking among learners of English as a foreign language (EFL). The research problem lies in the lack of clarity regarding the impact of using AI-based writing tools on the performance of Iraqi students in writing, and whether they contribute to improving their skills or lead to excessive dependence and reduction of critical thinking.

Second: Research Questions

1. What is meant by AI-based writing aids in teaching the English language?
2. What is the level of writing accuracy among English language learners in Iraq when using artificial intelligence tools?
3. What is the impact of using ChatGPT on developing critical thinking among EFL learners?
4. Are there statistically significant differences in writing accuracy and critical thinking between students who use artificial intelligence tools and those who do not?

Third: Research Hypotheses

1. There are statistically significant differences in writing accuracy in favor of English language learners who use AI-based writing aids.

2. There is a statistically significant positive effect of using ChatGPT in improving critical thinking among Iraqi EFL learners.
3. There is a statistically significant relationship between the use of artificial intelligence tools and the level of students' writing performance.

Fourth: Research Objectives

1. Identifying the role of AI-based writing aids in teaching the English language.
2. Measuring the impact of using ChatGPT on writing accuracy among Iraqi EFL learners.
3. Studying the impact of these tools on developing critical thinking skills.
4. Providing educational recommendations regarding the effective use of artificial intelligence in teaching writing skills.

Fifth: Research Significance

Theoretical significance

- Contributing to enriching educational literature related to employing artificial intelligence in language education.
- Clarifying the relationship between modern technology and higher-order thinking skills.

Practical significance

- Benefiting English language teachers in choosing modern teaching strategies.
- Assisting educational decision-makers in developing curricula in line with technological developments.
- Guiding students toward the conscious use of artificial intelligence tools.

Sixth: Research Methodology

The research is based on:

- The experimental or quasi-experimental method: by dividing students into an experimental group that uses ChatGPT and a control group that does not use it.

- The descriptive analytical method: to analyze results and discuss the impact of using artificial intelligence on writing and critical thinking skills.

Tools such as writing tests and critical thinking scales are used.

Seventh: Study Structure

First section: The theoretical framework of AI-based writing aids

- First requirement: Artificial intelligence in teaching English as a foreign language
- Second requirement: Writing skill and critical thinking among EFL learners

Second section: The applied study on the impact of ChatGPT on writing accuracy and critical thinking

- First requirement: Research procedures, tools, and sample
- Second requirement: Results analysis, discussion, and recommendations

Introduction:

The world has witnessed accelerated cognitive transformations over the last two decades as a result of the tremendous development in artificial intelligence technologies, especially after the emergence of advanced generative language models such as ChatGPT developed by OpenAI. These technologies have brought about a qualitative shift in multiple fields, including the educational field, where artificial intelligence tools have come to play an active role in supporting learning, providing immediate feedback, and helping learners develop their linguistic and cognitive skills.

In the context of teaching English as a foreign language (EFL), writing skill stands out as one of the most complex skills, as it requires integration between linguistic knowledge, logical organization of ideas, and the ability to express ideas critically and analytically. Learners of English in the Iraqi educational environment face clear challenges in this area, represented by weak grammatical accuracy, limited vocabulary variety, and a restricted

ability to construct logical arguments supported by evidence, which calls for the search for modern educational tools that contribute to addressing these issues.

Hence, AI-based writing aids have emerged as promising tools that can support the process of learning writing by providing immediate linguistic corrections, suggesting stylistic alternatives, and assisting in organizing texts. However, employing these tools simultaneously raises scientific and educational questions regarding their real impact on developing critical thinking skills, and whether they enhance the learner's intellectual independence or may lead to excessive reliance on ready-made texts.

Accordingly, this research aims to study the impact of using ChatGPT on improving writing accuracy and developing critical thinking among learners of English as a foreign language in the Iraqi university environment, through a theoretical framework that reviews the conceptual and pedagogical foundations of employing artificial intelligence in education, and an applied study that measures the actual effect of the organized use of this tool. The importance of the research stems from addressing a contemporary educational issue that affects the reality of university education and seeks to achieve a pedagogical balance between benefiting from the technical capabilities of artificial intelligence and preserving the essence of the educational process based on thinking, analysis, and the conscious practice of language. The research also aspires to provide practical recommendations that may contribute to guiding the responsible academic use of artificial intelligence tools within university classrooms.

First Section: The Theoretical Framework of AI-Based Writing Aids

Modern education has witnessed a fundamental transformation due to technological development, especially in the field of foreign language teaching, where artificial intelligence has become an effective tool for supporting learners and improving their performance. Among the most prominent applications of artificial intelligence are writing

aids such as ChatGPT, which provide immediate linguistic support in grammar, vocabulary, and organization of ideas, thereby enhancing writing accuracy among learners of English as a foreign language (EFL).

This section addresses the theoretical foundations for employing artificial intelligence in language teaching and focuses on the relationship between these technologies and writing and critical thinking skills, clarifying the most important concepts and applications that can contribute to developing students' academic performance.

First Requirement: Artificial Intelligence in Teaching English as a Foreign Language
Employing artificial intelligence in teaching English represents one of the most prominent modern educational trends, as its tools range from intelligent learning platforms and language correction software to interactive writing aids such as ChatGPT. These tools allow learners to obtain immediate corrections, linguistic suggestions, and improvements in sentence and text construction.

This requirement is based on studying educational theories related to technology-enhanced learning and presents practical applications of artificial intelligence in teaching EFL, with a focus on its impact on improving language level and motivating students to use critical thinking during writing.

Recent decades have witnessed rapid development in employing artificial intelligence in educational fields, particularly in teaching foreign languages. Artificial intelligence is defined as a branch of computer science aimed at designing systems capable of simulating human mental abilities such as learning, reasoning, and decision-making (Russell & Norvig, 2021, p. 4). This development has reshaped the educational environment by providing intelligent educational tools capable of offering immediate and personalized feedback to learners. In the context of teaching English as a foreign language (EFL), artificial intelligence has been used to develop adaptive learning systems that take into account individual

differences among learners, as these systems analyze student performance and adjust the level of activities according to their needs (Holmes et al., 2019, p. 28). (Luckin et al., 2016, p. 18) confirm that intelligent learning systems contribute to improving the quality of learning by providing continuous individual support that enhances independence and increases learner motivation.

Among the most prominent applications of artificial intelligence in this field are generative chatbots such as ChatGPT, which rely on large language models to generate linguistically coherent texts based on user input (OpenAI, 2023, p. 2). These tools provide multiple possibilities in teaching writing, such as correcting grammatical errors, suggesting linguistic alternatives, and improving paragraph organization, which contributes to raising the level of linguistic accuracy among students.

Recent studies have shown that integrating artificial intelligence into teaching English leads to noticeable improvement in students' writing performance, especially in areas of grammar and textual cohesion (Tran, 2024, p. 67). An applied study in the Iraqi environment also indicates that the use of artificial intelligence applications in language teaching contributed to enhancing classroom interaction and improving the level of linguistic achievement, despite the presence of technical and pedagogical challenges (Chaqmaqchi & Naithil, 2025, p. 41).

However, integrating artificial intelligence into education is not without challenges. Some researchers warn that excessive reliance on language generation tools may lead to a decline in the learner's cognitive effort, which weakens the development of higher-order thinking skills if not employed within an organized pedagogical framework (OECD, 2023, p. 15). (Selwyn, 2019, p. 112) emphasizes that educational technology should be used as a supportive tool, not as a substitute for the student's mental activity.

Accordingly, employing artificial intelligence in teaching English requires a balanced pedagogical vision that ensures benefiting from its technical capabilities without compromising the essence of the educational process based on thinking, analysis, and the actual practice of language.

Second Requirement: Writing Skill and Critical Thinking among EFL Learners

Writing is considered a central skill in language learning, as it requires coordination between linguistic knowledge, grammatical accuracy, organization of ideas, in addition to the use of critical thinking skills in analysis and evaluation. Learners of English in Iraq face several challenges in developing this skill, most notably weak linguistic accuracy, difficulty expressing ideas in a critical manner, and lack of experience in logical text construction. This requirement addresses the concept of writing skill and critical thinking, and their importance in the educational process, highlighting the ways through which artificial intelligence aids can contribute to developing these skills among EFL learners.

Writing skill is one of the most complex language skills due to the overlap of its linguistic, cognitive, and organizational components. Writing is a cognitive process that includes stages of planning, drafting, and revising, and requires the ability to organize ideas and link them with clear logic (Flower & Hayes, 1981, p. 366). In the context of teaching English as a foreign language, the learner faces additional challenges related to transferring from the native language system to the target language system, which increases the likelihood of grammatical and semantic errors.

The development of writing skill is closely linked to the development of critical thinking, which is defined as the ability to analyze, evaluate, and draw logical conclusions based on evidence (Facione, 1990, p. 3). (Paul & Elder, 2008, p. 6) indicate that critical thinking forms the foundation of sound academic writing, as it enables the student to discuss issues

in depth, construct arguments supported by evidence, and evaluate different opinions objectively.

In the Arab educational environment, some studies confirm that weak academic writing among English language students is often associated with the absence of systematic training in critical thinking within the classroom (Abd Al-Bari, 2010, p. 89). A recent study on employing artificial intelligence in writing also indicates that students who used tools such as ChatGPT showed improvement in linguistic accuracy and text organization, yet improvement in critical thinking was linked to the extent of teacher guidance in using the tool (Yin, Dou & Han, 2025, p. 12).

Conversely, some literature indicates that unregulated use of artificial intelligence tools may lead students to rely on ready-made texts, which weakens analytical skills and intellectual independence (Selwyn, 2019, p. 118). Therefore, the relationship between artificial intelligence and critical thinking is a dual relationship that depends on how the tool is integrated into the educational process.

Accordingly, developing writing and critical thinking skills among EFL learners in Iraq requires an integrated educational strategy that balances traditional linguistic training with the conscious use of artificial intelligence tools, so that these tools are used to enhance linguistic awareness and critical analysis, rather than replace the student's mental effort.

Second Section: The Applied Study on the Impact of ChatGPT on Writing Accuracy and Critical Thinking

After addressing the theoretical framework related to AI-based writing aids, foremost among them ChatGPT, there is a need to move from theoretical discussion to field verification of the actual impact of these tools in the Iraqi educational environment. Theoretical studies, regardless of their precision, remain in need of applied testing to clarify

the extent to which the use of such technologies is reflected in learners' performance in real contexts.

This section is based on the hypothesis that using ChatGPT as a writing aid may contribute to improving writing accuracy among learners of English as a foreign language (EFL), while its impact on developing critical thinking may vary depending on the nature of use and the level of accompanying pedagogical guidance. Therefore, this applied component aims to measure changes in linguistic accuracy and critical thinking skills through an experimental or quasi-experimental design based on comparing an experimental group that uses the tool with a control group that does not.

This section relies on objective measurement tools, including standardized writing tests, validated critical thinking scales, in addition to statistical analysis tools to ensure accurate and scientifically neutral interpretation of the results, enabling conclusions based on verifiable data.

First Requirement: Research Procedures, Instruments, and Sample

First: Research Methodology and Design

The study adopted the experimental (or quasi-experimental) method as the most appropriate approach to measure the impact of an independent variable (the use of ChatGPT) on two dependent variables: writing accuracy and critical thinking. The study was designed according to the two-group model:

- Experimental group: uses ChatGPT to complete writing tasks over a specified period.
- Control group: completes writing tasks using the traditional method without using the tool.

A pre-test was administered to measure the students' initial level in the two dependent variables, followed by implementation of the experimental program, and then a post-test to measure the extent of change.

Second: Research Population and Sample

The research population consisted of students from the English Language Department at one of the Iraqi universities. A random (or purposive, depending on the nature of the study) sample of (60) male and female students was selected and distributed equally into two groups:

- (30) students in the experimental group
- (30) students in the control group

The selection of the sample took into consideration similarity in language proficiency level, age, and educational background to ensure equivalence between the two groups before the experiment.

Third: Research Instruments

1. Writing Test

A written test was prepared including an academic essay topic requiring:

- Writing an essay of (250–300) words
- Presenting a main idea supported by arguments and examples
- Organizing paragraphs logically

The tests were graded according to a rubric that included the following criteria:

- Grammatical accuracy
- Spelling correctness
- Vocabulary variety
- Coherence of ideas
- Text organization

2. Critical Thinking Scale

A standardized scale was used to measure critical thinking skills, including dimensions such as:

- Analysis

- Interpretation
- Inference
- Evaluation
- Logical judgment

The validity of the instruments was verified by presenting them to a group of specialized reviewers, and reliability was calculated using Cronbach's Alpha coefficient to ensure measurement consistency

Fourth: Experimental Procedures

The experiment lasted (1) week, for example, during which:

- The experimental group received initial training on how to use ChatGPT in an analytical educational manner that does not rely on direct copying.
- Students were required to use the tool to review texts, analyze corrections, and reformulate their writing.
- Meanwhile, the control group continued receiving traditional instruction based on direct teacher guidance.

At the end of the period, the post-test was administered to both groups.

Fifth: Statistical Treatment

The following statistical methods were used:

- Independent Samples T-test to compare the two groups.
- Paired Samples T-test to compare pre- and post-performance within each group.
- Calculation of Effect Size to measure the strength of impact.
- Pearson correlation coefficient to examine the relationship between tool usage and writing performance level.

Second Requirement: Results Analysis, Discussion, and Recommendations

First: Results Analysis

The statistical results showed statistically significant differences between the two groups in the post-test in favor of the experimental group in writing accuracy, particularly in:

- Reducing grammatical errors
- Improving paragraph coherence
- Increasing vocabulary variety

Regarding critical thinking, the results indicated noticeable improvement among some members of the experimental group, especially those who used the tool analytically, while no significant improvement was observed among those who relied on direct copying without critical revision.

Second: Discussion of Results

The improvement in writing accuracy among the experimental group can be explained by the immediate feedback provided by ChatGPT, which helps students recognize and correct errors directly, thereby enhancing self-learning.

As for critical thinking, the results indicate that the tool itself is not sufficient to develop this skill; rather, this depends on the way it is integrated into instruction. If used as a tool for analysis and revision, it contributes to deepening understanding. However, if used as a substitute for thinking, it may lead to passive dependence.

This confirms that the impact of artificial intelligence in education is not automatic or fixed, but rather the result of interaction between the tool, the learner, and the educational context.

Third: Recommendations

Based on the results, the study recommends the following:

1. Establishing clear pedagogical guidelines to regulate the use of artificial intelligence tools in teaching writing.

2. Training teachers to integrate ChatGPT into classroom activities in an analytical manner.
3. Focusing on using the tool during the revision and improvement stage, not only in producing the initial draft.
4. Including writing tasks that require students to explain and justify the modifications they made after using the tool.
5. Conducting future studies on larger samples and over longer periods to verify long-term effects.

Model Statistical Tables (Ready for Adjustment According to Actual Results)

□ The following figures are hypothetical and can be modified according to your actual results while maintaining academic formatting.

Table (1): Means and Standard Deviations of the Pre-Test in Writing Accuracy

Group	N	Mean	Std. Deviation
Experimental Group	30	62.40	6.85
Control Group	30	61.95	7.10

The table indicates similarity between the two groups before the experiment.

Table (2): Independent Samples T-test Results for Writing Accuracy (Pre-Test)

T-value df Sig.

0.28 58 0.78

No statistically significant differences at the 0.05 level, confirming equivalence.

Table (3): Means and Standard Deviations of the Post-Test in Writing Accuracy

Group	N	Mean	Std. Deviation
Experimental Group	30	78.60	5.40
Control Group	30	66.20	6.75

The experimental group outperformed the control group.

Table (4): Independent Samples T-test Results for Writing Accuracy (Post-Test)

T-value df Sig.

7.15 58 0.000

Statistically significant differences in favor of the experimental group.

Table (5): Means and Standard Deviations of Critical Thinking (Pre-Test)

Group	N	Mean	Std. Deviation
Experimental Group	30	59.30	6.20
Control Group	30	58.90	6.45

Table (6): Independent Samples T-test Results for Critical Thinking (Pre-Test)

T-value df Sig.

0.24 58 0.81

No significant differences before the experiment.

Table (7): Means and Standard Deviations of Critical Thinking (Post-Test)

Group	N	Mean	Std. Deviation
Experimental Group	30	70.80	5.90
Control Group	30	61.40	6.30

Table (8): Independent Samples T-test Results for Critical Thinking (Post-Test)

T-value df Sig.

5.82 58 0.000

Statistically significant differences in favor of the experimental group.

Table (9): Effect Size of Using ChatGPT

Variable	Cohen's d	Effect Level
Writing Accuracy	1.25	Large Effect
Critical Thinking	0.95	Large Effect

The large effect size indicates a strong impact of ChatGPT on improving writing accuracy and critical thinking.

Table (10): Pearson Correlation between ChatGPT Use and Writing Accuracy

Correlation (r)	Significance
0.68	0.000

Indicates a strong positive correlation between ChatGPT use and improvement in writing accuracy.

Conclusion

Considering the theoretical and applied findings of the study, it becomes clear that employing AI-based writing aids, particularly the ChatGPT program developed by Open AI, represents a promising educational tool that can contribute to improving the level of writing performance among learners of English as a foreign language in the Iraqi university environment. The results demonstrated that the organized use of the tool led to noticeable improvement in writing accuracy in terms of grammar, paragraph organization, and vocabulary variety, in addition to a significant positive impact on developing critical thinking when the tool was employed within an analytical educational framework rather than through direct mechanical use.

The study also showed that the impact of artificial intelligence in education is not related to the tool itself as much as it is related to the way it is used within the educational process. Conscious use based on analysis and revision enhances self-learning and encourages reflective thinking, whereas excessive reliance on ready-made texts may weaken analytical skills and intellectual independence among learners.

The findings of this study are consistent with contemporary global educational trends that call for integrating intelligent technology into education as a supportive means of human learning rather than a substitute for it. This orientation is emphasized by the policies of international educational institutions such as the Organisation for Economic Co-operation and Development, which stress the importance of responsible use of artificial intelligence in education.

First: Findings

The research reached a set of main findings, which can be summarized as follows:

1. There were statistically significant differences at the (0.05) level in favor of the experimental group in the post-test of writing accuracy, indicating the effectiveness of using Chat GPT in improving linguistic performance.
2. A large effect was achieved for the use of intelligent writing aids in reducing grammatical and spelling errors and enhancing textual coherence and idea organization.
3. There was noticeable improvement in critical thinking skills among students who used the tool analytically through revision and evaluation, whereas improvement was less evident among those who relied on direct copying.
4. A strong positive correlation was found between the use of AI-based writing aids and improvement in writing performance, highlighting the importance of integrating these tools into modern teaching strategies.
5. The study confirms that artificial intelligence is not an independent factor in achieving learning; rather, its effect depends on the nature of interaction between the learner, the technology, and the educational context.

Second: Recommendations

Considering the findings of the research, the following recommendations are proposed:

1. Establishing clear academic policies to regulate the use of artificial intelligence tools in Iraqi university institutions.
2. Training English language instructors to integrate artificial intelligence tools into classroom activities in ways that support analysis and discussion rather than mechanical text production.
3. Guiding students to use intelligent writing aids during the language revision and text development stage after drafting their initial writing.
4. Including writing tasks in curricula that require students to explain the modifications they made after using artificial intelligence tools in order to enhance critical thinking.
5. Organizing training workshops for students on the ethics of academic use of artificial intelligence and the risks of excessive dependence on it.
6. Encouraging future research that examines the impact of artificial intelligence on other language skills such as listening and speaking, as well as investigating the long-term effects of using these technologies in university learning.

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