

# Impact of Artificial Intelligence Tools on Academic Writing Skills among ESL Learners: An Analytical Study

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## ABSTRACT

The swift incorporation of Artificial Intelligence (AI) tools into the educational process has changed the academic writing process, especially with ESL (English as a Second Language) students, to an important extent. The paper will discuss the effect of AI tools on ESL students in academic writing, which includes ChatGPT, Grammarly, or QuillBot. With the descriptive and analytical research design, a structured questionnaire was designed with five points Likert scale to collect primary data on 150 students. The data was evaluated using statistical methods such as standard deviation, correlation analysis and mean. The results show that AI tools positively influence many aspects of academic writing, such as the accuracy of grammar, vocabulary development, and idea coherence. ChatGPT was the most commonly used tool, indicating an increasing trend of the use of generative AI in academia. Another important finding of the study is that there is a great positive correlation between the use of AI tools and writing proficiency, which implies that the higher the use of AI tools, the better the writing performance. Nonetheless, the findings draw attention to the issues of moderate dependence on AI tools, which can influence the original thought and independence among learners. The research concludes that although AI tools are useful to facilitate academic writing, their application should be instructed and controlled to achieve balanced learning. The results have crucial implications on the use of AI tools by the educators, students, and institutions in order to integrate the use of AI tools in language learning in an ethical and effective manner. Future studies need to focus on longitudinal impacts and comparative studies to gain better insight into the place of AI in ESL learning.

**Keywords:** Artificial Intelligence, ESL learners, Academic Writing, Writing Proficiency, Digital Learning

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## 1. Introduction

Familiarizing with the English academic writing has now become a competency aspect of the students particularly those who are classified to have been ESL (English as a Second Language) learners. Academic writing is not a simple linguistic practice, but rather a complex mental process, which consists of synthesizing grammar, vocabulary, coherence, argumentation and critical thought process. Among the most widespread issues of ESL learners, especially in the non-English speaking world, such as India, is the failure to master these aspects, which, in turn, affects their academic performance and readiness to work (Hyland, 2022).

There has been a high rate of technological development in the past decade and this has affected a lot in the pedagogical practice in teaching languages. One of these innovations is Artificial Intelligence (AI), which has become a revolution and

changed the approach of students to writing assignments. Applications based on AI, such as ChatGPT, Grammar, and Quillbot, provide real-time feedback, word processing, paraphrasing, and content creation. They are actively being applied into the academic environment and offer individualised learning opportunities, alongside offering self-managed learning opportunities to ESL students (Zawacki-Richter et al., 2021). Recent empirical research shows that AI-based writing aids have a positive impact on many aspects of writing competence. In one such example, AI solutions have been found to enhance grammatical accuracy, lexical diversity, and organisational coherence, provide real-time and repetitive feedback (Marzuki et al., 2023). Similarly, Mahapatra (2024) has demonstrated that the use of the generative AI tool such as ChatGPT can significantly improve the ability of students to structure academic content and clearly express their

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ideas. These findings suggest that AI technologies can be regarded as cognitive scaffolds, which can enable learners to eliminate linguistic barriers, and improve the quality of their writing.

In addition, AI tools have been known to play a key role in enhancing learner autonomy and motivation. These technologies enhance self-regulated learning behaviours, enabling the student to find and rectify errors independently, which is crucial in the long-term development of language (Polakova and Klimova, 2024). Moreover, feedback-driven by AI offers a non-judgmental learning experience that reduces anxiety levels and builds confidence in ESL learners when they undertake writing activities (Fitria, 2023). In spite of these benefits, there are challenges associated with the use of AI tools in academic writing. Literatures are increasingly questioning too much AI-generated content that may lead to the inability to develop critical thinking, originality, and original voice when writing (Dwivedi et al., 2023). Overreliance on AI tools may also result in superficial learning, in which students are not involved in the writing process, but are relying on automated results. Additionally, academic integrity, plagiarism, and authorship issues have been one of the most relevant topics in the discussion of AI-assisted writing (Cotton et al., 2023). The other critical inquiry is associated with the contextual application of AI tools in the different learning settings. Even though there are studies that are carried out to test the effect of AI in developed contexts, empirical studies in ESL students in developing countries are lacking particularly students in the history course in Indian higher education institutions.

The levels of digital literacy, the linguistic variety, and differences in the approaches to pedagogy in such environments demand a more sophisticated explanation of the effects of AI tools on academic writing (Kohnke et al., 2023). With this in mind, there is an apparent research gap, which is analytical, data-driven research that will report the pros and cons of AI tools in enhancing academic writing among ESL learners. Most of the research available is conceptual or exploratory and less emphasis on the quantitative analysis and testing of hypotheses. Thus, there is an urgent necessity of empirical studies that would evaluate the effect of the AI tools on the particular aspects of writing competence in a systematizing manner. It is on this background that the current research will aim at examining how Artificial Intelligence tools will affect academic writing competence among ESL students.

The research uses a descriptive and analytical approach to investigate how much AI tools can help in the enhancement of grammar, vocabulary, coherence, and writing quality in general. It also examines the connection between the use of AI tools and writing competence, as well as discusses issues of dependency and ethical use. Based on empirical evidence and a critical review, this study will contribute to the existing body of literature on AI in language education and give useful recommendations to teachers, students and policy-makers. The results will be used to inform the successful implementation of AI tools in ESL teaching where the technologies will be used as auxiliary tools, but not as does-not-need-thinking and writing.

## 2. Review of Literature

There has been an enormous body of academic interest within the field of English language teaching and academic writing in the application of artificial intelligence (AI) within the educational field over the past few years. The use of AI-based applications such as ChatGPT, Grammarly, and other writing support programs have found numerous adherents among ESL learners who want to develop their writing skills. The existing literature presents a rather valuable view of the pedagogical benefits, as well as potential restrictions of the utilization of such technologies. The positive impact of AI tools on the quality of writing is one of the strands of research.

To illustrate, the review of Marzuki et al. (2023) on the usefulness of writing assistants with AI revealed that these methods could be effectively used to help students to enhance their grammatical accuracy, coherence and structure in writing. The research proposed that automated feedback helps the students to detect and rectify mistakes in the process of writing and therefore, improves the overall quality of work. Likewise, Mahapatra (2024) made comparisons between the impact of such generative AI tools, such as ChatGPT, on academic writing and found that the tools aid in generating ideas, clarifying sentence structure and assists in creating well-organized content. Besides improving technicality of writing, AI tools have been observed to have improved lexical learning of ESL.

Polakova and Klimova (2024) argue that writing tools based on AI are beneficial in terms of vocabulary growth since they propose words and phrases that are contextually relevant. This not only makes the language more precise, but also enables the learners to come up with even more complex and diverse expressions. In addition to that, Fitria (2023) noted that AI tools motivate learners to explore the

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language, hence, promoting creativity and self-confidence when writing. Learner autonomy is another critical aspect of learning that has been addressed by the literature. Personalised feedbacking is made possible by AI tools and it can be instant, hence, the students can learn independently.

Zawacki-Richter et al. (2021) state that AI in education enables adaptive learning environments to enable learners to study at their own pace. This will particularly benefit ESL students who usually require additional support outside the classroom. Constant practice and revision are enabled by the presence of the AI tools, thereby facilitating the learning outcomes. Moreover, the implementation of AI tools as scaffold systems in language learning has been researched several times. Kohnke et al. (2023) consider AI tools as a certain type of cognitive support that can compensate the existing level of proficiency of learners and their desired level of academic performance. These tools assist the learners to internalize the conventions of writing, through giving them structured feedback and suggestions, and over time, enhance their skills. This is a very important effect of scaffolding especially in academic writing that needs a lot of accuracy and structure. Along with these benefits, there are also several issues related to the use of AI in academic writing that are mentioned in the literature.

Over-reliance on AI tools is one of the most commonly discussed ones. Dwivedi et al. (2023) caution that excessive reliance on AI-generated materials can undermine critical thinking and development of analytical skills. Using automated suggestions to a great extent, learners do not provide a comprehensive experience in the process of writing, which may make them develop superficial learning. Ethical considerations form an important area of concern, too. Cotton et al. (2023) expound the implications of AI-generated material in the context of academic integrity and present the argument that the use of these tools raises the issue of authorship and originality.

The risk of abuses that include plagiarism and the lack of acknowledgment of AI assistance poses a challenge to educators and institutions in the quest to achieve academic excellence. These points help to emphasize the significance of giving the clear guidelines and ethical framework, which could be applied to control the usage of AI in the academic sphere. Additionally, AI tools are dependent on the contextual variables such as access to technology, and digital literacy. In less developed nations, including India, the disparities in the technological infrastructure and disparities in the usage of digital

tools might affect the application and adoption of AI to education (Kohnke et al., 2023). This underlines the importance of doing research in a contextualised way that takes into account the needs and issues of ESL learners in the different contexts.

### 3. Research Gap

Even though the issue of Artificial intelligence in language teaching is already adequately studied, no research analysis has been done to assess the impact of AI in academic writing among ESL learners, particularly in the Indian context. Most of the work available is either theoretical or descriptive; empirical analyses conducted using statistical techniques are less common. Moreover, little focus has been placed on how the use of AI is associated with particular writing skills like grammar, coherence, and vocabulary. This research fills in these gaps by providing an analytical method using data.

### 4. Objectives of the Study

1. To analyse the impact of Artificial Intelligence tools on academic writing skills among ESL learners.
2. To examine the relationship between AI tool usage and writing proficiency among ESL learners.

### 5. Hypotheses of the Study

- **H1:** Artificial Intelligence tools have a significant impact on academic writing skills among ESL learners.
- **H2:** There is a significant relationship between AI tool usage and writing proficiency among ESL learners.

### 6. Research Methodology

**6.1 Research Design:** The current research design is a descriptive and analytical research design. The descriptive method is applied to comprehend the trends of AI tools use among ESL learners and the analytical method is applied to investigate the effects of these tools on academic writing abilities based on statistical data.

**6.2 Population of the Study:** The study population is that of ESL learners who are in institutions of higher learning, with English being the medium of instruction in academic writing assignment.

**6.3 Sample Size and Sampling Technique:** The participants used were 150 respondents. A convenience sampling method was used to conduct the sampling, where accessibility and availability of respondents were taken into consideration.

### 6.4 Data Collection Methods

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Both primary and secondary data were utilised:

- **Primary Data:** Collected through a structured questionnaire
- **Secondary Data:** Collected from journals, research articles, and academic publications (2020–2026)

## 6.5 Research Instrument

A structured questionnaire based on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) was used to collect responses. The questionnaire included items related to:

- AI tool usage
- Grammar improvement
- Vocabulary enhancement
- Writing coherence
- Dependency on AI tools

## 6.6 Variables of the Study

- **Independent Variable:** Usage of AI tools (ChatGPT, Grammarly, etc.)
- **Dependent Variable:** Academic writing skills (grammar, vocabulary, coherence)

## 6.7 Tools and Techniques for Data Analysis

The collected data were analysed using the following statistical tools:

- Mean and Standard Deviation (to measure central tendency and dispersion)
- Correlation Analysis (to examine relationships between variables)
- Hypothesis Testing (to test significance of results)

## 7. Data Analysis and Interpretation

In this section, the analysis of the data obtained on 150 ESL learners about using Artificial Intelligence tools and their effect on the academic writing skills will be presented. The statistical tools that have been used to analyse the data include descriptive and inferential statistics like mean, standard deviation and correlation.

**Table 1**  
**Demographic Profile of Respondents**

Variable	Category	Frequency	Percentage (%)
Gender	Male	82	54.7
	Female	68	45.3
Course	Undergraduate	98	65.3
	Postgraduate	52	34.7

The demographic analysis reveals that the majority of the respondents (65.3) are undergraduate students meaning that the study has largely captured the opinions of students at a tender age in creating

academic writings. This is important because undergraduate ESL students are more prone to use external writing aids. The gender balance is rather even, 54.7% of the respondents are male, and 45.3% are female, which means that the results are not favorable to a specific gender group. Overall, the sample make-up may be regarded as a good representation of ESL learners and, consequently, enhances reliability and validity of research results.

**Table 2**  
**Frequency of AI Tool Usage**

Usage Frequency	Frequency	Percentage (%)
Daily	60	40.0
Weekly	55	36.7
Occasionally	35	23.3

According to the statistics, the respondents are immersely involved with AI tools, 40 percent of them use it on a daily basis, 36.7 percent uses it once a week. This shows that AI tools have been integrated into academic writing of students. The fact that the proportion of occasional users is quite low (23.3) suggests that most of the learners are regular users of such technologies, rather than occasional ones. This broad usage is indicative of the increasing ease of use and perceived usefulness of AI tools in the academic setting and underscores the rising role of AI tools in facilitating writing activities among ESL learners.

**Table 3**  
**Preferred AI Tools**

AI Tool	Mean Score
ChatGPT	4.35
Grammarly	4.10
QuillBot	3.85

The mean scores indicate that the respondents prefer ChatGPT (4.35) which is followed by Grammarly (4.10) and Quill Bot (3.85). This tendency presupposes the transition to the generative AI tools that can not only correct mistakes but also help to create content and develop ideas. The relatively high preference of Grammarly and a moderate score of Quillbot indicate that grammar checking tools are heavily sought after, but not in the context of paraphrasing activities. On the whole, the results indicate that students like multifunctional AI tools that can be used to provide end-to-end writing assistance but not single purpose applications.

**Table 4**  
**Impact on Grammar Skills**

Statement	Mean	SD
AI tools improve grammatical	4.42	0.58

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accuracy		
AI reduces spelling and syntax errors	4.25	0.64

Both the averages of the statements related to grammar improvement (4.42) and spelling and syntax errors reduction (4.25) are high scores, which indicates that the respondents disagree on the effectiveness of AI tools in enhancing grammatical correctness. The fact that the values of standard deviation are relatively low facilitates the consistency of responses and also contributes to the reliability of the results. These findings can be interpreted to mean that AI tools are relevant to minimizing the rate of frequent linguistic mistakes, which in most cases is a major problem among ESL students. Therefore, AI-assisted writing helps in enhancing the clarity and accuracy of academic writing.

**Table 5**  
**Impact on Vocabulary Development**

Statement	Mean	SD
AI tools enhance vocabulary usage	4.30	0.60
AI improves word selection and expression	4.18	0.62

The findings demonstrate that AI tools are important in vocabulary development with the average scores of 4.30 and 4.18, respectively, in vocabulary use and word choice. These values suggest that the respondents feel that AI tools are effective to enrich the lexical resources and enhance expression. The standard deviation is relatively low implying that there is homogeneity in agreement among participants. This means that AI tools assist learners to get access to more vocabulary and use words that are appropriate to their context and thus elevate the level and quality of their academic writing.

**Table 6**  
**Impact on Writing Structure and Coherence**

Statement	Mean	SD
AI tools improve coherence and organisation	4.22	0.59
AI helps in idea generation and structuring	4.48	0.52

According to the results, AI tools are very efficient to enhance the structure of writing and its coherence, with the mean scores of 4.22 and 4.48. The biggest average score in the idea generation and structuring demonstrates that the students value AI tools in

particular in structuring their thoughts and establishing well-structured texts. There is also low variability of responses and this also helps to bring a consistency to such a perception. These findings suggest that AI tools are cognitive support systems, which enable students to develop logically organized and coherent pieces of academic writing, which is a major component of successful writing.

**Table 7**  
**Dependency on AI Tools**

Statement	Mean	SD
I rely heavily on AI tools for writing tasks	3.92	0.78
AI reduces my independent writing ability	3.75	0.85

The respondents have a medium dependency on AI tools with an average of 3.92 and 3.75. Despite the fact that students confess that these tools are very useful, the problem of reducing the ability to write without the use of the tools is also appearing. The relatively higher values of the standard deviation imply that there is variation in the responses and thus the dependency levels are different among the individuals. The discovery reveals that the main issue is that excessive use of AI tools might result in the absence of critical thinking and originality, and they should be used in a moderate and controlled way.

**Table 8**  
**Overall Impact on Writing Skills**

Variable	Mean	SD
Overall writing improvement	4.33	0.57

The mean value of 4.33 points to a great deal of positive attitude towards AI tools in enhancing writing skills in academic writing among ESL students. Its standard deviation is not high, therefore, the answers were uniform, meaning that there is a broad agreement on the applicability of AI tools. This finding confirms that the use of AI as an aid in writing can be significant in enhancing different facets of writing including grammar, vocabulary and coherence. It reinforces the argument of the AI tools as effective learning tools that contribute to the process of developing proficiency in writing in an ESL setting.

**Table 9**  
**Correlation between AI Usage and Writing Skills**

Variables	AI Usage	Writing Skills
AI Usage	1	0.69**

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Writing Skills	0.69**	1
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**(Significant at 0.01 level)**

The positive correlation coefficient ( $r = 0.69$ ) indicates that a positive relationship exists between the AI tool use and writing skills that is significant at 0.01 level. This indicates that as AI tools are used more, the writing skills of ESL learners are enhanced. The high value of the correlation underscores the success of AI tools in promoting language learning. However, the correlation is very high yet this does not imply that it is causal but rather additional studies are needed to elaborate on other underlying factors that influence this relationship.

**Table 10**

### Hypothesis Testing

Hypothesis	Test Result	p-value	Decision
H1	Significant	0.01	Accepted
H2	Significant	0.01	Accepted

The results of hypothesis testing indicate that both H1 and H2 are statistically significant and the p-values are less than 0.05. This proves that AI tools can greatly influence academic writing skills and that there is a positive correlation between AI use and writing skills. Both hypotheses are accepted, which supports the analytical structure of the research and the findings, in general. The results could be viewed as empirical evidence of the applicability of AI tools to build writing skills and, consequently, add value to the existing body of research.

## 8. Findings of the Study

Based on the data analysis and interpretation, the following key findings have been derived:

1. The study reveals that Artificial Intelligence tools are widely used among ESL learners, with a significant proportion of students using them on a daily basis for academic writing tasks.
2. AI tools such as ChatGPT and Grammarly are the most preferred platforms due to their ease of use and effectiveness in providing instant feedback.
3. The results indicate that AI tools significantly improve grammatical accuracy by reducing errors related to syntax, punctuation, and sentence construction.
4. AI-assisted writing contributes to vocabulary enhancement by suggesting appropriate words and expressions, thereby improving lexical richness.
5. The tools are highly effective in improving coherence and organisation of ideas,

particularly in structuring essays and academic responses.

6. A strong positive relationship has been observed between AI tool usage and writing proficiency, indicating that increased usage leads to better writing outcomes.
7. The study also identifies a moderate level of dependency on AI tools among students, which may affect independent writing ability.
8. Overall, AI tools have a statistically significant impact on academic writing skills among ESL learners.

## 9. Discussion

The findings of the present study are in line with the new literature which accentuates the positive role of Artificial Intelligence in academic writing. The findings suggest that grammar, vocabulary, and writing structure have greatly enhanced, which agrees with the findings of Marzuki et al. (2023), who asserted that AI tools can provide effective real-time feedback, which helps to achieve writing accuracy and coherence. Similarly, the results confirm Mahapatra (2024) who observed that generative AI tools enhance the organisational and expression of ideas among students. The positive relationship observed with significant level of significance in the interactions of AI usage and writing skill also justifies the argument that AI tools are cognitive and pedagogical aiding systems. This finding is consistent with Polakova and Klimova (2024), who emphasised that AI-driven feedback enhances learner autonomy and facilitates self-directed learning. The ability of AI tools to provide instant and personalised feedback provides the learner with the chance to identify their weak areas and enable them to improve in their writing on a cycle basis. Also, the study notes that AI tools can be utilized successfully in enhancing vocabulary like Fitria (2023) did, indicating that the AI-aided writing tools facilitate vocabulary development and creative writing. The fact that the coherence and organisation of the current study increased also testifies to the fact that AI tools are scaffolding mechanisms that assist learners to better organise their ideas (Kohnke et al., 2023). However, the ambiguities regarding the dependence on AI tools are also included in the results and it is a highly significant issue that is reflected in the recent literature. The mean level of dependence, displayed by the respondents, explains the results by Dwivedi et al. (2023), who have identified that excessive use of AI may weaken the process of the development of critical thinking and independent writing.

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Correspondingly, Cotton et al. (2023) expressed the issue of academic integrity and the ethical aspect of AI-generated content, which is also applicable in this study. By doing so, the findings are not only able to confirm that AI tools can be useful in enhancing academic writing but also stress the significance of using them moderately. Application of AI in learning should be an aiding tool rather than a substitute of human involvement and thinking process. Teachers should be instrumental in helping students to use these technologies in a manner that is ethical and effective.

## 10. Conclusion

The fact that the application of the Artificial Intelligence tools can have a positive and significant impact on academic writing competencies of ESL learners provides the conclusion of the current research paper. The quality of academic output is improved by the application of AI tools that increase grammatical correctness, use of vocabulary and general coherence of the writing. The use of the AI as learning tools can also be validated by the fact that the use of the tool is strongly correlated with the writing performance. The study, however, points at possible obstacles, especially over-dependence and decreased independence of writing. These results may indicate that despite the significant advantages of AI tools, their application should be strictly controlled to make sure that learners do not lose the ability to think critically and write original texts. To sum up, it is crucial to consider AI tools as the add-on tool that facilitates the learning process but does not interfere with the conventional practice of writing. The ethical guidelines and pedagogical plans of their integration into the ESL pedagogy should be directed at maximising their advantages and minimising the possible disadvantages.

## 11. Implications of the Study

The results of the current research have far reaching implications to various stakeholders in the educational ecosystem. To teachers, the findings imply that Artificial Intelligence applications should be incorporated into pedagogy in a methodical and well-directed way in order to not only improve the academic writing proficiency of students, but also to help nurture critical thinking and creativity. Not only the teachers have to encourage the use of such tools but also train students on how to use the tools in an ethical and effective manner. The study focuses on the use of AI tools as an aid in learning and not as the means of substituting the use of an independent means, balancing the technological support and

cognitive development to students. In the case of educational institutions, the results highlight the importance of formulating effective policies, ethics, and training modules to facilitate responsible application of AI in academic writing to guarantee academic honesty and good learning outcomes.

## 12. Limitations of the Study

In spite of its contributions, the study has some limitations. Firstly, the sample size of 150 respondents might not be considered a big sample of the entire population of ESL learners and therefore the generalisability of the findings might be limited. Secondly, the research is based on self reported data, collected using questionnaires, and it is subject to respondent bias and subjective perceptions. Thirdly, the study is predominantly quantitative and lacks the qualitative perspectives that would have given a more comprehensive perspective on the experience and attitude of learners to AI-assisted writing.

## 13. Suggestions for Future Research

Considering the shortcomings, a number of future research directions are proposed. In future studies, more heterogeneous and larger samples in diverse geographical regions and education can be used to enhance the generalisability of the findings. A comparative research to examine the effectiveness of AI-enhanced writing in comparison to conventional writing practices would make a valuable contribution to the research on pedagogical results. Furthermore, longitudinal studies could be implemented to ascertain the long-term impact of the use of AI tools on writing, critical thinking, and learner autonomy and thereby obtain a more comprehensive picture of the effect of AI tool use on language teaching.

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