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The Potential Impact of Artificial Intelligence Writing Tools in English Teaching and Learning. A Library Research in a Technological Institute in Ecuador

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Abstract:- Currently, Artificial Intelligence (AI) has become a prominent technology tool in various fields, including education. With the rapid development of technology, AI tools and applications have been integrated into language teaching writing platforms with the aim to provide English language learners with personalized instruction, immediate feedback, and immersive language practice. This research addresses the extent of using AI writing tools in English language teaching, their advantages and drawbacks, students' attitudes towards AI implementation in the classroom, the improvement of writing skills, and the different algorithms, software, and AI writing assistant technologies. The methodology proposed by Torres-Carrion was used, and five research questions were raised. The search was done in the Scopus database, getting 169 articles published between 2019 and 2023, and being analyzed 37. The results of this research show that artificial intelligence is needed in English language teaching and learning. Artificial intelligence also has a negative and positive impact on English language teaching, depending on whether it is utilized correctly and at the appropriate timing. Besides that, artificial intelligence also helps students improve their English writing skills like sentence-level writing issues, grammar, vocabulary, communicative achievement using AI writing assistances such as: Chat GPT, Quillbot, Grammarly, Plagiarism Checker. Therefore, the use of AI in English teaching and learning is useful, reducing the burden on teachers and improving writing quality.

Keywords*: AI writing tools, English teaching and learning, L2 writing, Systematic Literature Review.*

1. Introduction

Artificial intelligence (AI) has the potential to revolutionize education. Technological advancements have created new challenges and demands for both, teachers and students. We have not even finished discussing the impact of the Internet and Communication Technology (ICT) in our classrooms yet, and we need to be ready to take the next step with AI. It is stated that teachers must master specific skills in order to deal with the disruptive effects of AI in education as it may have an impact on current classroom practices [1]. In terms of EFL classrooms, recent advancements in AI technology indicate that EFL teachers' roles are also being disrupted. There are technologies that can perform tasks normally performed by teachers. For instance, the AI-powered applications, that could provide grammatical feedback on students' writing without the assistance of a teacher, being the feedback accompanied by detailed but brief explanations and examples, and this is one method for learners to learn grammar in use, in context, and in a personalized manner. Likewise, similar apps are available for other EFL areas, such as speaking, writing, and vocabulary. It is widely said that AI could be viewed as a useful companion not only for learners but also for teachers, because providing similar exhaustive but personalized feedback to every learner would be a difficult task for a teacher during the teaching-learning process. Nevertheless, it seems as though AI is replacing teachers which could imply that students can learn without the presence of a human teacher or simply copy the information the AI provides [2]

The main goal of learning a foreign language is to be able to communicate with others and express emotions and thoughts in that language. Writing is an excellent productive skill that is paramount for the acquisition of a foreign language. It is considered that writing is one of the most significant language abilities for communicating in a foreign or second language [3]. It is stared as significant because it allows academics to assess their students intellectually [4]. The writing process involves the application of various components such as grammar rules, structure, organization, and comprehension, it assists learners to transfer their thoughts in a written way to communicate effectively.

Research and development in the field of AI in Education have undoubtedly accelerated in the previous years [5]. AI improvements have led to more sophisticated intelligent writing assistants that offer synchronous feedback to the EFL students on the writing process [6]. Prior research has thoroughly implied that EFL students who are tasked with a written assignment frequently struggle to complete the task because they must mentally translate their ideas from their first language (L1) into English [7]. Artificial Intelligence (AI) writing tools are taking over much of content generation in the teaching-learning process. AI writing tools are a fascinating new way to generate content on a large scale, generating text in a variety of formats, as blog posts, social media, articles, emails, and other digital content. It is extensively explored that AI writing tools can enhance writing proficiency; however, it is discovered a void in the participants' substantial long-term acquisition improvements.

For that reason, this study will emphasize on the analysis of AI writing tools in English teaching and learning to establish its potential impact on the development of learners' writing tasks. This is library research that will be carried out through collecting bibliographic data and scientific writing aimed at the object of research, based on a critical and in-depth study of appropriate library materials.

2. Related Systematic Review Of Literature

After the SLR, we proceed to look for previous literature review works related to the theoretical constructs: AI, English language learning, and writing tools. In the results obtained (see **Table 1**), the studies on the different pedagogical uses of AI writing tools in the English teaching-learning process, are discussed, the benefits and drawbacks of using AI writing tools are also considered in the process of writing improvement. Furthermore, students' attitudes toward AI, as well as AI techniques, softwares, algorithms, and AI-powered writing assistance technologies are examined. All research is more than five years old and does not answer the research questions proposed in this study.

Table 1. Related Review

Article	Analysis	# Papers
The impact of AI writing tools on the content and organization of students' writing: EFL teachers' perspective	The survey revealed that several AI writing tools used in classrooms, such as Quillbot, WordTune, Jenni, Chat-GPT, Paperpal, Copy.ai, and Essay Writer had a positive impact on students' writing quality, specifically enhancing content and organization.	80
Students' Perceptions of the AI Technology Application in English Writing Classes	Regarding ***writing skills*** alone, some studies show the benefits of AI to learners. Focusing on Google Translate, Naver Papago, and Grammarly, the study of Kim and Han showed that all these tools aided students in learning English writing. Specially, learning vocabulary, grammar, and sentence structure with GT/NP was really beneficial.	185
The Extent of AI Application in EFL Learning and Teaching	The purpose of this paper is to summarize the existing literature on AI applications in English as a Foreign Language (EFL) education. This review explores a wide range of AI technologies and methods, with a particular focus on the integration of AI in EFL education.	56

Section two describes the applied methodology, research questions, inclusion criteria, and semantic structure of the search; in Section three, research questions are answered based on the 37 articles found; and Section four presents conclusions and future work.

3. Method

A. Method for SLR

Torres-Carrión [8] adopted Kitchenham's technique [9] for a systematic review of the literature, which splits the process into three phases: planning, doing the review, and reporting the review using the PRISMA method [10]. Several general and particular inclusion and exclusion criteria were created as part of the search process.

B. Research Questions

RQ1: What are the pedagogical uses of AI writing tools among EFL students?

RQ2: What are the advantages and disadvantages of using AI writing tools for EFL students' writing tasks?

RQ3: What are the attitudes of EFL students towards using AI writing tools in the teaching and learning process?

RQ4: What are the writing aspects improved by using AI writing tools?

RQ5: What AI techniques, softwares, algorithms, and AI-powered writing assistance technologies are used in teaching EFL writing?

C. Quality Inclusion and Exclusion Protocols

As inclusion criteria, scientific articles published in the Scopus database during the years 2017–2022 are considered to be the type of document (article, review, editorial or conference proceedings), research area (Computer Science, Education, Cognitive Science); it excludes repeated documents, short papers, posters, and book chapters. As a quality criterion, a detailed review of the articles is carried out, filtering the studies that do not analyze the writing improvement or that do not apply the artificial intelligence writing tools and their impact on the English learning process.

D. Semantic Search Structure

Synonyms are sought in the scientific thesaurus; operators are applied (OR, AND, W/) to optimize the search, although **Table 2** only shows the search query for Scopus. The procedure is detailed in levels with the resulting number of articles, as the inclusion, exclusion, and quality criteria are applied. Thirty-seven articles are obtained, identified as valid and explicitly related to the problem raised, and with which this SLR is working.

Table 2. Semantic Search Structure

Level	SCOPUS script	Scopus
L1	Artificial Intelligence	
	Artificial AND intelligence	481.741
L2	Artificial Intelligence Writing Tools	
	Artificial AND intelligence AND writing	4282
	Artificial AND intelligence AND writ*	7578
	Artificial AND intelligence AND writ* AND tools	1198
	Artificial AND intelligence AND writ* AND tools OR features	2193
L3	Artificial Intelligence English Writing Tools	
	Artificial AND intelligence AND writ* AND tools OR features AND english	169
		37

4. Results

The results are presented in accordance with the research questions set in the methodology, as well as the variables and indicators that correlate to them.

RQ1: What are the pedagogical uses of AI writing tools among EFL students?

As can be seen in Table 3, 27.02% of studies show that adaptive learning is common in the teaching of English as a foreign language through writing tools. However, 13.52% of the studies mentioned that AI writing tools can provide students with personalized learning environments tailored to their goals, interests, and prior knowledge. Additionally, it has been shown that the least significant values, amounting to 2.70%, pertain to the following adaptive learning techniques: adjusted to the needs of the student, adapted to learning disabilities, and easy to adapt. According to the studies, it was found that data-driven insights, error categorization, and correction are used, each representing 8.10%. Using this data, professors can better understand their students, identify learning needs, identify common problems, and design specific interventions or instructional strategies for writing skills. While 5.40% of the research mentioned that error diagnosis is used since it is important in problem-classifying and detecting students' writing errors. Another important finding was that in 18.92% of works, the educational use of AI writing tools among EFL students requires effort among students to write, edit, review, and revise written texts using platforms, while 16.22% of studies indicate that AI tools are not used to promote collaborative writing. When it comes to educational applications of AI, it was found that different types of feedback are provided by AI-powered tools, such as automated feedback, corrective feedback, and personalized feedback. According to Table 3, 13.52% of the studies show that automated feedback aids in performance verification through technology like virtual platforms, and 13.52% show that corrective feedback is direct, requires human intervention, and can capture attention effectively without causing discouragement in the learner. whereas 8.10% of the studies mentioned that personalized feedback adapts to the individual needs of each student, providing them with precise and detailed comments that allow them to identify their strengths and areas for improvement in their writing skills. On the other hand, a number of AI studies have also uncovered the use of additional types of feedback that AI does not typically provide, such as efficient, reliable, effective, global, synchronous, highly repeatable, descriptive, immediate, aggregated, dynamic, and analytical feedback.

Table 3. Research Question 1

Adaptive Learning		F
Yes	[11][12][13][14][15][16] [17][18][19][20][21]	**10**
Easy	[22]	**1**
Adaptive and personalized learning	[17] [23]	**2**
Adjusted to students' needs	[24]	**1**
Adjusted learning disabilities	[25]	**1**
Personalized learning/atmosphere	[26][27][28][29][30]	**5**
Not found	[32]	**1**
Data-driven Insights		
Provided	[11][13][27]	**3**
Not provided	[32][33]	**2**
Provided error categorization	[18] [34] [26]	**3**
Detecting students' errors	[23]	**1**
Provided error correction	[26][27]	**3**
Provided error diagnosis	[28][28]	**2**
Not found	[29]	**1**

Collaborative Writing		
Yes/Treated	[11][33][13][14][17][29][21]	**7**
Not Treated	[32][31][22][32][16][19]	**6**
Word Recommendations	[30]	**1**
Feedback		
Handwritten	[32]	**1**
Not found	[31][13][15][32]	**4**
Automated	[14][33][18][23][19]	**5**
Corrective	[16][34][28]	**3**
Reliable / Useful	[17][34][26]	**3**
Global	[30]	**1**
Synchronous	[25]	**1**
Overly repetitive	[34]	**1**
Sophisticated	[35]	**1**
Personalized	[24][29][34]	**3**
Immediate	[26][29]	**2**
Formative	[28]	**1**
Propositive	[28]	**1**
Diagnostic	[27]	**1**

RQ2: What are the advantages and disadvantages of using AI writing tools in EFL students' writing tasks?

Based on Table 4, approximately 59.46% of the studies indicate a significant improvement in students' writing when employing AI writing tools. The evidence supporting the notion that AIs represent a disadvantage is scarce, as the research reveals.

Regarding organization and connection, 29.73% of the studies indicate that students show a better ability to connect and organize ideas when using AI tools at the moment of writing. Regarding limited skill development, 24.32% of the studies reflect that AI does not limit the development of this skill in students. However, 14.81% of the research indicates that when using AI tools, students have a limited understanding of writing skills. An even lower percentage, 3.70%, shows that there is no development of writing skills when using AI tools.

On the other hand, according to 24.32% of the research, students demonstrate a commitment to using artificial intelligence tools in their writing. In addition, 5.4% of the studies indicate that there has been an improvement in students' attitudes regarding their commitment and responsibility when employing these technologies. Regarding the ethical considerations related to the use of artificial intelligence in writing, a significant disadvantage is evident since 29.73% of the investigations indicate that ethical aspects are not considered when using these tools in students' written productions. Furthermore, 5.4% of the studies reveal that artificial intelligence promotes academic dishonesty among students. Meanwhile, to a lesser extent, only 5.4% of the studies indicate that artificial intelligence stores users' private data. Concerning autonomous learning, 13.51% of the studies indicate that using artificial intelligence improves and promotes this type of learning, while only 2.7% mention that AIs do not promote autonomous learning in students. Regarding the speed of generating written texts, 24.32% of the studies indicate that writing with artificial intelligence is faster. Simultaneously, 13.51% of the studies show greater efficiency and an improvement in students' written productions when using AI tools.

Regarding accessibility, 27.03% of the studies indicate that web pages or websites achieve more efficient access to AI digital tools. In contrast, a smaller percentage, 5.4%, indicates that access is achieved through software

platforms. Regarding the lack of authenticity in written productions when using artificial intelligence tools, 29.73% of the studies need to address or lack evidence on the authenticity of such productions. In a relatively low percentage, precisely 2.70%, it is highlighted that some tools allow plagiarism detection. In addition, these tools provide writers with learning experiences by offering them ideas to integrate into their writing.

Concerning creativity, the research shows divergent opinions. A total of 18.91% of the studies suggest that artificial intelligence tools foster and stimulate students' creativity in writing. In contrast, by a slight difference, 16.21% of the studies indicate that no boost in creativity is observed when students employ learning tools for their writing. Regarding the impact of teaching writing skills using artificial intelligence tools, 10.31% of the research evidences a substantial improvement in teaching quality and the student's writing level. In addition, 2.70% of the studies indicate that using artificial intelligence saves time and effort in writing production. Finally, 21.62% of the research focuses on the learning environment, highlighting that students who employ artificial intelligence learning tools succeed in acquiring the essential knowledge to develop their skills effectively. In addition, other facets of the learning environment are addressed, such as integrated learning, distinct learning, complex and informative, and productive. However, according to the research, these characteristics do not have significant relevance in the learning environment.

Table 4. Research Question 2

Improve writing skills		*F*
Improved / Yes	[11][13][14][22][15][32][16][17][30][25][29][33] [18][34][28][29][36][19][24][34][26][27]	**22**
No long-term improvement	[34]	**1**
Not positively improved	[26]	**1**
Little evidence of improvement	[28]	**1**
Organization and Connection		
Improved / Yes	[11][13][14][32][15][16] [17][30][29][18][19]	**11**
No found	[34]	**1**
Treated	[34][26]	**1**
Skills development limitation		
Not found	[32][33][31][13][22][15][17][18][19]	**9**
Limited understanding	[14][32][24][29]	**4**
Little or no learning	[34]	**1**
Engagement		
Yes/Promoted	[11][13][14][32][16][17][18][21][19]	**9**
Multifaceted	[22]	**1**
A little	[15]	**1**
Behavioral, emotional, cognitive	[18]	**1**
Multifaceted and complex	[34]	**1**
Improved	[26][29]	**2**
Learning oriented engagement	[28]	**1**
Ethical Considerations		
No detected	[11][32][33][12][31][13][14][22][34][27][19]	**11**
Privacy issues	[32][23]	**2**
Applied	[16]	**1**

Promote Academic Dishonesty	[17][29]	**2**
Plagiarism	[29]	**1**
Monitored (Teacher)	[25]	**1**
Autonomy Learning		
Improved	[11][32][17][30][29]	**5**
No promoted	[33][13]	**2**
Supported/promoted	[14][16][33][35]	**4**
Decreased	[29]	**1**
Time Efficiency		
Quick/Rapid	[11][13][14][15][16][17][18][34][27]	**9**
Efficient/ Improved/Maximized	[15][17][33][24][26]	**5**
Limited time	[32]	**1**
Shorten time	[30]	**1**
Accessibility		
Software Platform	[11][15]	**2**
Websites/web platforms	[32][33][12][31][13][22][32][16][34][19]	**10**
Apps	[26]	**1**
Anywhere	[29]	**1**
Premium service	[18]	**1**
Lack of Authenticity		
No treated	[11][32][33][12][31][13][14][22][16][18][19]	**11**
Difficult to detect	[32][17]	**2**
Check plagiarism	[29]	**1**
Near-human writings	[34]	**1**
Creativity		
Promoted/Encouraged	[11][32][22][16][17][25][40]	**7**
Not promoted	[33][12][31][13][18][24]	**6**
Teaching Impact		
Improved/promoted	[33][31][17][30]	**4**
Save time and effort	[18]	**1**
No evidence	[19]	**1**
Learning Environment		
Treated	[11][32][33][15][32][30][23][28]	**8**
Not treated	[12]	**1**
Reliable	[14][17][18]	**3**
Productive	[16]	**1**
Complex and informative	[34]	**1**
Distinct Learning Environments	[24]	**1**
Integrated Learning Environments	[29]	**1**

RQ3: What are the attitudes of EFL students towards using AI writing tools in the teaching and learning process?

Based on the findings presented in Table 5, it is evident that 59.46% of the scrutinized theoretical materials acknowledge the efficacy of artificial intelligence in enhancing self-study or self-regulation skills. Furthermore, it proves to be highly advantageous in the realms of self-evaluation, practical application, and content reinforcement. Conversely, only 8.61% of the results indicated that the utilization of artificial intelligence is deemed ineffective for fostering self-reflection or self-study. Likewise, 29.73% of the studies indicate that the use of artificial intelligence within the teaching-learning writing process improves motivation in the development of the activities proposed. While 5.41% of the results obtained indicate that this type of tool does not improve motivation in the development of activities. On the other hand, 24.32% of the studies reviewed noted a lack of evidence on students' emotional development when using artificial intelligence. In contrast, 10.81% of the studies indicated that students experienced emotions when interacting with artificial intelligence, such as feelings of comfort or motivation, although with limited understanding. Similarly, 2.70% of the results suggested that students felt satisfied or happy to learn by using these tools.

Regarding increased interest in learning, 13.51% of the studies underscored a considerable interest among users in mastering techniques for automating information, recognizing its facilitative role in writing tasks. Conversely, in 10.81% of the studies, a lack of interest in acquiring new skills was observed. Further, 8.11% of the research highlighted the utility of such tools in text correction, exemplification of grammatical structures and as a basis for written content.

Moreover, an equivalent proportion of responses (8.11%) emphasized the efficacy and reliability of AI in textual tasks, instilling a sense of security in users. Lastly, an equivalent share of results (8.11%) noted the perception among users of receiving personalized attention through AI utilization, owing to its adaptive nature catering to individual needs.

Table 5. Research Question 3

Self-regulation Skills		*f*
Improved / Yes	[11][13][14][22][15][32][16][17][30][25][29][33][18][34][28][29][36][19][24][34][26][27]	**22**
No long-term improvement	[34]	**1**
Not positively improved	[26]	**1**
Little evidence of improvement	[28]	**1**
Motivation in the task		
Improved / Yes	[11][13][14][32][15][16][17][30][29] [18][19]	**11**
No found	[34]	**1**
Treated	[34][26]	**1**
Emotions		
Not found	[32][33][31][13][22][15][17][18][19]	**9**
Limited understanding	[14][32][24][29]	**4**
Little or no learning	[34]	**1**
Increased interest in learning		
Handwritten	[32]	**1**
Not found	[31][13][15][32]	**4**
Automated	[14][33][18][23][19]	**5**

Corrective	[16][34][28]	**3**
Reliable / Useful	[17][34][26]	**3**
Global	[30]	**1**
Synchronous	[25]	**1**
Overly repetitive	[34]	**1**
Sophisticated	[35]	**1**
Personalized	[24][29][34]	**3**
Immediate	[26][29]	**2**
Formative	[28]	**1**
Propositive	[28]	**1**
Diagnostic	[27]	**1**

RQ4: What are the writing aspects improved by using AI writing tool?

It can be seen from the data on sentence-level writing issues shown in Table 6 that 27.02% of AIs do not focus on looking for comma splices, fragments, and run-on sentences in a written text. Despite this, 18.91% of studies show that AIs are mostly used to fix simple sentence-level issues like run-on sentences or comma splices, incorrect verb form or tense, and unclear pronoun references. In terms of high-order writing skills, 27.02% of research works revealed that AI writing tools do not have a remarkable potential for developing high-order writing issues (content, organization, coherence, and creativity). While 24.32% of the works stated that AI technologies have demonstrated their capabilities in addressing and enhancing these high-order writing challenges, Strong evidence of grammar improvement was found when 43.24% of research works demonstrated that AI excels at automating the proofreading process. They can quickly identify and correct grammatical errors, including punctuation, sentence structure, verb agreement, and more. Interestingly, for vocabulary improvement, 29.72% of investigations showed that AI-based learning tools enrich students' vocabulary as they offer more than just basic synonym suggestions; they employ advanced language models to provide contextually relevant and diverse word choices.

From the data in Table 6, it is also apparent that AI has proven highly effective in automatically detecting and correcting spelling errors, significantly enhancing the overall quality of written texts (29.72%). However, 24.32% of the writing artificial intelligence systems analyzed in the research do not focus on addressing spelling errors. Regarding content, on the one hand, there is evidence from 24.32% of studies where the effectiveness of AIs in identifying and correcting grammatical and stylistic errors is significant, improving the quality of the content and making it relevant to the written task. However, there are 18.91% of investigations where AIs still face challenges in understanding the specific context, especially in terms of idioms, cultural expressions, and technical vocabulary. Findings in the present study suggest that 24.32% of AIs are programmed to improve and facilitate relevant and useful communicative achievement in English, while another percentage (10.81%) does not pay specific attention to using an appropriate style and tone, the correct features for each specific written text, such as titles and subheadings, or how well ideas are expressed.

Table 6. Research Question 4

Sentence-level writing issues		*f*
Treated	[11][13][29][33][34][35][29]	**7**
Not found	[32][33][12][31][14][32][16][17][18][19]	**10**
Appropriate/better use	[15][30]	**2**
Low-level errors	[25]	**1**

High-order writing issues		
Not found	[11][32][33][12][31][14][32][16][18][19]	**10**
Treated/improved/promoted	[13][25][35][28][29][28][34][26][27]	**9**
Current	[15]	**1**
Difficult to detect	[17]	**1**
Not treated	[34]	**1**
Grammar		
Treated	[11][32][13][14][22][15][32][16][17][35][24][27] [28][28][19][27]	**16**
Better use	[30]	**1**
Improved	[29][33][18]	**3**
Sophisticated	[34]	**1**
Vocabulary		
Treated	[11][32][13][14][22][15][29][18][34][24][23]	**11**
Not Treated/ Not found	[32][16][17] [19]	**4**
Better Use	[30]	**1**
Lexical diversity	[25]	**1**
Spelling		
Treated	[11][13][14][15][29][18][34][27][28][28][26]	**11**
Not treated	[32][33][12][31][22][32][16][17][19]	**9**
Better Use	[30]	**1**
Content		
Treated	[14][22][15][32][16][17][29][28][27]	**9**
Not treated	[11][32][33][12][31][13][34]	**7**
Communicative Achievement		
Treated	[11][32][30][29][33][18][34]	**7**
Not treated	[33][12][31][13]	**4**
Relevant and useful	[14][16]	**2**
Written Fluency	[15][25]	**2**
Detect learning behaviour	[32]	**1**

RQ5: What AI techniques, softwares, algorithms, and AI-powered writing assistance technologies are used in teaching EFL writing?

It is apparent from Table 7 that different AI techniques are used to teach computers to think like humans. 48.64% of papers support the idea that machine learning is used in a subset of AI writing tools, while the findings in other works show that Inmersive learning, experimental learning, deep learning, and processing of natural languages are employed in AI to assist in the writing process. As regards AI-powered writing assistance tools, Table 7 illustrates that Mind-mapping Software, Automatic word order error, Computer-based learning software, and AI-based instructional Software contribute to AI writing tools with an equal percentage of integration. No significant differences were found when the AIs for writing employed the aforementioned software, which was limited.

Concerning advanced linguistic algorithms incorporated in AI writing tools, 35.13% of papers show that Natural Language Processing (NLP) is one of the most important algorithms in AI writing tools. The implementation of NLP can have a significant effect on the writing ability of EFL learners by generating high-quality content with contextual understanding, grammar correction, analysis of emotional tone, and content personalization. Beyond NLP, Classification algorithms, Supervised, Partially Supervised, and Reinforcement Machine Learning Algorithms, as Natural Language Understanding (NLU), are integrated into the AI tools for writing. Recent research on AI-powered writing assistants has found that Automated Essay Scoring (AES) and Automated Essay Grading (AEG) are computer systems that use standard measurements to grade and give feedback on text-based test items that are either open-ended or constructed. These systems are intended to simplify the scoring and feedback process in EFL writing classrooms. Automated Assignment Scoring, Automated Text Generation, Computer-assisted Scoring System, Academic Word Suggestion Machine (AWSuM), Automated Writing Evaluation (AWE), Automated Word Suggestion, Automated Writing Corrective Feedback (AWCF), Machine Translation, and Intelligent Tutoring System (ITS) are all part of AI writing softwares. They are put together to offer new ways to deal with different parts of the writing process. Each system provides unique functions, resulting in a more efficient, personalized, and comprehensive approach to EFL writing process.

Table 7. Research Question 5

Artificial Intelligence Techniques		
Not detected	[11][32][17]	**3**
Machine Learning	[13][12][31][13][14][22][15][32][16] [33][18][34][24][23][28][29][36][34]	**18**
Machine, Deep, and Processing of Natural Languages	[37]	**1**
Immersive Learning	[26]	**1**
Experimental Learning	[19]	**1**
AI-powered writing assistant technology		
Mind mapping Software	[11]	**1**
Automatic word order error	[13]	**1**
Computer-based learning software	[32]	**1**
AI based instructional Software	[30]	**1**
Algorithms		
Classification algorithms	[15]	**1**
Supervised Machine Learning Algorithms	[25][23]	**2**
Reinforcement Machine Learning Algorithms	[29]	**1**
Partially Supervised Machine Learning Algorithms	[24]	**1**
Natural Language Processing (NLP)	[25][29][34][35][24][27][28] [29][28][21][34][26][27]	**13**
Natural Language Understanding (NLU)	[34]	**1**
Writing Assistant Softwares		
Automated Essay Scoring (AES) / Automated Essay Grading (AEG)	[33][22][15][24][23][34] [26][27]	**8**
Automated Assignment Scoring	[14]	**1**
Automated Text Generation	[14][24][19]	**3**
Computer-assisted Scoring System	[17]	**1**

Academic Word Suggestion Machine (AWSuM)	[25]	**1**
Automated Writing Evaluation (AWE)	[33][35][28]	**3**
Automated Word Suggestion	[18]	**1**
Automated Writing Corrective Feedback (AWCF)	[34]	**1**
Machine Translation	[34]	**1**
Intelligent Tutoring System (ITS)	[23]	**1**

5. Conclusions and Future Work

This study examines the pedagogical uses of artificial intelligence tools for writing in English as a Foreign Language (EFL) education. It provides comprehensive insights into the use of adaptive learning and AI tools for teaching writing skills. Percentages are presented that reflect the prevalence as well as the impact of AI tools on learning to write in English. It was also shown that the role of automated, corrective, and personalized feedback in the teaching-learning process is discussed. Some of the questions raised by this finding relate specifically to the importance of understanding how teachers can use data-driven insights to improve students understanding, identify learning needs, and design interventions specific to writing skills. It is also mentioned that some studies have shown a high percentage of students who experience benefits from improving collaborative writing through the use of artificial intelligence (AI). This is in line with the work of Koch et al. [42], who emphasized that adaptive learning tools personalize student experiences through educational technologies, such as real-time writing tools, to provide feedback and support, enhancing engagement and motivation in the classroom. Similarly, Ahmad Koka et al. [43] indicated that the use of AI-writing tools fosters collaborative writing, improving its quality and student attitudes, emphasizing the importance of task design for optimal learning opportunities. A further study with more focus on the potential long-term impact of AI-assisted language learning on writing skills and and its pedagogical uses is therefore suggested.

The second finding of our research addresses the advantages and disadvantages of using artificial intelligence (AI) tools in writing tasks for students learning English as a foreign language. Among our most notable advantages are improved writing skills, organization, engagement, efficiency in autonomous learning, and time management. However, disadvantages are also evident; one of the most significant is the students' limited understanding of writing ability when creating their compositions. Another relevant disadvantage is related to ethical considerations, since this aspect is not considered when using artificial intelligence tools for written production. These results support the perspective of Alharbi [34], who states that implementing AI tools in the classroom to teach writing skills has been controversial, though these artificial intelligence tools are essential in the writing process, providing suggestions for text generation and sentence completion like human intervention. On the other hand, teachers express concerns about the authenticity of the writings, as the AI tools allow the students to copy and paste their work with limited impact or no evidence of learning the writing skill. The quality of these results emphasizes the need for a balanced and thoughtful integration of AI tools into writing skills in education so that this research can be used as a basis for future works.

In terms of writing aspects improved, the findings of the current study indicate that the use of AI writing tools in EFL classrooms can lead to improvements in various aspects of writing skills, such as simple sentence level issues, grammar, vocabulary, quality of written texts, as well as communicative achievement. The EFL instructors' mutual interest in employing a variety of AI tools to improve students' writing abilities alluded to the fundamental trend of technology integration in education. These results further support the idea of Marzuki et al. [44], who suggested that a varied set of AI writing tools be used in EFL education. QuillBot, Jenni, Chat-GPT, WordTune, Copy.ai, Paperpal, and Essay Writer were shown to promote a holistic learning environment and improve students' overall academic performance. The study's findings imply that integrating AI writing tools can help improve the quality of EFL student writing. Similar to this, Song & Song's study [45] looked at the effects of AI-assisted language learning for EFL students. Their findings support and validate our own results. Significant improvements in writing proficiency and motivation were observed among students who were exposed to AI-assisted instruction. The experimental group exhibits improved ability in several facets of writing, such as organization, coherence,

grammar, and vocabulary. Further research should be done to investigate the impact of AI writing tools on developing high-order writing issues, given that there is a limited amount of research related to their development and their impact on the EFL teaching and learning process.

Additionally, the articles examined revealed that students presented diverse perspectives on the influence of AI writing tools on students' writing. Certain studies recognized the efficacy of artificial intelligence writing tools in enhancing students' ability to manage their own emotions, thoughts, behaviors, and impulses, as well as increasing their motivation for the task. It was also found that there is a lack of evidence on students' emotional development when using artificial intelligence. However, in other investigations, an increased interest in learning was found as a consequence of using AI writing tools in the EFL classroom. Students who are initially hesitant about learning English may develop a newfound interest when they realize the potential of AI tools to enhance their writing skills. These findings further support the idea of Sumakul et al. [46], who mentioned that artificial intelligence (AI) significantly impacts education by enhancing self-study and self-regulation skills, as well as improving learning outcomes through self-evaluation, practical application, and content reinforcement. AI also shows promise in boosting motivation in the teaching-learning writing process, although some studies suggest limitations in fostering self-reflection. While there is a growing interest in mastering techniques for automating information, some challenges remain in promoting AI adoption among certain student groups. Further research is needed to understand the complex interplay between AI and emotional responses in education. The next point of discussion focused on AI techniques, softwares, algorithms, and AI-powered writing assistance technologies used in EFL writing instruction. The results of this study show that a higher number of AI writing tools integrated with Machine Learning Techniques are being highly employed to identify and correct errors in grammar, punctuation, and spelling, enabling them to create coherent and engaging content. This is in line with the work of Qiu et al. [47], who emphasized that AI writing tools focus on latent semantic analysis through the use of machine learning techniques. These tools aim to help students improve their English writing by leveraging the collective expertise of trained human graders. Likewise, one of the key findings of this research is the significant role of machine learning algorithms in AI writing tools. These algorithms employ extensive datasets to generate text that resembles human language patterns, allowing these tools to create cohesive and contextually written texts. Through the implementation of Natural Language Processing (NLP), these algorithms consistently enhance their functionality, improving the quality and efficiency of content generation. This concern aligns with the findings of Su [48], who suggested that the integration of artificial intelligence and Natural Language Processing enables the identification of features such as word use and syntax in students' writing skills, resulting in an accurate evaluation and the supply of necessary feedback. Moreover, writing assistance softwares plays a crucial role in fostering students' creativity and productivity. By offering synonym suggestions, writing alternatives, and contextual recommendations, these AI tools inspire students to explore various linguistic expressions and refine their writing in the language. Again, this is supported by the research conducted by Qiu et al. [47], who mentioned that the purpose of these systems is to guarantee improved English by assessing writing styles, identifying errors, recommending necessary interventions, and providing solutions to the identified errors. suggestions, writing alternatives, and contextual recommendations, these AI tools inspire students to explore various linguistic expressions and refine their writing in the language. Again, this is supported by the research conducted by Qiu et al. [47], who mentioned that the purpose of these systems is to guarantee improved English by assessing writing styles, identifying errors, recommending necessary interventions, and providing solutions to the identified errors.

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