

# The Extent of AI Applications in EFL Learning and Teaching

Yousif A. Alshumaimeri  and Abdulrahman K. Alshememry 

**Abstract**—Foreign language teaching, like almost all other aspects of human existence, has been substantially influenced by recent advances in modern information and communication technologies, such as augmented reality, virtual reality, and artificial intelligence (AI). Although AI has been in use for almost 30 years, educators remain skeptical toward the use of AI-technology in the education field more broadly, and how its use might meaningfully affect English language skills. Through a systematic review, this work seeks to provide a summary of the available literature with regard to the applications of AI in English as a foreign language (EFL) education. This review considers a wide range of AI technologies and methodologies, with a specific focus on the integration of AI into the realm of EFL education. The review then delineates the possible effects of AI in terms of developing students' language skills, students' and teachers' perceptions of using AI applications, and the difficulties and challenges inherent to implementing AI applications. The discussion culminates by identifying research gaps.

**Index Terms**—Artificial intelligence (AI) tools, automation, computer vision, deep learning, English as a foreign language (EFL), humanoid robot, machine learning, speech recognition, translation.

## I. INTRODUCTION

THE classic generic and standardized system of education has come under heavy fire in recent years since it cannot be tailored to each student's needs [1]. Education systems worldwide are moving in the direction of a more individualized, technology-enhanced, and student-centered curriculum. One of the latest technological developments to trigger educators' interest is artificial intelligence (AI). In particular, educators see great potential in AI applications' ability to help them gain a fundamental understanding of students' learning paths from the yielded data, perceiving AI usage as ultimately enhancing the effectiveness of learning structures and academic systems. The use of AI has permeated the educational system deeply enough to drastically alter its shape and structure, from developing tailored study materials and fulfilling the unique and individual needs of the learners to replicating human dialogue and creating and grading customized assessments [1], [2].

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The phrase AI, first came about in 1956 from John McCarthy [3]. No consensus currently exists regarding a universal definition of AI, and contemporary explanations are varied. Due to ongoing changes in what AI entails, it is challenging to formulate a common definition of AI [4], along with the interdisciplinarity of its research [5]. Some academics have defined AI as devices, such as computers or computer systems that mimic human cognitive abilities [3], whereas others have considered AI to be a defined group of computer functions precisely associated with learning and problem solving. For example, Luckin et al. [4] described AI as follows:

“Computer systems that have been designed to interact with the world through capabilities (for example, visual perception and speech recognition) and intelligent behaviors (for example, capability of using available information about the world and making decisions or taking the most sensible action to achieve a stated goal) that we would think of as essentially human.” [4, p. 14]

Authors have also referred to AI as the application of technological advancements, such as machine learning and natural language processing to enable a computerized device to emulate smart human behaviors [6].

In the field of education, AI-powered technologies surpass human teachers in the ability to collate enormous volumes of data on learners' academic achievement, on the basis of which educational content and students' individual learning trajectories are modeled or adapted [5], [7]. In addition, they facilitate learning growth by providing quick feedback. AI is based on two key principles: autonomy and adaptability. Adaptability refers to the capacity to enhance task execution through experience-based learning, whereas autonomy refers to the capacity to complete activities in challenging settings without ongoing user direction [8]. These two ideas serve as key tenets in establishing an instructional precedent that offers a satisfactory response to the range of current and future AI-based approaches [8].

Although researchers have examined how to integrate AI in education over the past three decades, they are only at this stage starting to look into the potential teaching prospects of AI technologies to assist students across the student life cycle [9]. In the context of language learning in particular, AI supports advancement in various ways, including the provision of customized feedback, adjustable educational pathways, sophisticated tutoring systems, and natural language processing tools. However, these technologies also pose multiple issues of concerns and requirements that highlight the need for further examination, including ethical, societal, cultural, and linguistic problems, as well as the caliber and authority of the information

and algorithms used by AI frameworks. As a result, further in-depth research needs to be undertaken to investigate how AI can be used in language instruction contexts, both successfully and conscientiously, along with identifying the best practices and recommendations for designing, constructing, and evaluating AI-based language-learning resolutions.

Vigorous growing development of AI, together with educators' increased interest in this area, justifies further literary analysis into the use of AI in English as a foreign language (EFL). Accordingly, this article highlights the current landscape, potential drawbacks, and promising future of AI in EFL for teachers, students, and developers. This systematic review provides an overview of AI research in language learning, an evaluation of the primary AI-powered tools featured in EFL research, and possible identification of future research directions.

## II. STUDY AIMS AND OBJECTIVES

This review article's goal is to analyze and systematize the vast amount of articles relevant to use of AI-powered tools in EFL classrooms to enhance language skills and to elucidate the fundamental themes upon which AI-powered methods alter modern pedagogical systems. The objective is to provide a systematic review of AI applications/programs used in EFL education. The article intends to offer insights into the effects, advantages, and limitations of the existing research and provides an objective assessment of conflicting research. Furthermore, the review will identify the research gaps as well as the potential of AI technology for language classrooms. Finally, the discussion will cover the challenges that face the implementation of this technology.

This article expressly responds to the following research queries.

- 1) Which AI tools and technologies have been used in EFL learning and teaching?
- 2) What possible impact has AI imposed on language learning and teaching?
- 3) What difficulties and challenges have faced educators and their students while implementing AI technologies in EFL classrooms?
- 4) What research gaps have been identified?

## III. LITERATURE REVIEW PROCESS

Answering these questions involved carrying out a systematic literature review, as it has the potential to provide more comprehensive answers. Adopting a systematic review eliminates technical or etymological tangents brought about by the vast amount of articles on AI in the field of EFL that are currently available, and to accept and develop thematic adjustments for better implementation. In other words, the key topics that emerge from this review form a foundation for future scholars researching technology advancements and policy design, with the primary aim of facilitating successful implementation of AI-powered individualized pedagogical systems [10].

The review began by formulating research questions (see previous section), followed by defining criteria for excluding and including studies under consideration.

Specifically, this review employed the following inclusion criteria.

- 1) Pertinent studies of AI and its use in EFL learning and teaching.
- 2) Studies used qualitative, quantitative, or mixed methods or entailed literature reviews.
- 3) The samples used in the studies were teachers and/or instructors responsible for implementing AI programs.
- 4) The papers that mentioned the challenges of integrating AI in EFL classrooms.
- 5) Only English studies, published between 2007 and 2022.

Meanwhile, one exclusion criterion was applied; specifically, papers that focused on technical disciplinary knowledge associated with AI were excluded from the current review.

The review data were extracted from articles published in the Web of Science Core Collection or Scopus, ScienceDirect, and IEEE (Institute of Electrical and Electronics Engineers). The scope was to find the use of AI in EFL, we therefore used broad search terms, including AI, EFL, speaking, conversation and communication skills, personalized language learning, AI pedagogical approaches, and AI challenges in education. A total of 405 journal articles were selected initially. After examining the full text, 80 articles were finally chosen for this review.

A qualitative synthesis approach was used to extract the main findings. The first phase involved in-depth, recurrent, and most importantly highly active reading for the reviewer to become accustomed with the selected studies and take out relevant excerpt [11]. The thematic synthesis allowed identifying different influencing factors of the topic (i.e., the impact of AI on EFL) and organizing those into common themes [12]. Therefore, after reviewing all relevantly selected studies, the primary outcomes were extracted. Evaluation of the publications revealed a rising interest in AI research and its use for enhancing English language learning skills. Finally, the results were sorted and summarized, yielding six themes related to language teaching and learning; and five AI applications that answered the four research questions. Overall, the literature review process provided a solid foundation for the following discussion, which will center on the employment of AI in EFL schools to enhance speaking abilities [13].

## IV. METHODOLOGY

This article's aim is to systematically conduct an evidential review on the basis of data generated through web-based findings concerning AI and its effects on EFL learners' skills. This review entailed searches in several databases, including IEEE, Scopus, and Web of Science, to identify articles that fit the study's scope. Such databases offer advanced search options and filters that support expediency in distinguishing among the numerous available papers, ensuring the quality and relevance of the search results. For these reasons, database-determined studies are recognized to yield valuable publications about the topic of interest.

### A. Study Selection

This web-based research aims to help make learning effective and improve teaching methodologies. In addition, this study

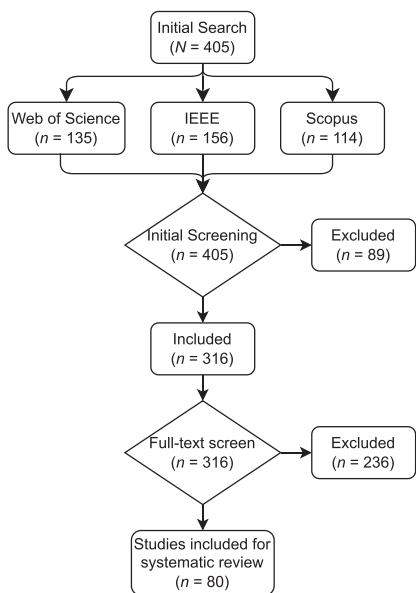


Fig. 1. Flow chart of the current study.

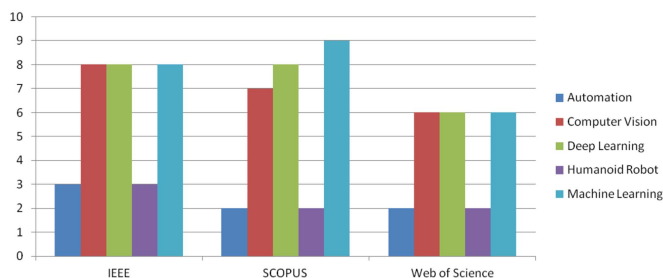


Fig. 2. AI applications on language learning.

considers the issues and difficulties associated with the implementation of AI technologies in the classroom setting. We elected to perform a systematic review in order to research this subject. Fig. 1 illustrates processes used to pinpoint and choose the literature included in the current study.

A systematic review follows a steady and transparent process to explore a topic of concern and provide broad and extensive output. This article includes data from 2007 to 2022 that were obtained by relevant keyword searches. The three databases, IEEE (30), Scopus (28), and Web of Science (22), yielded a sum total of (80) articles, which after being identified as relating to the use of web-based AI in EFL learning have been included. Table I presents a detailed list of the included literature, which has been divided into six themes relevant to language pedagogy. Fig. 2 summarizes the number of studies of each AI application identified according to their data source detail. The target data source of this research was IEEE, Scopus, and Web of Science. This figure shows that SCOPUS publications are more prominent with machine learning as a prominent area of AI used in language learning and teaching research.

### B. Inclusion and Exclusion Process

This article applied all of the predetermined parameters for inclusion and exclusion in the review. The focus of this study is on the use of AI-powered tools in the development of EFL learning skills. The process of designing the study identified a systematic review as the best approach to fulfill the study’s aim, while excluding such techniques as questionnaire-based surveys, data collection, and follow-up procedures. Articles that included the practical use of AI in an educational environment were identified via the search features in three academic databases, namely, Web of Science, IEEE, and Scopus.

The current study includes only studies published between 2007 and 2022. Table II provides a detailed breakdown of the publication dates of the articles collected in the literature search process. This figure shows the rising interest in research in EFL and AI. In 2007, there were published only two research papers related to AI in EFL. This trend increased linearly till 2022, which brought 15 publications in this research area.

## V. DISCUSSION

### A. Possible Effects of AI on Language Learning

The studies reviewed revealed that applying AI to the study of foreign languages can provide students with rapid and highly individualized reinforcement, representing a vital cornerstone for individualized study, as well as a crucial requirement for modern teaching [92]. Fig. 4 presents a projection of the work done on the basis of research in terms of data collected through automation in the areas of argumentative writing, survey translation, and knowledge graphs. The figure clearly reveals the differences achieved after implementing all the basic approaches to obtain the results.

1) *Artificial Intelligence (AI-Powered) Tools:* AI and the automation it facilitates can provide increased convenience in the areas where AI is applied. In this regard, AI-powered technologies, such as software for language learning (platforms and applications with gamification elements, e.g. Duolingo), intelligent virtual reality, machine translation (MT) tools, such as Google Translator or Translator Online, writing assistants, chatbots, and intelligent tutoring systems, can supplement and even surpass the efforts of teachers, who cannot compete with these adaptable and sophisticated technological tools that also provide collaborative learning support [2].

Pokrivčáková [5], who examined teacher preparation for applying AI-powered tools in EFL learning, claimed that human educators simply lack the capacity to continuously assess every individual student’s outputs, identify their unique learning requirement, appropriately modify the course material, and provide them with detailed feedback in a matter of seconds, let alone in a class containing a dozen of more learners. As a result, teachers can rely on AI programs and applications as highly useful auxiliary tools that enable educators to avoid time-consuming, energy-intensive, and exhausting tasks, such as grammar or pronunciation exercises, as well as support developing learners’ English language speaking or oral skills and communication skills [93].

TABLE I  
CATEGORIZATION OF STUDIES ON AI IN EFL

Study	Theme	Study	Theme
Yu and Chen [14] Pinner [16] Zaini and Mazdayasna [18] Sakulkeakulsuk et al. [20] Saks and Leijen [22] Pikhart [24] Zhang and Aslan [26] Kasepalu et al. [28] Almusharraf [30]	Language Education	Tribelhorn and Dodds [15] Brine et al. [17] Aguado et al. [19] McDonough and Sunitham [21] Fu and Liu [23] Rich and Wang [25] Maleki and Ahangari [27] Schoonen et al. [29] Cai et al. [31] Huiying [32] Samaneh et al. [34] Fraytag et al. [36] Stevenson and Phakiti [38] Yong-Sheng et al. [40] Liao [42] Liao and Lin [44] Wang [46] Kalantari and Kolahi [48] Kongcharoen et al. [50] Pecorari [52] Kim et al. [54] Wang et al. [56] Xu et al. [12] Xiaoxuan [59] Chiu et al. [61] Nazari et al. [63] Li and Mak [65] Guo et al. [67] Tam et al. [69] Gayed et al. [71] Farahian and Parhamnia [73] Parhamnia et al. [75] Kim and Shim [77] Bulakh and Shandruk [79] Liu et al. [81]	Argumentative Writing
Fernández Álvarez and García Laborda [33] Shakouri et al. [35] Matsuno et al. [37] He et al. [39] Cheng [41] Chai et al. [43] Xue et al. [45] Merine and Purkayastha [47] Darmawansah et al. [49]	Automated Feedback		
Lan et al. [51] Zhuo et al. [53] Isisag [55] Javanbakht and Hadian [57] Wang [58] Zhao et al. [60] Kim and Kim [62] Toivonen et al. [64] Dessi et al. [66]	Generating Knowledge Graph		
Hsu et al. [68] Tsai and Young [70] Vázquez et al. [72] Chang et al. [74] Motschenbacher [76] Hwang et al. [78] Chen [80] Ergül [82] Judewicz et al. [83]	Survey		
Min [84] Zhang et al. [85] Chang and Hsu [86] Shao et al. [87] Shah et al. [88] Yang and Tao [89] Mahfoodh [90] Cancino Panes [13] Wu and Li [91]	Translation		

TABLE II  
INCLUDED ARTICLES BY THE YEAR

Year	Number of papers
2007	2
2008	3
2009	3
2010	7
2011	5
2012	2
2013	3
2014	5
2015	2
2016	3
2017	4
2018	5
2019	3
2020	8
2021	10
2022	15

2) *Speech Recognition Technology and AI Tools*: Speech recognition technology, language processing technology, and language translation softwares are among the key examples of

how AI tools are evolving in language learning to support developing students' communication, conversation, and speaking skills. Communication can affect the learning process while training conversation. The translation level of AI has evolved with AI progress and upgrading from simple literal matching to deep-level semantic comprehension, reaching human-like thinking and intelligent translation [94]. Over the past years, learning English has become an integral and even obligatory part of progress in learning language in the face of new technologies. AI technology can be used to teach English in a way that fully exploits this tool's benefits and compensates for the drawbacks of conventional classroom instruction [95].

Evidence suggests that achieving fluent communication is the main objective of oral English learning. While examining the application of AI in English teaching, Yang [92] found that the fluency of students' oral English clearly demonstrated how well they could use the language in real-world situations. Therefore, integrating AI technology into the teaching of English offers irrefutable benefits.

1) Most importantly, AI technology effectively reaps the benefits of complementary practice. AI can establish an

TABLE III  
AI EFFECTS ON LANGUAGE LEARNING

	Language Education	Argumentative Writing	Automated Feedback	Generating Knowledge Graph	Survey	Translation	Grand Total
Automation	1	3	1	1	0	1	7
Computer Vision	1	8	4	4	1	3	21
Deep Learning	2	10	2	2	4	2	22
Humanoid Robot	1	4	0	0	1	1	7
Machine Learning	4	10	2	2	3	2	23
Grand Total	9	35	9	9	9	9	80

environment for learning English for students, and interact with them as companions would. Through human-computer interaction, learners can swiftly raise their oral English proficiency while avoiding embarrassing situations in practice [96].

- As an added plus, instructors and students can form groups, collaborate, and practice online to accomplish group learning. For example, an intelligent robot can serve as a teaching aid by offering some phrase patterns and preset colloquial expressions to group members for practice purposes. By assisting students in practicing and improving their spoken English fluency, this approach can ultimately ease the tension between humans and computers. Overall, Yang [92] concluded that AI plays a significant role in helping pupils' English proficiency.

3) *Reading and Writing With AI-Powered Tools:* Reading and writing in English are crucial components of learning oral English and gaining comprehensive skills. AI-based techniques offer possibilities for constructive discourse. According to the literature, devices, such as language bots and MT can support students' speaking skill development [97]. For example, teachers and students can converse with an AI bot and gain knowledge through dialogue [9]. AI-powered chatbots for language learning respond to messages with personalized responses and can even score student performance or offer advice on areas for improvement, which helps with speaking skills [6]. GPT Chatbot is a prime example of this type of learning. Jasper AI and Jenni AI offer help in writing in any format with a vast vocabulary. Lingvist is another sound choice for learning vocabulary. These results were confirmed by Bailey, Southam, and Costley [98], who reported that the use of storybots in an English language classroom increased reading, comprehension, and interaction. Table III and Fig. 3 display the focus area of AI effects on EFL learning through language education, argumentative writing, generated knowledge graphs, survey translation, and automated feedback conducted via deep learning, humanoid robots, machine learning, or computer vision. The primary developments concern systems that allow learners to emphasize compassion and precision while adapting to the needs of learners. Table III and Fig. 3 show that argumentative writing is the most area of EFL research addressed using AI applications.

4) *Machine Learning and Translation:* Another AI tool is MT. In Fig. 4, the graph of machine learning is higher than any other tool being used to obtain data. According to Cancino and Panes [13], machine learning and translation have advanced significantly due to such AI innovations as neural MT [99]. In

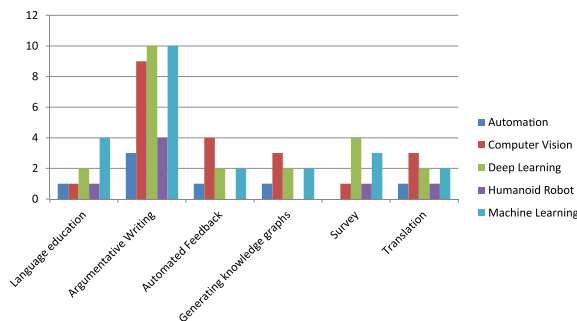


Fig. 3. AI effects on language learning.

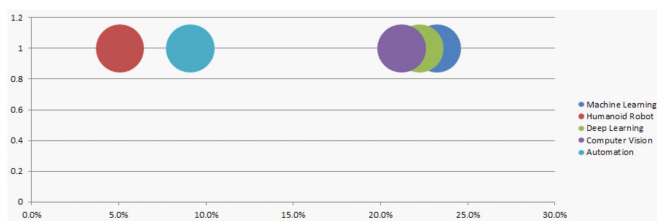


Fig. 4. Research gap: Using AI in EFL.

particular, neural MT, such as that incorporated into Google Translate, can help with integrating MT into EFL education, as well as improving translation quality. Through using MT as a teaching tool [100], students can spot and correct flaws and inconsistencies in the text that has been automatically translated. Students can thus gain a greater understanding of the language, while improving their comprehension, sentence structure, and vocabulary [28].

B. AI Tools and Technology Used in EFL

Despite educators seeing the potential of AI-based tools, some scholars perceive that educators will need to first acquire basic technology use skills, and critically, methods of successful lesson integration prior to the application of AI in classroom setting [101]. Understanding how important AI is and what benefits it can bring to instruction will also help educators to integrate advanced technology into their lessons. For instance, the extensive involvement of AI-powered tools in educational settings promises to increase students' academic interest and success. In addition, numerous educators who have not utilized

AI-based learning aids may perceive it as merely a more modern educational tool [102], leading them to underestimate what role AI can play in the classroom. Consequently, successfully utilizing AI as a support system in an educational context requires that teachers use it themselves so that they can understand its role in the support of learning [103].

Although AI is affecting teaching practice in numerous ways, these changes are positive overall. Therefore, teachers should participate in self-development by learning about the benefits that AI can bring to learning settings. Here, Sumakul [104] highlighted that while utilizing AI might aid in lesson delivery, human teachers would still necessarily dominate the preparation and evaluation stages.

Scholars have also identified other areas in which gaps exist between technology use and practice. According to Guzman and Lewis [97], AI is not perfectly compartmentalized into archetypes that have historically emphasized human-to-human communication; therefore, the researchers pointed to the need to approach this gap between theory and developing technology. Another issue is that AI can intimidate teachers due to misconceptions and misunderstandings about its use in education [104]. This observation implies that teachers are unaware of how AI is changing the landscape of how languages are taught and learnt [105].

Furthermore, despite promising advancements, AI-related English language programs are infrequently used in practice since the available applications typically feature poor-quality feedback, and the exercises are oriented only toward communication, with a pointed emphasis on solitary grammar and vocabulary exercises. Teachers need to know the linguistic requirements of the activities, along with their strengths and weaknesses. Most importantly, teachers must understand the significance of “authentic practices using big problems in collaborative settings” [106, p. 583] and personalization.

Research has also revealed that the (planned) usage of various instructional methods in the classroom must be connected to practitioners’ expectations and beliefs (e.g., the importance or utility of instructional practices; [107]). The adoption of instructional approaches into practice is not always prompted by scientific support for those practices. Considering the utility of AI for promoting EFL is also vital, along with evaluating how its use may affect teachers’ beliefs and expectations, which may also factor into the likelihood that AI will be implemented [108].

### C. Difficulties and Challenges in Implementing AI Applications

Despite the fact that AI may present excellent opportunities for teaching and learning, some scholars have warned of the concurrent emergence of new ethical issues and concerns. For instance, educational organizations with tight budgets might be persuaded to substitute profitable automated AI solutions for human-based instruction. Therefore, those in the educational field may have a collective concern that they face a threat of being replaced by technologies such as chatbots and AI tutors [65]. Despite AI’s potential to improve learning analytics, the technology also offers a downside in the form of serious privacy and data

TABLE IV  
GENERATING KNOWLEDGE GRAPH

Row Label	Automated Feedback	Grand Total	Total Percentage
Automation	1	7	8.75%
Computer Vision	2	21	26.25%
Deep Learning	3	22	27.5%
Humanoid Robot	4	7	8.75%
Machine Learning	5	23	28.75%
Total		80	

protection concerns since these technologies necessitate utilizing the sensitive data and information of educators and students. For example, when the server location is unknown or where data privacy and protection laws are ambiguous, chatbots should not be granted access to language learning as it is a very private process [109]. In a similar vein, Schmidt and Strassner [110] emphasized the need to clearly address the issue of data privacy needs. Recently, certain organizations have been established to construct a framework for the ethical regulation of the use of AI in the field of education [111]. Generally, AI-powered tools and technologies, such as artificial neural networks, computer vision, voice recognition softwares, and computer vision, among others, are now used in language education.

Foreign language instructors routinely perceive the use of MT in the classroom setting to be disruptive, unsuccessful, or even a violation of the learner’s integrity. Thus, limiting the use of MT in the classroom setting has been the objective of many of the articles reviewed in this work. However, some scholars have reported that, for the most part, prohibiting MT use in the classroom setting is futile and counterproductive. Along these lines, White and Heidrich [112] asserted that educators should rather opt for strategies to assist students in effectively using MT tools. Accordingly, foreign language instructors should have an awareness of both MT’s possibilities and its restrictions and give their students the necessary assistance in order to boost student learning [4]. Table IV displays the percentage of automated feedback in the studies included in this review.

Some studies suggested that human–chatbot communication is significantly lacking in vocabulary richness compared with human-to-human dialogue. Thus, the results displayed in Table IV provide an example of the performance of AI-generated outcomes in percentage form. In a review of modern AI spoken English teaching products, Zhou [107] described various disadvantages, including a restriction of word choice, lack of a real-time grading system, and lack of interactional, hands-on teaching, all of which are crucial for both teachers and learners. When employed in foreign language instruction, such AI tools as chatbots and online platforms/apps have additional issues, as well [113]. According to Lotze [114], discussions with chatbots can be inconsistent, confusing, and prone to error if teachers or students do not input queries and replies that the system developers were able to anticipate. This observation implies that the technologies are ineffective as role models for students who are learning foreign languages. Therefore, according to Lotze [114], before replacing a human language instructor, AI dialogic systems still need to meet many prerequisites (such as, spontaneous improvisation, inventiveness, and shared understanding). Popenici and Kerr [115] advised acknowledging

the currently existing technological limitations, and the fact that AI is not yet prepared to assume the role of educators, is critical. Nevertheless, they went on to contend that the proper use of AI's true potential will increase human capacities and opportunities for teaching, learning, and research. The integration of AI into language education should generally be approached through a robust instructional lens, in which algorithms must unite with feelings and sound values [116].

#### D. Research Gaps Identified

This study undertook a thorough, systematic analysis of research published between 2007 and 2022 in light of the growing significance of AI in language education, and the dearth of complete reviews on the topic [110]. The analysis produced the following findings.

Literature on the use of AI for oral skill instruction remains scarce. On a related note, research has not conclusively established, which pedagogical strategy is best for teaching English [117]. The current study's search of the literature revealed a dearth of critical analyses of the pedagogical effects of adopting AI in education or novel implementation strategies. Furthermore, any currently available reviews would already seem to be out of date given the ongoing swift advancements and developments in technology; resulting in a scarce number of published reviews focused on innovative AI technologies trends and development in the educational setting [5]. Bibliometric analysis is most beneficial when analyzing substantial amounts of literature data, although more thorough research utilizing systematic review approach is required. Therefore, additional systematic review of representative articles to develop a deeper understanding of the incorporation of AI for EFL education is recommended [101]. The identified gaps raise, in turn, several questions that need to be addressed, including the following.

- 1) How far along is AI for EFL currently, and how knowledgeable are educators of its developments?
- 2) What AI technologies are teachers most likely to incorporate into language education?
- 3) What is the perception of AI among EFL students, and why might they want to employ AI technologies to study English?
- 4) What is the reason behind language teachers incorporating AI technologies into their regular teaching practices, and how do they view AI?
- 5) What essential abilities do language teachers require in the modern, AI-enhanced classroom?
- 6) How exactly should teacher training programs account for AI advancements?

Fig. 4 illustrates how the collection of data in the current systematic review did not demonstrate these questions, although it shows the data resources that were used and evaluated through this study. In this bubble chart, the  $x$ -axis shows the contribution percentage to a particular AI application in language learning research. It can be seen that Automation and Humanoid robots are very rarely addressed in language learning, whereas machine learning is the most used AI technology in language learning.

## VI. CONCLUSION

This systematic review has presented an overall summary of AI applications currently used in EFL learning and teaching, through its examination of 80 carefully selected papers from the IEEE, Scopus, and Web of Science databases. Our findings suggest that the area of argumentative writing in the use of AI applications in EFL has received the most research attention compared with language education, automated feedback, generating knowledge graphs, surveys, and translation research. Among the different AI technologies used in EFL instruction, machine learning predominates, followed by deep learning, and computer vision.

#### A. Contributions and Implications

This study further adds to the theoretical understanding of the role of AI in EFL by providing an in-depth analysis of the current literature on AI applications in language learning and teaching. The investigation uncovered the most investigated EFL domains employing AI applications, along with the most commonly used AI technologies. The findings also highlight the potential of AI to augment EFL learning and teaching, while prompting recognition of the disparities between the available technology and practice. Although AI-based tools can furnish personalized learning experiences and immediate feedback, their use partially supplants the role of instructors in aiding learning and giving social and emotional help. In this light, recommendations arising from the study findings include weighing the use of AI against face-to-face teaching and guaranteeing the just application of AI in a way that does not intensify already existing inequalities in education.

The systematic review employed in this study comprehensively explored the current literature on the role of AI in language education. According to Mallett et al. [118], systematic reviews focus on evidence, impact, validity, and causality, all of which were critical in this work in making conclusive recommendations on the value of AI in education practices. The adopted strategy entailed a clear, thorough procedure for recognizing, selecting, and evaluating pertinent studies from various databases, leading to a final sample of 80 articles. The systematic review methodology facilitated detecting the scope of AI implementations in EFL learning and teaching, the most studied areas of application in EFL instruction and AI technologies, and the differences between the technology employed and the current practice. Overall, the systematic review method provided a beneficial approach to synthesizing the existing literature on AI in EFL and identifying research gaps, establishing a basis for future exploration in this domain.

AI can revolutionize educational practices by transforming the functions of teachers and students, as well as refining assessment. AI applications can offer differentiated instruction to students, answering the challenge found in the traditional educational mode posed by a large number of students requiring attention from relatively few teachers. In practical terms, the increasingly pervasive use of AI-based technologies and methods may allow the teacher's role to evolve from serving as the principal source of expertise to that of a learning coach who

furnishes guidance and commentaries to learners as they connect with personalized adaptive learning experiences. As for pupils, they may become more autonomous and self-motivated in their educational journey, benefiting from AI tools as they investigate and sharpen their language capabilities in numerous situations. The evaluation process may also be revolutionized based on AI-based systems' capacity to provide instantaneous feedback and examination of student proficiency, permitting more precise and unbiased appraisals of language abilities. However, despite their promising potential for enriching EFL learning and teaching, AI tools exhibit gaps between the available technology and practice. In particular, they do not fit into the communication paradigms [97] and may intimidate teachers due to misconceptions and misunderstandings regarding their use in education [104]. Furthermore, the use of AI tools will inevitably be accompanied by the need to address various related challenges that may arise, such as ethical and privacy concerns [109], [110].

Some researchers have asserted that understanding the intricate and interconnected contextual elements relating to the educational system in its entirety is necessary, before implementing any innovation [119], [120], [121]. More specifically, instructors should seek to educate themselves in order to comprehend the instructional implications of such innovation, its application in the classroom settings, and the many user roles [119], [120], [121]. Therefore, presenting the integration of AI into language education with caution and contemplative reflection remains vital, in addition to reflecting on the probable moral and social ramifications of these alterations.

### B. Limitations

Although this systematic review was conducted with the utmost care, every review has limitations [122]. Despite the size and scope of the research databases chosen, the current review did not include research on AI published in any other languages, because it was confined to peer-reviewed papers published in English. In addition, although English peer-reviewed articles were added in accordance with the inclusion strategy that was followed in implementing the current investigation, it is possible that articles not indexed with the selected key phrases were, nevertheless, not included. In aiming for a broader review scope, researchers considering future studies may wish to include a wider variety of databases and publication languages.

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