A Systematic Review of the Effects of Generative Artificial Intelligence Models (ChatGPT& Gemini) on English Language Teaching (ELT): Opportunities & Challenges

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ABSTRACT

Artificial intelligence has affected the field of education in many ways. The current research aimed to investigate the effects of generative artificial intelligence models (ChatGPT and Gemini) on English language teaching (ELT), and systematically reviewed 41 articles published in scientific journals that were published in 2023 and 2024 and the opportunities that these chatbots bring to teachers and language learners along with their challenges and limitations have been examined. By following the strict entry and selection criteria of articles and research standards, including inter-rater reliability (Cohen's Kappa coefficient = 0.81), articles were collected and analyzed from reliable international scientific research databases. The research findings showed that previous studies focused on four main themes: a) Effects and benefits of using generative artificial intelligence models in ELT, b) Challenges and limitations of using artificial intelligence models in ELT, c) The role of artificial intelligence models in evaluating and improving education in the field of ELT, and d) The necessity of training and support for the effective use of generative artificial intelligence models in ELT. Also, the results showed the benefits of using chatbots in teaching English and the challenges and limitations of using them. This systematic review can provide a clear perspective and practical recommendations on the integration of artificial intelligence in English language education and help policy makers and educational planners to make more informed decisions about the effects of generative artificial intelligence models in education. Meanwhile, this research can help design new teaching tools and methods that are specifically optimized for the needs of English language learners.

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1. Introduction

Artificial intelligence (AI) has had profound effects on all aspects of human life and has affected people's lives from the application in smart devices to production, transportation, health and other fields. As this technology continues to evolve at an unprecedented rate, its boundaries remain fluid. The educational sector, particularly English language teaching (ELT), has been significantly impacted by AI, a multifaceted field encompassing the convergence of computer science, cybernetics, information theory, neurophysiology, psychology, philosophy, linguistics, and other disciplines (Bin & Mandal, 2019).

Originating from the seminal Dartmouth Conference of 1956 (Stewart, 2016), the concept was introduced by Minsky and McCarthy. Scientific works and texts in this field are very vast and extensive including topics such as intelligent robots, voice recognition, image recognition, natural language processing and expert systems (Hou, 2021).

In recent years, the interface between humans and electronic devices has become increasingly sophisticated. Concurrently, the past decade has witnessed significant advancements in the development of AI-driven systems. For instance, Apple's Siri, Amazon's Alexa, Microsoft's Cortana, and Google Assistant are prime examples of chatbots capable of responding to human voice commands (Sharadgah & Sa'di, 2022).

A chatbot is a virtual agent that leverages natural language processing to interact with users and process their input (Chiu et al., 2023; Huang et al., 2022; Jeon et al., 2023). Essentially, it is an AI-powered computer program designed to engage in both written and spoken conversations,

simulating human-like interactions on a wide range of topics (Haristiani, 2019). While initially designed for answering frequently asked questions, recent advancements in AI, including natural language processing, automatic speech recognition, and large language models (Hsu et al., 2023), have empowered chatbots such as ChatGPT to engage in more human-like and nuanced conversations (Chiu, 2023; Hsu et al., 2023). Gemini, another AI model (Chin & Lin, 2020), is capable of providing informative responses to even challenging or unconventional questions (Dhio & Maryati, 2024). These capabilities make them ideal candidates for educational applications. In essence, integrating AI into education involves incorporating it into instructional practices to ensure that the entire learning process is effectively supported (Sharadgah & Sa'di, 2022).

Artificial intelligence has permeated the educational sector in various ways. Some of these technologies include intelligent tutoring systems, adaptive learning, large-scale assessment design, predictive modeling and learning analytics, educational games, virtual/augmented reality, and other forms of enhanced learning (Guan et al., 2020).

In recent years, there has been a surge of interest in conducting comprehensive reviews of existing research on chatbots and their applications across various domains. Researchers in this field have been systematically examining and synthesizing previous studies to identify patterns, uncover knowledge gaps, and provide recommendations for enhancing educational practices and guiding future research (Yan Li et al., 2024).

The rapid development of AI technologies such as ChatGPT and Gemini has outpaced

research into their educational applications, particularly in the context of English language teaching. To address this gap and provide a comprehensive overview of the current state of research, a systematic review of previous studies is imperative. Such a review would enable researchers to gain a clear understanding of the research landscape, identify areas requiring further investigation, and contribute to the effective utilization of ChatGPT and Gemini in English language teaching (Locky Law, 2024). Consequently, this study contributes to identifying existing research gaps and can be considered a significant step towards effectively utilizing ChatGPT and Gemini in English language education by examining their impacts, opportunities, and challenges.

2. Literature Review

While there has been a number of research studies exploring the applications of AI in various domains, including education, studies specifically investigating the use of generative AI models, such as ChatGPT and Gemini, in English language teaching (ELT) remain relatively scarce. A notable example is the study conducted by Gordani et al. (2023), which employed a randomized controlled method involving 60 English language learners from Salman Farsi University of Kazerun. The study divided participants into experimental and control groups, with the experimental group receiving chatbot-integrated instruction for 15 weeks and the control group was taught in the same period with the same teacher and textbook using the traditional method. The results revealed that the chatbot-based approach significantly enhanced learners' speaking skills, motivation, and overall attitudes towards English language learning when compared to traditional teaching methods. Asgari

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Vaziri and Asgari Goudarzi (2023) conducted a study exploring the applications of artificial intelligence in English language teaching, focusing on areas such as grammar error detection and correction, assessment of listening and speaking skills, personalized learning recommendations, and interaction with talking robots. While their findings indicated that AI can enhance student engagement, accelerate learning, and improve language proficiency, they also highlighted concerns related to privacy, technological dependency, and bias. In another study, Mousavi (2023) explored innovative methods of integrating artificial intelligence into English language teaching to enhance the learning process. The research focused on the utilization of AI systems for error detection and correction, personalized feedback, and the creation of interactive and engaging learning content. The findings indicated that the integration of AI in English language education can significantly impact the learning process and help students improve their language skills.

The varying findings across studies underscore the need for a comprehensive systematic review. Castro (2023) conducted a critical review of existing literature using databases such as Harvard University Press, Google Scholar, Springer, and Scopus. However, the review was relatively brief, encompassing only thirteen sources, indicating a limited sample size. Similarly, Ali et al. (2024) critiqued studies, including Faisal's (2024) systematic review of ChatGPT's benefits in higher education. While he analyzed 52 articles from databases like Web of Science, EBSCO, and ProQuest, their review was limited to studies published up to June 5, 2023 and the advantages of ChatGPT and concluded

with a speculative discussion about its potential applications in Saudi Arabian higher education.

Given the varying findings and limitations of previous studies, a comprehensive systematic review is warranted to provide a more robust and nuanced understanding of the role of ChatGPT and Gemini in English language teaching. The current study aims to address this gap by conducting a systematic review of the existing literature. Specifically, this research seeks to answer the following questions:

1. Does the utilization of ChatGPT and Gemini chatbots lead to enhanced teacher instruction and improved learner language proficiency?

2. What is the role and impact of generative AI models, such as ChatGPT and Gemini, on language assessment and the enhancement of English language teaching?

3. What are the challenges and limitations associated with the use of ChatGPT and Gemini chatbots in English language education?

3. Methodology

This research adopted a qualitative approach and a rigorous, systematic review process, incorporating a synthesis approach, particularly meta-synthesis. Systematic review is a precise and structured method for integrating existing research evidence. This process involves identifying, critically appraising, and synthesizing primary studies relevant to a specific research question (Gough D. et al., 2012). In other words, a systematic review is a research method aimed at collecting and analyzing a diverse range of studies conducted on a particular topic (Ring et al., 2011). However, this study endeavors to provide a comprehensive and robust understanding of the research topic, namely, the effects of generative AI models, particularly

ChatGPT and Gemini chatbots, on English language education. Therefore, the research process commenced with a search of reputable international databases. Evidently, in such review studies, the latest scientific information in a specific field is examined. The objective of this research, in addition to providing knowledge, is to conduct a thorough and detailed analysis of the research topic.

This study employed a qualitative data coding approach, coupled with a quantitative analysis of code frequencies. A systematic literature review was conducted to identify relevant research published between 2023 and 2024 in reputable international databases (Google Scholar, ScienceDirect, Scopus, ResearchGate, SpringerOpen, Wiley Online Library, and Sage Journals). The search terms included "ChatGPT" and "English language teaching (ELT)," "Gemini" and "English language teaching (ELT),"and similar terms related to English as a foreign language (EFL). An initial search yielded 101 articles, which were subsequently screened using the PRISMA checklist, resulting in 41 articles meeting the inclusion criteria (Figure 1). Inclusion criteria encompassed the most recent research articles, regardless of language or publication date, while exclusion criteria included inaccessible full texts, duplicate studies, review articles, off-topic content, and irrelevance to the impact of ChatGPT and Gemini chatbots on ELT and EFL. Studies focusing on the broader impact of AI, particularly ChatGPT and Gemini, on other aspects of education and learning were excluded. Table 3 presents details of the included studies, including author, publication year, country, methodology, sample size, and findings. The Sandelowski and Barroso framework (2007) was adopted as the analytical framework for this

study. This framework consists of seven stages, as illustrated in Figure 1, and the results of each stage are detailed separately.
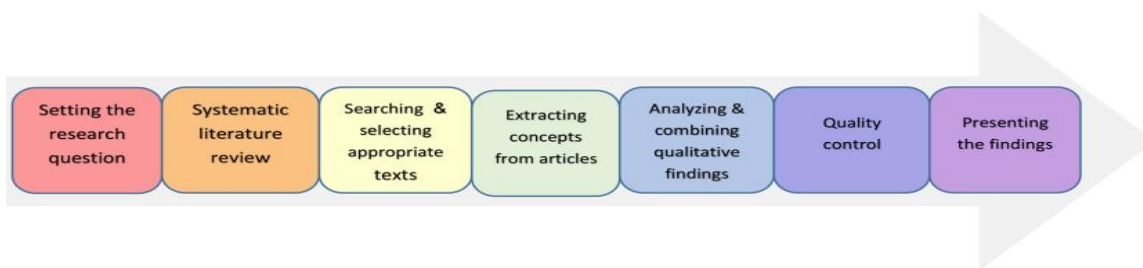
Figure 1. *The Seven Steps of Meta-synthesis (Sandelowski and Barroso, 2007)*

Step 1: Setting the Research Question

The primary objective of this systematic review was multi-faceted. Firstly, this study aimed to synthesize and integrate existing research findings to provide a comprehensive understanding of the impact of ChatGPT and Gemini chatbots on English language teaching (ELT). By conducting this systematic review, researchers can gain a holistic perspective and a deeper understanding of the topic, thereby identifying research gaps, selecting the most effective approaches for future research, and making more informed decisions regarding the design and implementation of their studies. Secondly, a systematic review in this area evaluates the efficacy of ChatGPT and Gemini chatbots in ELT, highlighting their strengths and weaknesses for English language teachers and informing policy development. Consequently, the primary concern of the current researchers was to conduct a systematic exploration and analysis of studies investigating the impact of ChatGPT and Gemini chatbots on ELT, addressing the research questions outlined below, and aligning with the stated objectives.

Table 1. *Research Questions*

Components	The Research Question
(What)	Recent technological advancements and the integration of AI tools into education, particularly in the realm of English language teaching, have necessitated a significant enhancement in teachers' knowledge and skills in utilizing these tools. Given the proliferation of research in this area worldwide, a comprehensive systematic review was deemed essential to synthesize existing findings. To address the research problem and the aforementioned objectives, the following research questins were formulated: 1. Does the utilization of ChatGPT and Gemini chatbots lead to enhanced teacher instruction and improved learner language proficiency? 2. What is the role and impact of generative AI models, such as ChatGPT and Gemini, on language assessment and the enhancement of English language teaching? 3. What are the challenges and limitations associated with the use of ChatGPT and Gemini chatbots in English language education?

(How)	The synthesis and integration of data from multiple studies provide a more comprehensive and in-depth understanding of the research topic, facilitating the development of new theories, evaluation of intervention effectiveness, and generalization of findings. Overall, systematic reviews play a crucial role in guiding and shaping future research by systematically collecting, appraising, and synthesizing the results of previous studies, thus providing a comprehensive overview of the existing knowledge in a specific field.
(Who)	The data for this systematic review was derived from 41 studies indexed in prestigious international databases (Table 2). These studies specifically examined the impact of ChatGPT and Gemini chatbots on English language education and were published between 2023 and 2024.
(When)	The research articles included in this study were sourced from journals indexed in reputable databases and published between 2023 and 2024.

Step 2: Sytematic Literature Review

Data for this study was collected through an exhaustive search of reputable international academic databases. Table 2 presents a list of the databases used in this process. The included studies were English-language research articles published in peer-reviewed international journals and encompassed studies from various countries, including Iran. The studies were identified using keywords related to the research topic.
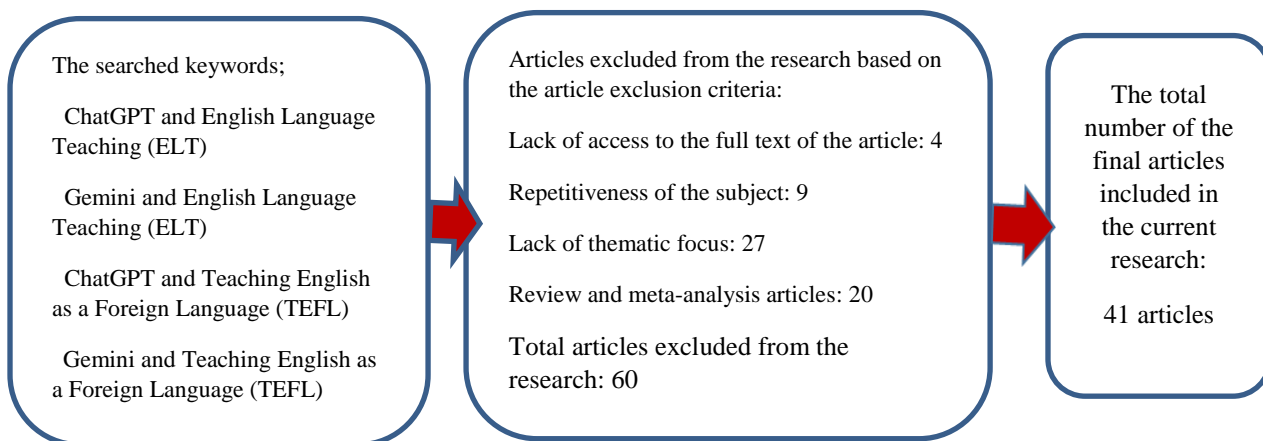
Table 2. *List of Databases used*

Databases used in this study
Google Scholar
ScienceDirect
Scopus
ResearchGate
SpringerOpen
Wiley Online Library
Sage Journals

Step 3: Searching & selecting appropriate texts

A rigorous quality assessment of the included qualitative studies was conducted using the Critical Appraisal Skills Programme (CASP). This programme is designed to assist researchers in evaluating the methodological rigor of qualitative studies. A comprehensive review of international databases was conducted, and each article was scrutinized to assess research questions, methodology, sample, data analysis tools and scales, coherence of content, and results. The title, abstract, methodology, and discussion sections of each article were carefully examined regarding predefined criteria.

Initially, 101 articles were identified; however, 60 were excluded due to not meeting the inclusion criteria (e.g., reviews, meta-analyses, duplicate studies, studies with irrelevant themes, and inaccessible full-text articles). Ultimately, 41 studies that met the inclusion criteria for the systematic review were included in the analysis.

The searched keywords;

ChatGPT and English Language Teaching (ELT)

Gemini and English Language Teaching (ELT)

ChatGPT and Teaching English as a Foreign Language (TEFL)

Gemini and Teaching English as a Foreign Language (TEFL)

Articles excluded from the research based on the article exclusion criteria:

Lack of access to the full text of the article: 4

Repetitiveness of the subject: 9

Lack of thematic focus: 27

Review and meta-analysis articles: 20

Total articles excluded from the research: 60

The total number of the final articles included in the current research:
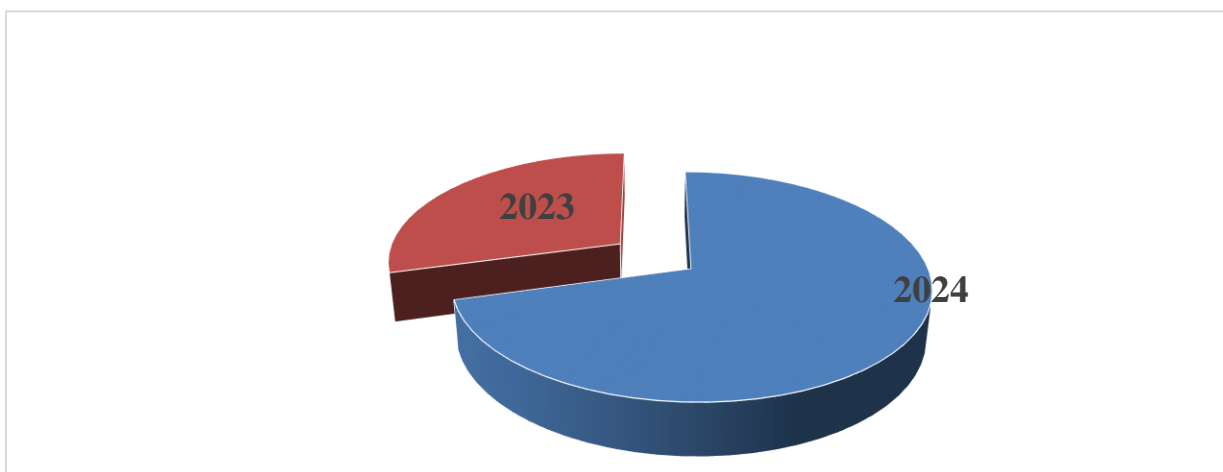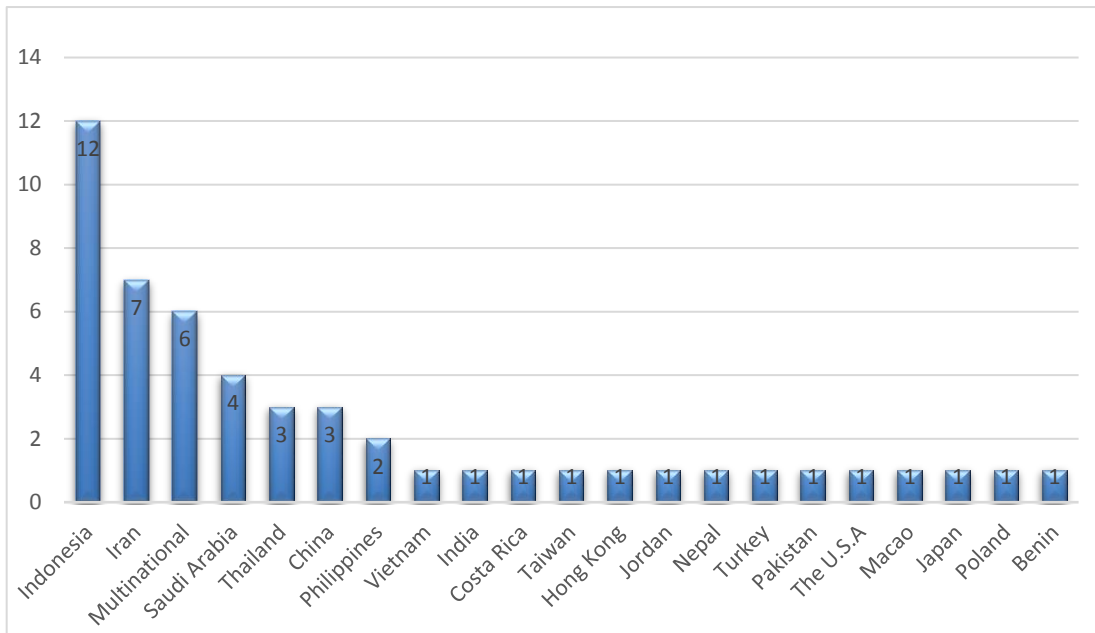
41 articles

Figure 2. *The Flowchart of the Article Selection Process*

An analysis of the publication dates of the articles included in this systematic review revealed a growing interest in research on the impact of ChatGPT and Gemini chatbots on English language teaching. As illustrated in Figure 3, the number of relevant articles indexed in journals and included in this study increased from 12 in 2023 to 29 in 2024, indicating a surge in research activity in this area.

Figure 3. *The Comparion of Article Count by Year of Indexing*

A geographical analysis of the studies revealed that Indonesia had the highest number of publications. Iran, with 7 articles, ranked second, demonstrating a significant contribution to the research on the impact of ChatGPT and Gemini on English language teaching (Figure 4).

Figure 4. *Geographical Distribution of the Studies*

Step 4: Extracting Concepts from Articles

At this stage, data from the studies included in this review were categorized and tabulated as shown below. The study information included author(s), year of publication, country of origin, research methodology, study sample (participants), and the findings (Table 3).

Table 3. *Characterization of Reviewed Articles and Summary of Their Results*

Row	Author/ year	Country	Method	Sample	Findings
1	Nguyen Phuong Duy Anh 2024	Vietnam	A mixed-methods approach was employed, combining quantitative and qualitative techniques. Data were collected through surveys and subsequent analysis.	Undergraduate students majoring in Food Technology at Thu Dau Mot University participated in the study.	The findings demonstrated that the comprehensive language model Gemini held significant potential as a valuable tool to assist undergraduate students, particularly those majoring in Food Technology who may have limited English language proficiency, in enhancing their English language skills.
2	Marzuki, Utami Widiati, Diyenti Rusdin, Darwin & Inda Indrawati	Indonesia	A qualitative case study approach was employed, involving	4 English language writing instructors from three different universities in Indonesia	The findings indicated that the integration of AI-powered writing tools can significantly enhance the quality of

	2023		semi-structured interviews.	participated in the study.	writing among English as a Foreign Language (EFL) learners.
3	Badiah N. M. Alnasib & Noof Saleh Alharbi 2024	Saudi Arabia	A quasi-experimental pre-test post-test design was employed.	One hundred and fifty female students majoring in English as a Foreign Language (EFL) participated in the study.	The findings revealed statistically significant differences at the 0.05 level of significance between the mean scores of the sample regarding the perceived motivational level of the Gemini AI tool for EFL learning among undergraduate students. The observed changes in the study provided substantial support for the post-intervention phase.
4	Sesilia Yuliani ,Tefanya Laili Mukhibbah and Eliasanti Agustina 2024	Indonesia	A qualitative approach was adopted, employing two data collection instruments.	6 students from various classes at PGRI Adi Buana Surabaya University participated in the study.	The findings indicated that the vast majority of students agreed that the incorporation of artificial intelligence in English as a Foreign Language (EFL) classroom had significantly contributed to their independent learning process and enhanced their speaking, reading, writing, and ideation skills.
5	Nancy Putri Utami, Farida Repelitawaty Kembaren,Sholihatul Hamidah Daulay 2024	Indonesia	Case study method	Ten students from a public higher education institution in North Sumatra	The findings of this case study demonstrated that the Gemini chatbot, with its user-friendly interface, comprehensive feedback, and wide range of capabilities, had a significantly positive influence on students' language proficiency and self-efficacy.
6	Syafaruddin Marpaung	Indonesia			This study concluded that the integration of

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			A mixed-methods approach	30 high school students	artificial intelligence into spoken language classrooms can enhance language skills through iterative and adaptive feedback.
	2024				
7	Dhio Rizky Anandaa,,Maryati Salmiah 2024	Indonesia	A qualitative approach was employed, with data collected through semi-structured interviews.	30 English as a Foreign Language (EFL) students from the English Language Department at the State Islamic University of North Sumatra participated in the study.	The findings revealed that while participants expressed greater comfort with AI applications or technologies they had previously used, they believed there was no need to adapt to new technologies. On the other hand, considering all the beneficial features of Gemini in assisting students' writing process, this tool had become highly useful and reliable for some students who had used it.
8	Mohammad Hossein Arefian, Irem Çomoğlu b and Kenan Dikilitaş 2024	Iran	A transcendental phenomenological approach	4 English as a Foreign Language (EFL) teachers	Findings from group discussions, observations, and semi-structured interviews revealed significant growth among EFL teachers through ChatGPT-based professional development, both individually and collaboratively.
9	Sirin Sawangwan 2024	Thailand	A mixed-methods approach	50 English as a Foreign Language (EFL) learners with diverse majors from a public university	Quantitative results revealed a significant difference in overall English writing performance after the integration of ChatGPT. Furthermore, there was a notably significant improvement observed between the pre- and

				post-intervention phases.
10	Graciela Ferreiro-Santamaria 2024	Costa Rica	A mixed-methods, cross-sectional study using a questionnaire.	25 university professors with a minimum of five years of experience teaching English courses.	The research findings indicated that both teachers and learners had limited familiarity with ChatGPT and its diverse applications in educational settings.
11	Ni Putu Oka Agustini 2023	Indonesia	A mixed-methods approach involving questionnaires and semi-structured interviews	6 Indonesian high school students	The findings of this study suggested that ChatGPT can significantly contribute to enhancing the independence of English language learning among university students within the framework of the learning process outlined in the research.
12	Wen-Chi Hu and Radovan Škultéty 2024	Taiwan	A quantitative and qualitative analysis of questionnaires.	70 first-year English as a Foreign Language (EFL) students.	The results indicated a generally positive response: participants acknowledged the positive impact of ChatGPT on their confidence in English communication, experiences of indirect interaction with people from different cultures, and familiarity with the system.
13	Frankie Har 2023	Hong Kong	Qualitative, interpretive design using semi-structured interviews	A group of 30 full-time undergraduate students across various years and English as a Medium of Instruction (EMI) lecturers at an English-medium university in Hong Kong	This research indicated that its findings can serve as a guideline for all stakeholders in higher education, including students, faculty, and university policymakers, to better leverage artificial intelligence, particularly ChatGPT, in higher education.

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14	I Putu Indra Kusuma, Marianus Roni, Kadek Sintya Dewi, Gede Mahendrayana

2024 | Indonesia | Qualitative research using a phenomenological approach and semi-structured interviews. | 8 Indonesian students enrolled in English as a Foreign Language (EFL) course at a public university in Indonesia. | The findings of this study emphasized the importance of utilizing technological tools like ChatGPT in teacher professional development programs. Such tools can equip teachers with the necessary skills and knowledge to succeed in the digital age. Additionally, ChatGPT can serve as a powerful tool in developing English language teaching materials, as it is capable of providing comprehensive and relevant data. |
| 15 | Olesya M. Tolstykh ·TamaraOshchepkova

2024 | Russia and Kuwait | A qualitative method using content analysis. | A collection of 150 open-source, web-accessible AI-powered software tools. | The research revealed that, overall, the application of Artificial Intelligence in Education (AIEd) presented numerous opportunities for educators to not only assist learners in mastering subject matter but also to enable teachers to expand their professional competencies and skills. |
| 16 | Rajab Esfandiari& Omid Allaf-Akbary

2024 | Iran | A mixed-methods approach employing a two-test scale, interviews, and questionnaires | 85 undergraduate students (male and female) majoring in English Language Teaching at Mohaghegh Ardabili University | The findings indicated that ChatGPT-based instruction has the capacity to provide personalized feedback and guidance through tailored responses to each query. |
| 17 | Ali Derakhshan, Farhad Ghiasvand | Iran | Qualitative method using a | 30 Iranian English as a Foreign Language (EFL) | Content and thematic analysis revealed that ChatGPT is a double- |

			phenomenological study (semi-structured interviews)	teachers with varying educational backgrounds and experiences in integrating AI into education	edged sword that can both benefit and harm second language education.
18	Hani Omar , Hamza Abu Owida , Suhaila Abuowaida , Nawaf Alshdaifat , Raed Alazaidah, Esraa Elsoud, Radwan Batyha 2024	Jordan	Quantitative method using paired t-test	150 second-year undergraduate students at the University of Jordan, aged between 19 and 22	The findings of this study strongly supported the use of AI technologies, such as ChatGPT, in English language teaching programs for Jordanian students.
19	Jamal Kaid Mohammed Ali 2023	Saudi Arabia	Mixed-methods approach using questionnaires	58 faculty members at Bisha University, Saudi Arabia	The results indicated that while most EFL teachers held a very positive view of ChatGPT's contribution to English language teaching and learning in higher education, some expressed concerns about issues such as plagiarism and overreliance on chatbots with minimal effort from the learners themselves.
20	Saifon Songsiengchai , Bang-on Sereerat &Wirot Watananimitgul 2023	Thailand	Mixed-methods research using standardized English language tests, focus group interviews, and field notes	120 Thai students (aged 19-20) in their first year of teacher training in Bangkok	The research findings strongly supported the integration of AI tools such as ChatGPT into educational settings to facilitate more effective language learning.
21	Inna Zaiarna,Olena Zhyhadlo, Olha Dunaievska 2024	Ukraine (European Union and United States)	A mixed-methods study using surveys	36 university instructors teaching English as a Foreign Language (EFL) and/or English for Specific Purposes (ESP) at the higher education level	The findings indicated that respondents' confidence in ChatGPT's capabilities varied. A significant portion of instructors either had limited familiarity with ChatGPT or had a limited understanding of its abilities.

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22	Guhan. MONIKA, Dr. C. SUGANTHAN 2024	India	A mixed-methods approach using a cross-sectional survey.	ESL engineering students enrolled in English language classes at various educational institutions.	The present research indicated that ChatGPT had a positive impact on learners' language acquisition. The study revealed that ChatGPT significantly improved learners' vocabulary, listening, speaking, writing, and reading skills.
23	Xiao Yangyu and Yuying Zhi 2023	China	A small-scale qualitative approach using semi-structured interviews	5 undergraduate students from various disciplines at a Chinese university.	The results of this study supported the notion that ChatGPT can serve as an effective tool for providing immediate feedback and personalized learning experiences for students.
24	Mohammad H. Al-khresheh 2024	Saudi Arabia	A qualitative method using questionnaires	46 English language teachers from various countries	This research contributed to the growing discourse on the intersection of AI and English Language Teaching (ELT); offering a global perspective, this research was valuable to teachers, curriculum designers, and technology innovators. The study also examined the limitations, recommendations, and implications of this intersection.
25	Romualdo Atibagos Mabuan 2024	Philippines	Mixed-methods approach using focus group discussions and online surveys	115 English language teachers in the Philippines	The findings revealed a diverse range of perspectives among English language teachers regarding the use of ChatGPT in English Language Teaching (ELT). These perspectives encompassed the

					potential applications of ChatGPT in ELT, the potential benefits of ChatGPT for English learners, and the potential limitations of using ChatGPT in ELT.
26	Muna Aryal 2024	Nepal	Qualitative research using a phenomenological approach with semi-structured interviews	Five English language instructors who have integrated ChatGPT into their English Language Teaching (ELT) practices	The research revealed fundamental barriers in the educational and technological domains. These barriers included interface issues, connectivity problems, and the need for alignment with curricular goals.
27	Osama Koraishi 2023	Turkey	A case study	ChatGPT4	The research confirmed that the integration of AI, particularly ChatGPT, has proven to be a valuable tool in the field of English as a Foreign Language (ELT) and has significantly contributed to various aspects of English language teachers' instructional activities.
28	Mudasar Jahan, Lubna Aram Azam, Hina Sadia , Farooq Ahmad 2023	Pakistan	A mixed-methods approach using questionnaires and activity-based research questions.	50 randomly selected undergraduate students and faculty members in the English Language Department.	This research concluded that ChatGPT was a distinctive interactive social chatbot that significantly enhanced the English as a Foreign Language (ELT) learning environment.
29	Ilka Kostka, Rachel Toncelli	United States	Qualitative method using a case study	2 university professors	The research findings concluded that AI can never replace the participating professors in the

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					fundamental aspects of their roles as educators, but it can make their work more engaging, interactive, and innovative.
	2023				
30	Mark Feng Teng 2024	Macau	Mixed-methods approach using interviews	45 English as a Foreign Language (EFL) learners	The research findings confirmed significant positive impacts of AI assistance on the writing process. These impacts included increased writing motivation, self-efficacy, engagement, and willingness to engage in collaborative writing.
31	Yijen Wang 2024	Japan	Mixed-methods approach	79 participants in a mandatory English as a Second Language (ESL) course	Findings indicated that although students believed that using AI tools for editing improved their writing outcomes, the role of instructors in providing appropriate guidance and technology training, as well as peer-learning, could not be replaced by these tools.
32	Mark Bedoya Ulla, et al. 2024	Philippines	Qualitative approach using questionnaires	14 faculty members in higher education institutions	The findings of this study not only highlighted the perceived benefits of generative AI in enhancing student inclusivity, engagement, and confidence, supporting personalized learning experiences, and providing immediate feedback but also pointed to its transformative potential in promoting educational equity and optimizing learning

					experiences for all students.
33	Joel C. Meniado, et al. 2024	Thailand and Vietnam	A mixed-methods approach using surveys and interviews	357 participants from three educational institutions in the survey and 16 participants from the same group in the interviews	The findings of this study indicated that participants evaluated ChatGPT as a valuable tool for second language writing. The tool's ability to generate ideas, provid examples, and gather necessary information were among the features highly valued by participants.
34	Zhihui Zhang, Xiaomeng Huang 2024	China	A mixed-methods approach using post-treatment assessments, including systematic observations and quantitative tests	52 foreign language (English) students, including 27 females and 25 males	The findings of this study demonstrated that the use of a large language model-based chatbot significantly assisted learners in the second language acquisition process, both in terms of vocabulary comprehension and production.
35	Rafał Niedbał , Adam Sokołowskib ,Artur Wrzalik 2023	Poland	A mixed-methods approach using questionnaires	245 full-time and part-time students	The findings of this study suggested that the use of an advanced AI-based language model was more beneficial for full-time students in the learning process.
36	Amir Reza Rahimi , Ana Sevilla-Pavon 2024	Iran	A bi-factor or mirror image structural equation modeling (PLS-SEM) approach	124 in-service Iranian English as a Foreign Language (ELT) teachers who have successfully completed postgraduate studies	The results of the partial least squares structural equation modeling (PLS-SEM) analysis in this study revealed that the more prepared language teachers were to practically use ChatGPT and the more aware they were of its opportunities and challenges in English Language Teaching (ELT), the greater their

					ability to generate new teaching methods and approaches, applied them in the teaching process, and shared them with colleagues.
37	Shiming Lin , Peter Crosthwaite 2024	China, Australia, and the United Kingdom	A mixed-methods approach	25 teachers from various English as a Foreign Language (EFL) and English as a Second Language (ESL) teaching contexts	The findings revealed that written feedback provided by teachers was typically a stable mix of direct and indirect feedback addressing both local and global issues, albeit with some degree of inaccuracy. The research also showed that ChatGPT-enhanced written feedback was often presented as metalinguistic feedback and/or rewrites of the original text.
38	Coffi Martinien ZOUNHIN TOBOULA 2023	Benin	A mixed-methods approach combining quantitative and qualitative data collection and analysis, including questionnaires and thematic analysis	30 university professors and 431 English as a Foreign Language (EFL) students	Overall, this research highlighted the potential of interactive and collaborative language learning with the aid of AI in EFL education, providing valuable insights for both EFL students and instructors to navigate the evolving landscape of online language learning. Findings suggested that the use of AI technology can enhance language learning, particularly in the post-pandemic era.
39	Ali, J., Shamsan, M., A., A., Hezam, T. & Mohammed A. A. Q 2023	Multinational (Saudi Arabia, India, etc.)	A quantitative method using a five-point Likert scale online survey	80 English language students and teachers	The findings indicated that ChatGPT generally motivated learners to develop their reading and writing skills.

					Participants in this study had a neutral attitude towards the impact of ChatGPT on developing listening and speaking skills.
40	Yahya Gordani, Asma Ejdehakosh, Samira Sedighi 2023	Iran	A quasi-experimental pre-test-post-test design with a control group	60 English language learners from Salman Farsi University of Kazerun	The results of the data analysis indicated that the teaching method incorporating chatbots was effective in significantly improving speaking skills, motivation, and learners' attitudes toward English language learning.
41	Indah Werdiningsih., Et al. 2024	Indonesia	A mixed-methods approach using questionnaires and semi-structured interviews	6 Indonesian high school students	The findings of this study showed that ChatGPT can enhance the independence of English language learning among university students within the framework of the "Kurikulum Merdeka Belajar" curriculum.

Step 5: Analyzing & Combining Qualitative Findings

Based on the coding scheme applied to the findings of research, 4 primary themes were identified with 21 axes and 62 concepts, which are categorized in Table 4. The article numbers indicated in this table correspond to those in Table 3 (Table of Articles).

Table 4. *Classification of Concepts, Axes and Themes*

Themes	Axes	Concepts	References
	The positive impact of ChatGPT and Gemini on language learning	• **Positive impact of Gemini on second language (L2) vocabulary acquisition** • **Improved writing skills through ChatGPT and Gemini** • **Enhanced learner motivation through ChatGPT** • **The role of ChatGPT in promoting interactive language learning** • **Strong performance of ChatGPT and Gemini in natural language generation**	Article numbers:1,6,13,20,34

The effects and advantages of employing GenAI models for ELT	The potential of ChatGPT and Gemini for personalized language instruction	• **Impact of using ChatGPT and Gemini chatbots to provide personalized learning content** • **Personalized support from ChatGPT** • **Personalized feedback** • **Instant and accurate language practice and feedback with ChatGPT and Gemini**	Article numbers:1,5,11,16
	Providing immediate feedback using ChatGPT	• **Immediate feedback** • **Instant feedback** • **Accurate and grammar-focused feedback** • **Customized feedback**	Article numbers:16,12,19,18
	The impact of ChatGPT and Gemini on learners' autonomy and self-efficacy	• **Increased self-confidence** • **Increased self-efficacy** • **Enhanced motivation and self-regulation**	Article numbers:6,11,20,30
	The role of ChatGPT and Gemini in developing language skills	• **Enhanced speaking proficiency** • **Improved language comprehension** • **Expanded vocabulary** • **Improved English language test scores**	Article numbers:6,18,34,21
	The potential of ChatGPT and Gemini to increase learners' engagement	• **Active student engagement** • **Leveraging ChatGPT and Gemini to enhance student engagement**	Article numbers:6,11,23
	The potential of ChatGPT and Gemini to facilitate the language learning process	• **Facilitating language learning** • **Providing effective and useful learning tools** • **Enhancing active learning processes**	Article numbers:5,18,34
	The potential of ChatGPT and Gemini for independent language learning	• **Promoting independent learning** • **Student-centered learning with ChatGPT** • **Developing language learning strategies with ChatGPT and Gemini**	Article numbers:5,11,12
Challenges and limitations of implementing GenAI models in ELT	Challenges and limitations of ChatGPT and Gemini in language education	• **Information overload** • **Accuracy concerns** • **Technical difficulties** • **Concerns about cheating and critical thinking**	Article numbers:3,10,5,13
	Ethical challenges in the utilization of ChatGPT	• **Ethical concerns** • **Need for responsible use of ChatGPT** • **Ethical implications of using ChatGPT** • **Adhering to ethical principles in AI usage**	Article numbers:8,9,15,22
	Challenges in the adoption of AI technologies in language education	• **Technical and pedagogical challenges** • **Natural language processing challenges** • **Concerns about replacing human interaction**	Article numbers:26,22,13
	Issues related to the accuracy and reliability of content generated by ChatGPT	• **Concerns about the accuracy and reliability of generated tasks** • **Potential for misinformation and bias** • **Lack of complexity in generated tasks**	Article numbers:7,21,15

	The need for further research on ChatGPT and language education	• **Need for more research on evaluating ChatGPT's effectiveness** • **Need to examine the long-term impact of ChatGPT**	Article numbers:10,14,15,12
	The necessity for ongoing improvement and research in ChatGPT and Gemini AI chatbots	• **Need for continuous improvement to maximize chatbot potential** • **Need for more research to improve AI technologies** • **The need for continuous technological advancements**	Article numbers:5,6,27
The role of GenAI models in assessment and instructional improvement in ELT	The role of chatbots in language learner assessment	• **Utilizing ChatGPT for language assessment** • **The potential of ChatGPT in evaluating language tasks** • **Ensuring accuracy in ChatGPT-based assessments**	Article numbers:21,17,19,27
	User feedback and evaluation in the development of Gemini	• **User feedback in the development of Gemini AI** • **The need to optimize Gemini AI's performance**	Article numbers:6,12
	The impact of ChatGPT on social interactions in language classrooms	• **ChatGPT as a valuable tool for social interactions** • **Facilitating real-world language use**	Article numbers:28,24
	The role of AI in enhancing language learning and teaching	• **Increasing the application of AI in education** • **Developing innovative teaching techniques using AI** • **The need to update educational tools in line with AI advancements**	Article numbers:4,16,17,26
	The impact of AI-powered technologies on educational equity	• **Promoting inclusivity and participation in education** • **Using ChatGPT to promote critical language awareness**	Article numbers:32,24
The necessity of training and support for effective utilization of GenAI models in ELT	Advances in teacher professional development through ChatGPT and Gemini	• **Utilizing ChatGPT to enhance teachers' professional skills** • **Educating teachers for effective AI utilization** • **Professional development of teachers using chatbots**	Article numbers:8,9,25,14
	The need for training and support for the effective use of ChatGPT and Gemini	• **The necessity of training teachers to effectively use chatbots like ChatGPT and Gemini** • **The need for guidance on using ChatGPT**	Article numbers:19,9,30

Step 6: Quality Control

In meta-analyses, such as the present study, meticulous attention to ensuring and maintaining the highest standards of quality is paramount (Seyyed Kalan & Mazharpour, 2023). This research has considered several critical elements to achieve this goal, including the precise

formulation of research questions, the rigorous design of a search protocol for relevant studies, a thorough assessment of study quality, accurate data extraction, comprehensive data analysis, and transparent reporting of findings. The sources used for this systematic review were subjected to multiple rounds of analysis, and the most recent and up-to-date research in the field was utilized. Additionally, Cohen's kappa coefficient was employed to ensure the reliability and validity of the findings. At this stage of the research, the results were scrutinized by two experts in technology and English language education, who both agreed on the extraction of 21 distinct categories. The inter-rater reliability for data categorization, as measured by Cohen's kappa, was 0.81 (95% CI: 0.76-0.86, p < 0.001), indicating strong agreement between the two researchers. This level of agreement corroborates the credibility of the collected qualitative data.

Step 7: Presenting the Findings

As presented in Table 4, the thematic analysis of studies related to the current research yielded 4 themes and 21 axes. The extracted themes were:

A) The effects and advantages of employing GenAI models for ELT (including: the positive impact of ChatGPT and Gemini on language learning, the potential of ChatGPT and Gemini for personalized language instruction, providing immediate feedback using ChatGPT, the impact of ChatGPT and Gemini on learners' autonomy and self-efficacy, the role of ChatGPT and Gemini in developing language skills, the potential of ChatGPT and Gemini to increase learner engagement, the potential of ChatGPT and Gemini to facilitate the language learning process, the potential of ChatGPT and Gemini for independent language learning).

B) Challenges and limitations of implementing GenAI models in ELT (including: challenges and limitations of ChatGPT and Gemini in language education, ethical challenges in the utilization of ChatGPT, challenges in the adoption of AI technologies in language education, issues related to the accuracy and reliability of content generated by ChatGPT, the need for further research on ChatGPT and language education, the necessity for ongoing improvement and research in ChatGPT and Gemini AI chatbots).

C) The role of GenAI models in assessment and instructional improvement in ELT (including: the role of chatbots in language learner assessment, user feedback and evaluation in the development of Gemini, the impact of ChatGPT on social interactions in language classrooms, the role of AI in enhancing language learning and teaching, the impact of AI-powered technologies on educational equity).

D) The necessity of training and support for effective utilization of GenAI models in ELT (including: advances in teacher professional development through ChatGPT and Gemini, the need for training and support for the effective use of ChatGPT and Gemini).

It is noteworthy that, in terms of geographical location, the majority of these studies (34 studies) were conducted outside of Iran, while 7 were carried out domestically. As illustrated in Figure 4, Indonesia accounted for the highest number of studies. Furthermore, the analysis revealed that the bulk of the research was concentrated in Asian countries. A review of the study findings, while uncovering some quantitative discrepancies, yielded consistent qualitative results regarding the advantages and disadvantages of employing chatbots in English

language instruction, mostly highlighting the positive effects of these generative AI models on language education. Additionally, an examination of the content of the 41 analyzed articles indicated that researchers commonly focused on four key areas: A) The effects and advantages of employing GenAI models for ELT, B) Challenges and limitations of implementing GenAI models in ELT, C) The role of GenAI models in assessment and instructional improvement in ELT, and D) The necessity of training and support for effective utilization of GenAI models in ELT. In terms of sample selection, the majority of studies (25 out of 41 studies) involved language learners at various educational levels (students or pupils). Following this group, English language instructors (school teachers and university professors) constituted the largest research population. Regarding research methodology, it can be asserted that most studies employed quantitative, qualitative, or mixed methods. The primary focus of the research was twofold: (a) the advantages of using chatbots such as ChatGPT and Gemini in English language teaching (with particular attention paid to the positive effects and potential of chatbots in enhancing language learners' skills) and (b) the challenges and limitations of using chatbots such as ChatGPT and Gemini in English language teaching (addressing technical, ethical, and content accuracy limitations in various dimensions). Figure 5 illustrates the frequency of extracted concepts related to the mentioned themes, indicating that most studies primarily focused on the impacts and benefits, followed by challenges and limitations, and the role of chatbots in assessment and instructional improvement. The least attention was given to chatbot training and support.
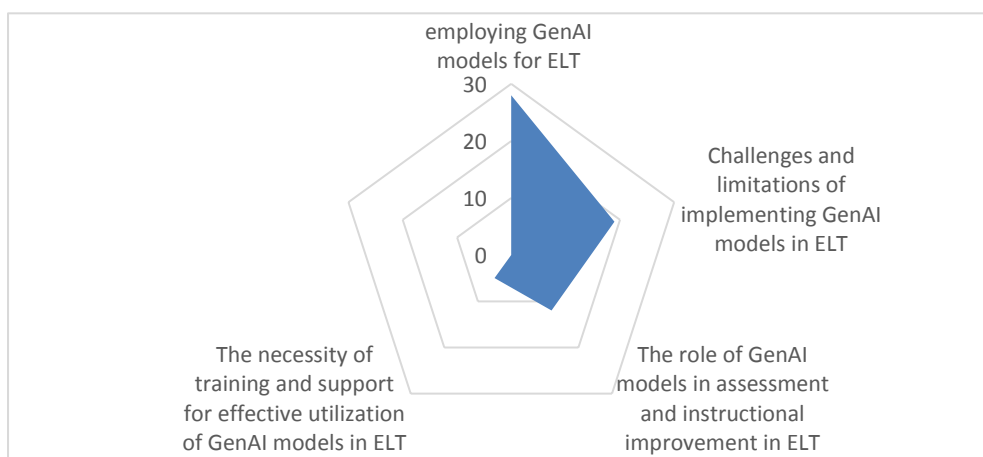
Figure 5. *Radar Chart of Data Analysis*

4. Discussion and Conclusion

Generative AI (GenAI) is a broad term encompassing AI systems capable of producing text, images, and other high-quality content, based on the data they are trained on (Martineau, 2023). More broadly, GenAI focuses on generating a wide range of outputs, including text, code, images, drug and biological entities (such as molecules), videos, and music. As a subset of AI, GenAI differs from previous forms of AI technology that relied on machine learning algorithms and predicted data based on past behavior (Locky Law, 2024). Chatbots are notable examples of generative AI models. Also

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known as conversational agents or chatterbots (Hatwar et al., 2016), chatbots are computer systems capable of communicating with humans through various channels, including messaging applications (Ciechanowski, 2019). Significant advancements in AI and Natural Language Processing (NLP) have facilitated the development of chatbots capable of more complex and nuanced interactions with humans. By leveraging the ability to process and analyze vast amounts of data, chatbots can now understand context, intent, and sentiment in human conversations. This capability enables chatbots to perform tasks previously exclusive to humans, such as providing personalized advice, answering detailed questions, and adapting to user preferences over time (Lyu et al., 2022). ChatGPT and Gemini are among the generative AI chatbots that have gained significant attention (Chiu, 2023; Hsu et al., 2023; Chen & Lin, 2020). The proliferation of AI-powered intelligent tools and their user-friendly interfaces have led to increased adoption by students and learners (Alharbi, 2023). Intelligent dialogue systems leveraging natural language processing algorithms have played a pivotal role in enhancing language learning by facilitating real-time interactions with learners (Kohnke et al., 2023). In the realm of English language education, conversational AI tools have been increasingly integrated to create engaging learning environments for students. These tools, characterized by personalization, interactivity, and immersion, have contributed to boosting learners' confidence in spoken English (Ruan et al., 2021), sustaining their interest in learning (Liu et al., 2022), and improving their writing skills through personalized feedback (Hwang et al., 2023).

Numerous studies have demonstrated that learners benefit from interacting with AI chatbots during language learning, leading to improvements in pronunciation (Liakin et al., 2014), grammar (Al-Kaisi et al., 2019), and vocabulary (Chen et al., 2020). Rapid technological advancements, particularly in artificial intelligence, necessitate English language teachers to re-evaluate their roles and adapt their teaching methods to integrate emerging technologies to enhance educational outcomes (Guo & Wang, 2024). While numerous studies have investigated the impact of generative AI tools on education and language skills, few have specifically evaluated ChatGPT and Gemini in the context of English language teaching. This gap in the literature prompted us to conduct a systematic review of existing studies to identify the challenges and opportunities presented by these generative AI models in English language teaching and learning. Our goal was to develop a comprehensive and nuanced understanding to address the following research questions:

1. Does the utilization of ChatGPT and Gemini chatbots lead to enhanced teacher instruction and improved learner language proficiency?

2. What is the role and impact of generative AI models, such as ChatGPT and Gemini, on language assessment and the enhancement of English language teaching?

3. What are the challenges and limitations associated with the use of ChatGPT and Gemini chatbots in English language education?

This research conducted a thorough and systematic review of 41 articles, extracting four themes, 21 axes, and 62 concepts to examine the opportunities and challenges of utilizing ChatGPT and Gemini chatbots in English

language education. The findings revealed comprehensive insights into this domain.

Based on the analysis of the four extracted themes and their corresponding sub-themes and concepts (Table 4), one of the two primary foci of the studies was the advantages of using ChatGPT and Gemini chatbots in English language education, alongside the challenges and limitations of these chatbots. The positive impacts and advantages of these AI models in English language education were examined from various perspectives in the studies. Notably, ChatGPT and Gemini were found to positively influence language learning and the development of learners' skills, encompassing components such as facilitating vocabulary acquisition (Nguyen Phuong Duy Anh, 2024; Marpaung, 2024; Zhihui Zhang et al., 2024), enhancing writing skills (Nguyen Phuong Duy Anh, 2024; Meniado et al., 2024), improving learning motivation (Hani Omar et al., 2024; Teng, 2024; Meniado et al., 2024; Gordani et al., 2023), fostering interactive language learning (Nguyen Phuong Duy Anh, 2024; Zhihui Zhang et al., 2024), and enhancing speaking skills (Gordani et al.., 2023; Marpaung, 2024), comprehension (Zhihui Zhang et al., 2024), and English language test scores (Saifon Songsiengchai et al., 2023). These components are attributed to the chatbots' ability to provide personalized learning content, instant and personalized feedback, and their robust natural language generation capabilities (Marpaung, 2024; Nguyen Phuong Duy Anh, 2024; Esfandiari & Allaf-Akbari, 2024; Xiao et al., 2023; Yuliani et al., 2024). Furthermore, these capabilities can also enhance learners' autonomy and confidence (Utami et al., 2024; Oka Agustini, 2023; Hani Omar et al., 2024; Teng, 2024; Meniado et al., 2024), increase their

engagement in the learning process (Mudasar Jahan et al., 2023; Ulla et al., 2024), facilitate independent learning (Oka Agustini, 2023), promote educational equity (Ulla et al., 2024), and advance professional development for teachers. According to the studies, these aspects are interconnected with the previously mentioned components. Overall, based on the majority of studies reviewed, the impact of ChatGPT and Gemini chatbots on English language education can be considered positive.

However, the second major focus of the studies was on the limitations and challenges associated with using ChatGPT and Gemini in English language education. These challenges were primarily categorized as concerns about accuracy and the presence of misinformation (Badiah Alnasib et al., 2024; Kusuma et al., 2024; Inna Zaiarna et al., 2024), the risk of plagiarism and its impact on critical thinking (Ferreiro-Santamaria, 2024; Har, 2023 Inna Zaiarna et al., 2024; Monika et al., 2023), ethical and privacy concerns (Yuliani et al., 2024; Arefian et al., 2024; Mabuan, 2024; Zaiarna et al., 2024), social and cultural concerns (Mohammad Ali, 2023; Kostka et al., 2023; Marpaung, 2024), technical and pedagogical challenges (Utami et al., 2024; Aryal, 2024; Toboula, 2023), challenges in natural language understanding (Badiah Alnasib et al., 2024; Utami et al., 2024; Hu et al., 2024), concerns about replacing human interaction in language learning (Arefian et al., 2024; Monika et al., 2023), and the need for ongoing improvement, updates, and monitoring (Badiah Alnasib et al., 2024; Utami et al., 2024; Koraishi, 2023). Other smaller challenges could be categorized under these broader limitations. To overcome these challenges and limitations, some studies suggested conducting further research to

evaluate the effectiveness of chatbots and their long-term impact, seeking user feedback to optimize performance, and providing teacher training to effectively utilize these generative AI models (Marpaung, 2024; Mabuan, 2024; Oka Agustini, 2023; Arefian et al., 2024; Kostka et al., 2023). While ChatGPT is a valuable tool, it should not replace the role of the instructor in assessment. Educators must enhance their assessment skills to ensure that learners receive feedback that is not only accurate but also contextually relevant and personalized (Baleghizadeh & Saeedi, 1403).

This research delves into the profound effects of generative AI models on English language education, illuminating their multifaceted applications across various domains. It specifically explores the opportunities and challenges presented by chatbots such as ChatGPT and Gemini in the context of English language teaching. The findings of this study can serve as a robust foundation for future research on the integration of AI in English language education. Moreover, the results can inform the design of novel instructional tools and methods specifically tailored to the needs of English language learners. Additionally, this research can empower policymakers and educational planners to make informed decisions regarding the integration of AI into educational systems and to harness the potential of this cutting-edge technology to enhance the quality of English language instruction.

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