

REVIEW

A Bibliometric Analysis of AI-Powered Technologies in Language Learning: Trends from 2022 to 2025

Ahmad Abdulrahman Alsagoafi ^{*} ^{ID}, Atheer Jassim Aljamal ^{ID}, Munirah Ali Alahmad ^{ID}, Jumana Waleed Buhaimeid ^{ID}, Tamadher Abdulallah Alhamdan ^{ID}, Muneera Saad Alfadhli ^{ID}

Department of English Language, King Faisal University, Alhasa 31982, Saudi Arabia

ABSTRACT

This bibliometric study explores the scientific landscape of AI-powered technologies in language learning from 2022 to 2025. Using data retrieved from the Scopus database and analyzed through VOS viewer and Bibliophagy, the study examined 737 publications. We provide publication trends, key authors, geographical distribution, thematic patterns, and content analysis. The analysis showed a significant increase in publication output, especially in 2024. China, India, Indonesia, and Saudi Arabia present as leading contributors, reflecting a geographical shift toward Asian leadership in this field. The focus of the research was on higher education students, writing skills, and motivation. ChatGPT and other AI tools, such as Grammarly and QuillBot, are common subjects in discussions about AI-powered technologies. The most used research method in the studies is the quantitative method, underscoring the need for more qualitative and mixed method approaches to capture learners' and teachers' perspectives. We explore several challenges, including overreliance on AI, data privacy, and academic integrity. The findings also highlighted positive outcomes, such as improved self-efficacy, greater engagement, and providing real-time feedback in language learning. Notably, gaps remain in addressing early education levels, speaking skills, and the roles of teachers, presenting opportunities for future research and practical implementation in language education.

Keywords: Artificial Intelligence; Language Learning; Research Trends; Research Patterns; Bibliometric Analysis; AI Integration

*CORRESPONDING AUTHOR:

Ahmad Abdulrahman Alsagoafi, Department of English Language, King Faisal University, Alhasa 31982, Saudi Arabia; Email: aalsagoafi@kfu.edu.sa

ARTICLE INFO

Received: 30 September 2025 | Revised: 31 October 2025 | Accepted: 4 November 2025 | Published Online: 19 November 2025
DOI: <https://doi.org/10.30564/fls.v7i12.12311>

CITATION

Alsagoafi, A.A., Aljamal, A.J., Alahmad, M.A., et al., 2025. A Bibliometric Analysis of AI-Powered Technologies in Language Learning: Trends from 2022 to 2025. *Forum for Linguistic Studies*. 7(12): 1362–1379. DOI: <https://doi.org/10.30564/fls.v7i12.12311>

COPYRIGHT

Copyright © 2025 by the author(s). Published by Bilingual Publishing Group. This is an open access article under the Creative Commons Attribution-NonCommercial 4.0 International (CC BY-NC 4.0) License (<https://creativecommons.org/licenses/by-nc/4.0/>).

1. Introduction

The rapid advancement of Artificial Intelligence technologies has significantly transformed the field of language learning. AI in education means using technologies like machine learning and natural language processing to improve learning. These tools use algorithms to study data, find patterns, and make predictions^[1]. They also include tools like personalized study plans, language games, and virtual tutors.

With more people using smart devices and the Internet, there are now many ways to study languages. AI language learning tools are computer programs that use artificial intelligence to help people learn and improve a foreign language. These tools perform tasks such as translating texts, offering personalized lessons with feedback, and even creating new sentences in the target language^[2]. Among them, one of the most promising technologies is AI chatbots. This technology, along with machine learning, voice recognition, and virtual tutoring systems, is also integrated into various platforms to create interactive learning environments. These tools help learners practice reading, writing, speaking, and listening. Conversational AI also offers innovative ways to apply Information and Communication Technologies (ICT) in language learning.

As we see today, many learners use platforms such as ChatGPT, Coursera, Duolingo, Elsa, Grammarly, Google Translate, and Microsoft Translator. These tools assist not only in developing language skills but also in supporting teaching, saving time, and enhancing personalized learning. They also promote cross-cultural communication by helping users overcome language barriers^[2].

Furthermore, these tools support the development of core language skills, including speaking, listening, reading, writing, grammar, vocabulary, and syntax, while also enhancing student motivation, engagement, and autonomy^[3,4]. For example, students can learn at their own pace and in ways that match their individual needs and learning styles, leading to improved outcomes by personalizing learning, offering instant feedback, removing traditional barriers, and supporting students continuously^[5]. Additionally, AI facilitates out-of-class practice and reduces the burden on teachers through features such as automated grading and intelligent tutoring systems^[1].

Despite these advantages, several challenges have been identified. These include over-reliance on AI, technical limitations, and reduced student capacity for critical thinking and independent research. AI tools also struggle with interpreting

informal language, cultural nuances, emotional and nonverbal cues, and may fail to provide the depth required for full language fluency. There are also ethical concerns, privacy issues, academic integrity, and the threat of it replacing or minimizing teachers' roles^[3,6,7].

Unlike prior studies, this study focuses specifically on the 2022–2025 period, capturing the most recent and rapid developments in AI-powered language learning technologies. This focus allows for the identification of emerging trends, influential contributors, and innovative tools that have not been analyzed in previous research. The period between 2022 and 2025 marks a turning point in the field of AI-powered language learning. The launch of large language models, such as ChatGPT, in late 2022, accelerated the practical integration of generative AI into language education. During this time, research and classroom practices rapidly shifted from experimental applications to widespread adoption of AI tools for writing, assessment, and interaction. Consequently, this period reflects the beginning of a new phase in language learning research, characterized by innovation, expansion, and the redefinition of teaching and learning processes through intelligent technologies. Bibliometric analysis is used for its ability to systematically examine publication trends, key contributors, and emerging themes in the field.

These are the objectives of this paper:

1. Provide a comprehensive bibliometric analysis of AI-powered technologies in language learning from 2022 to 2025.
2. It seeks to examine publication trends, most cited publications, and collaboration patterns within the field.
3. The study identifies the most frequently studied AI-powered technologies and core research themes, determines the most influential authors, institutions, countries, and publications, and highlights the countries and regions that are most productive in publishing research on this topic.

This study addresses the following research questions:

1. What are the patterns of scientific productivity and collaboration in relation to AI-powered technology in language learning during 2022–2025?
2. What are the dominant research directions and potential gaps related to AI-powered technology in language learning during 2022–2025?

2. Methodology

To achieve the objectives of this study, we employ a bibliometric research design to examine the scientific output related to the integration of AI-powered technologies in English language learning from 2022 to 2025. Bibliometric analysis offers a structured method for analyzing large volumes of academic literature, allowing researchers to identify trends, influential contributors, and thematic developments. As Donthu notes, bibliometric analysis includes various techniques and step-by-step guidelines that enable systematic and reliable investigations of scholarly output^[8]. Similarly, Passas highlights that bibliometric methods serve as valuable tools for understanding research trends, especially within academic disciplines^[9].

To ensure the reliability and comprehensiveness of the dataset, we selected the Scopus database for data extraction. Scopus was chosen due to its extensive coverage of peer-reviewed literature, consistent indexing standards, and user-friendly export features that facilitate bibliometric research^[10]. To maintain transparency in the selection and screening process, we followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework. PRISMA provides a standardized reporting structure, including a flow diagram that visually represents how studies were identified, screened, and selected^[11].

We designed a comprehensive search query using the following keywords: (“AI” OR “artificial intelligence”) AND (“English as a Foreign Language” OR “English as a Second Language” OR “EFL” OR “ESL” OR “Language learning” OR “LL”). The initial search yielded 2466 documents before any filters were applied. To refine the dataset, we applied the following filters:

Publication years: 2022 to 2025;

Subject areas: Computer Science, Social Sciences, Arts and Humanities, and Multidisciplinary;

Document types: Article, Book Chapter, Conference Paper, and Review;

Language: English only.

After filtering, 1450 documents remained. We manually screened the titles and abstracts to assess their relevance. The inclusion criteria required that documents clearly involve an AI-related technology and focus specifically on English language learning. Conversely, we excluded documents that only mentioned AI or language learning peripherally or that

were not written in English.

Following the manual screening, we retained 738 documents. Duplicate detection was performed using the Rayyan.ai platform, resulting in the removal of one duplicate, and leaving a final dataset of 737 unique documents for analysis (see **Figure 1**).

Data cleaning and validation: To ensure the accuracy and reliability of the dataset, duplicate records were identified and removed using the Rayyan.ai platform. Additionally, the researchers manually reviewed all titles and abstracts of the included studies to confirm their relevance before importing the data into VOSviewer for analysis. This manual verification ensured that only studies directly related to AI-powered English language learning were included in the final dataset.

To enhance the accuracy of keyword analysis and ensure consistency across related terms, a thesaurus table was manually developed. The table categorized and unified synonymous or closely related keywords (e.g., “AI” and “Artificial Intelligence,” “EFL” and “English as a Foreign Language”) under common conceptual groups such as skill, tool, participant, method, data collection, challenge, and positive outcome. This manual thesaurus served as a reference for harmonizing terminology before conducting the VOSviewer and Biblioshiny analyses, thereby minimizing duplication and improving the reliability of the bibliometric mapping.

We use two tools for this analysis to extract data and make the figures.

1. **VOSviewer:** This freely available software was used to generate keyword co-occurrence maps, author collaboration networks, and citation analyses. VOSviewer is particularly effective for handling large datasets and producing clear, interpretable visualizations of bibliometric networks^[12].
2. **Biblioshiny:** This web-based interface for the R-based Bibliometrix package is used for thematic analysis, conceptual structure mapping, and thematic evolution. Biblioshiny enables users to conduct bibliometric analyses without requiring the writing of complex R code, operating within RStudio, making it accessible to users with limited programming experience^[13].

It is important to note that although this study covers the years 2022 to 2025, data collection was conducted in the first half of 2025. As a result, publications from 2025

represent only those available up to mid-year, rather than the entire calendar year.

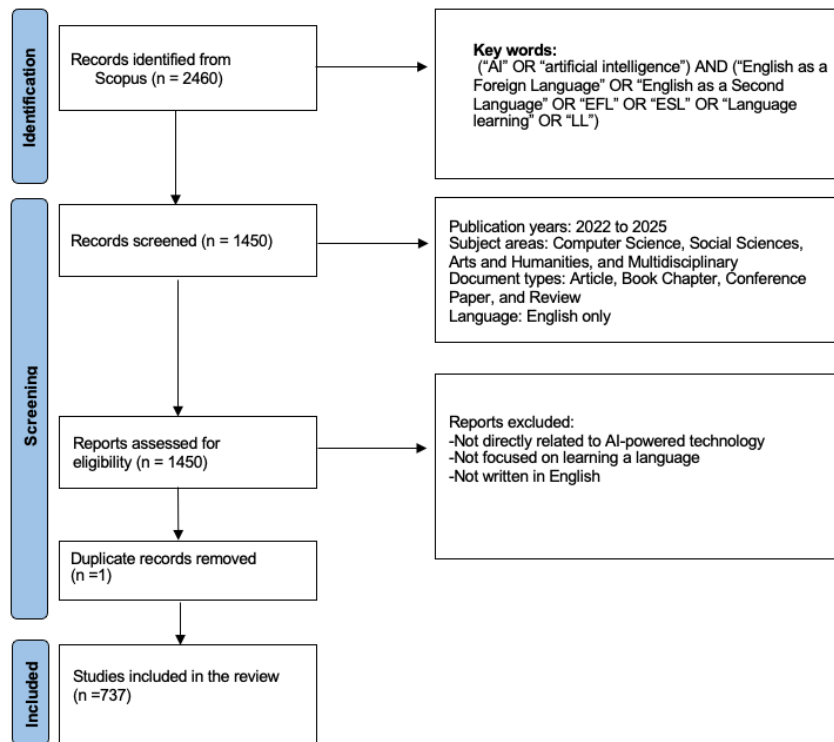


Figure 1. Represents the PRISMA flow diagram, which shows how studies are identified, screened, and selected for inclusion in the bibliometric review.

3. Findings

3.1. Overview of the Retrieved Data

To provide an overview of the bibliometric dataset, key information and annual scientific production were analyzed. The study was based on 737 documents received from Scopus for the period 2022–2025. As shown in **Figure 2**, these documents were published in 322 different sources, includ-

ing articles (481), book chapters (75), conference papers (151), and reviews (28). The average number of citations per document was 12.55, resulting in a total of 28,055 references and an annual growth rate of 67.37%, indicating that this field is experiencing rapid expansion. Authorship data identified 1582 unique authors, 180 of whom wrote individual publications. The average number of co-authors per document was 2.73, with an international co-authorship rate of 18.86%, indicating a moderate level of global collaboration.



Figure 2. The key bibliometric data for the analyzed documents (main information).

According to **Figure 3**, annual scientific production in this field has increased significantly over the past four years (2022–2025). The year 2024 ranked first, with 363 articles, followed by 2025 with 211 articles, and 2023 with 116 articles. The lowest year was 2022, with only 45 articles.

Although the number of scientific publications has

increased rapidly in recent years, citation averages vary significantly from year to year. **Table 1** illustrates that articles published in 2022 and 2023 earned the highest average citations per article (29.89 and 36.34), whereas recent publications from 2024 and 2025 had lower averages (9.24 and 1.61).

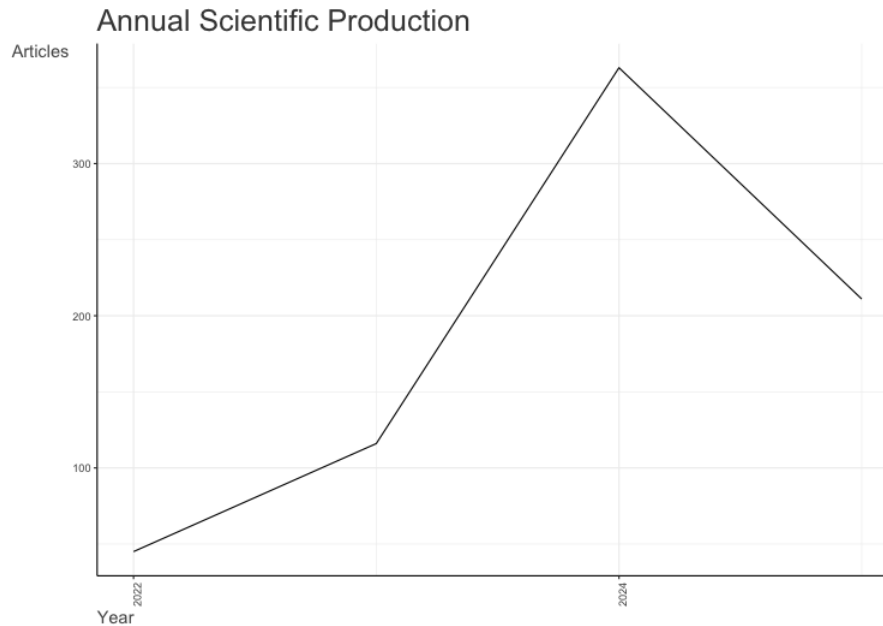


Figure 3. Represents the annual scientific production in the field from 2022 to 2025.

Table 1. Average Citations per Year (2022–2025).

Year	Mean Total Citation per Article	N	Mean Total Citation per Year	Citable Years
2022	29.89	45	7.47	4
2023	36.34	116	12.11	3
2024	9.24	363	4.62	2
2025	1.61	211	1.61	1

3.2. Sources and Authors

Biblioshiny was used to discover key authors and sources in the field of Artificial Intelligence. The second table displays the top ten most relevant authors in the dataset. There is a notable disparity between the number of published publications per author and the number of “fractionalized” articles, which indicate each author’s true contribution when credit is given depending on the number of contributors to each paper. Fractionalized articles are the number of articles that are distributed among authors based on their proportional contribution. This provides a more realistic estimate of an author’s actual contribution to research, rather than

merely tallying the total number of articles to which they contributed.

Wang Y has the most publications, with 17 papers, followed by Zhang Y (9), Li Y (9), Yang H (8), Zou B (8), Zhou Y (7), Zou D (7), Chen X (6), Guo K (6), and Mohammad T (6). For example, as shown in **Table 2**, Wang Y has the most papers (17), but his fractionalized count is 7.23, indicating the extent of his research collaboration. Zhang Y has only nine papers, but his fractionalized count is 5.42, indicating a higher individual contribution per paper. In contrast, Muhammad T, who has six papers, has a fractionalized count of 2.25, indicating average collaboration levels.

Table 2. Most Relevant Authors.

Authors	Articles	Articles Fractionalized
Wang Y	17	7.23333333
Li Y	9	1.98730159
Zhang Y	9	5.41666667
Yang H	8	2.7
Zou B	8	2.53333333
Zhou Y	7	1.28730159
Zou D	7	2.06666667
Chen X	6	1.81666667
Guo K	6	1.86666667
Mohammad T	6	2.25

The study findings indicated the most widely published range of topics, including linguistics, education, educational sources on this topic. The top ten sources represent a broad technology, and artificial intelligence, as shown in **Table 3**.

Table 3. Most Relevant Sources.

Sources	Articles
Forum for Linguistic Studies	19
World Journal of English Language	18
Education and Information Technologies	17
Cogent Education	16
European Journal of Education	16
Computers and Education: Artificial Intelligence	15
System	15
Acm International Conference Proceeding Series	14
Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)	12
Language Learning and Technology	11

The Forum for Linguistic Studies ranked first with 19 articles, followed by the World Journal of English Language, and then Education and Information Technologies with 17 articles. These resources demonstrate a strong interest in language teaching, applied linguistics, and the integration of technology into education. Sources such as Cogent Education and the European Journal of Education were also important, each with (16) articles.

The presence of technological sources such as Computers and Education: Artificial Intelligence, Systems, each with (15) articles, and the ACM International Conference Proceeding Series with (14) articles was especially notable, emphasizing the intersection between education and artificial intelligence. Other sources, such as Lecture Notes in

Computer Science and Language Learning and Technology, entered the top ten sources with 12 and 11 articles.

3.3. Geographical Distribution and Global Impact of Publications

Figure 4 illustrates the geographical distribution of publications by regions. An analysis of the countries with the highest publications revealed significant disparities in research output across geographic regions, as shown in **Table 4**. China ranked first with 408 publications, followed by India (196), Indonesia (167), and Saudi Arabia (160). These results indicate an increasing academic output from Asian countries in this field.

Table 4. Number of Publications Across Regions.

Region	F	Region	F	Region	F
China	408	Ukraine	12	Moldova	3
India	196	Bangladesh	10	Morocco	3
Indonesia	167	Czech Republic	10	South Africa	3
Saudi Arabia	160	Kuwait	9	Denmark	2
USA	100	Norway	9	Estonia	2
South Korea	78	Colombia	8	Greece	2
Malaysia	64	Iraq	8	Latvia	2
Japan	51	Portugal	8	Maldives	2

Table 4. Cont.

Region	F	Region	F	Region	F
Thailand	47	Ecuador	7	Nigeria	2
Oman	45	Pakistan	7	Serbia	2
Turkey	42	Poland	7	Sweden	2
Iran	36	Sri Lanka	7	Afghanistan	1
Spain	33	Uzbekistan	7	Algeria	1
UK	32	Cyprus	6	Brazil	1
United Arab Emirates	31	Italy	6	Chile	1
Australia	28	New Zealand	6	Cuba	1
Germany	23	North Macedonia	5	Ghana	1
Kazakhstan	23	Belgium	4	Ireland	1
Singapore	19	Canada	4	Israel	1
Egypt	17	France	4	Mexico	1
Jordan	17	Croatia	3	Switzerland	1
Philippines	17	Ethiopia	3	Yemen	1

Country Scientific Production

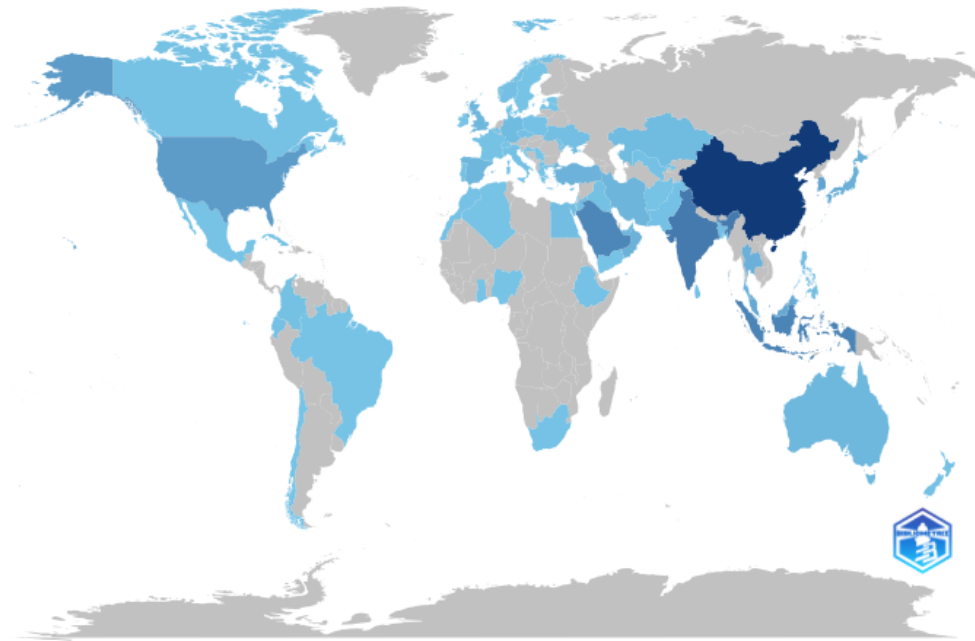


Figure 4. Geographical Distribution of Publications by Regions.

Countries like the UAE (31), Oman (45), and Jordan (17) have emerged, indicating growing investment in education and language in the Middle East.

Western countries such as the United States (100), the United Kingdom (32) had a moderate presence, although Germany (23) and Canada (4) contributed less.

The presence of countries such as Pakistan (7), Nigeria (2), and Yemen (1) also demonstrates their contribution to scholarly publishing.

These findings show that research production in this field is no longer limited to typical Western academic hubs,

but rather includes a broader international participation, particularly from Asia and the Middle East.

Regarding the corresponding author's countries, the analysis results shown in **Table 5** reveal that China leads the list of countries in terms of the number of publications, contributing 157 articles, which is 21.3% of the total output. However, the MCP (Multiple Country Publications) in Chinese research is low, accounting for only 14% of the total, indicating a heavy reliance on domestic research efforts.

Saudi Arabia comes in second with 54 articles (7.3%), but its percentage of MCP does not exceed 11.1%, reflecting

limited engagement in global research partnerships.

Countries such as Malaysia (47%), Hong Kong (45.5%), and Indonesia (34.3%) exhibit relatively high rates of MCP, along with the United States (36%).

It is worth mentioning that Oman did not register any international participation in its publications, with all ten papers coming from domestic organizations solely (Single Country Publications = SCP).

Table 5. Corresponding Author's Countries.

Country	Articles	Articles %	SCP	MCP	MCP %
China	157	21.302578	135	22	14.0127389
Saudi Arabia	54	7.32700136	48	6	11.1111111
Indonesia	32	4.34192673	21	11	34.375
India	26	3.52781547	25	1	3.84615385
Hong Kong	22	2.98507463	12	10	45.4545455
Usa	22	2.98507463	14	8	36.3636364
Korea	21	2.84938942	18	3	14.2857143
Japan	18	2.44233379	17	1	5.55555556
Malaysia	17	2.30664858	9	8	47.0588235
Thailand	16	2.17096336	15	1	6.25
Iran	13	1.76390773	9	4	30.7692308
United Kingdom	13	1.76390773	11	2	15.3846154
Turkey	12	1.62822252	11	1	8.33333333
Oman	10	1.3568521	10	0	0

Figures 5 and 6 show data for the most cited countries and the most globally cited documents. China leads the list of most cited countries with 2420 citations, followed by Hong Kong (1197) and South Korea (537). Kohnke (2023) published in the RELC Journal, leads the list of the most referenced documents internationally, with 523 citations, and this

is a study from Hong Kong. Marzuki (2023) from Indonesia also appears with an article that received 190 citations, supporting Indonesia's position with a total of 455 citations in **Figure 4**. Although Saudi Arabia ranked sixth in the total number of citations (408), it does not appear on the list of most-cited articles globally.

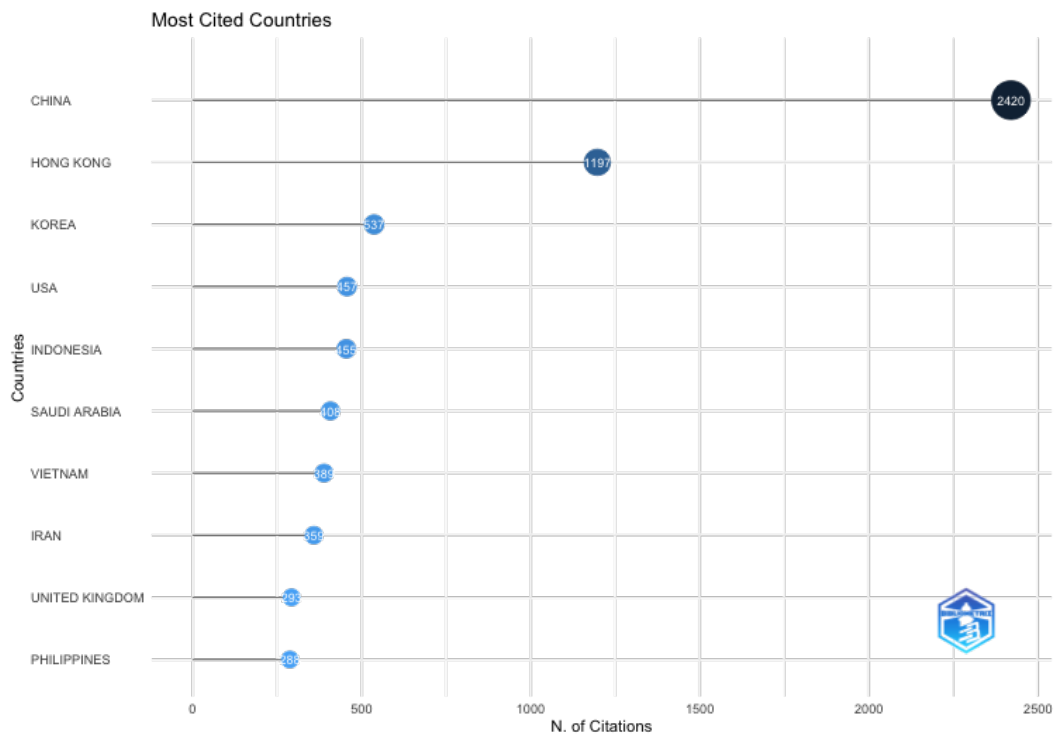


Figure 5. Most Cited Countries. Lists the countries having the most citations in the field.

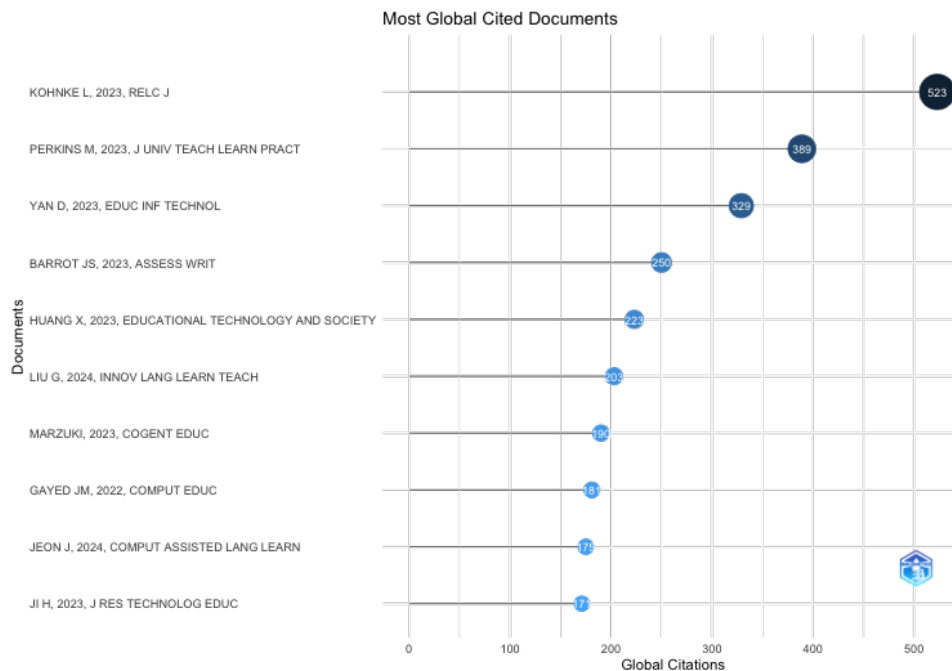


Figure 6. Most Global Cited Documents. Highlights the specific documents with the most citations worldwide.

The next map shows the countries' collaboration, as analyzed by VOSviewer. With (5) documents, 29 of the 79 countries met the threshold, and the countries with the highest overall link strength were selected, as shown in **Figure 7**.

China topped the list with 168 documents, followed by Saudi Arabia with 85, India (64), United States (50), Indonesia (47), Taiwan (34), South Korea (33), Malaysia (31), Japan and Vietnam with 30 papers each.

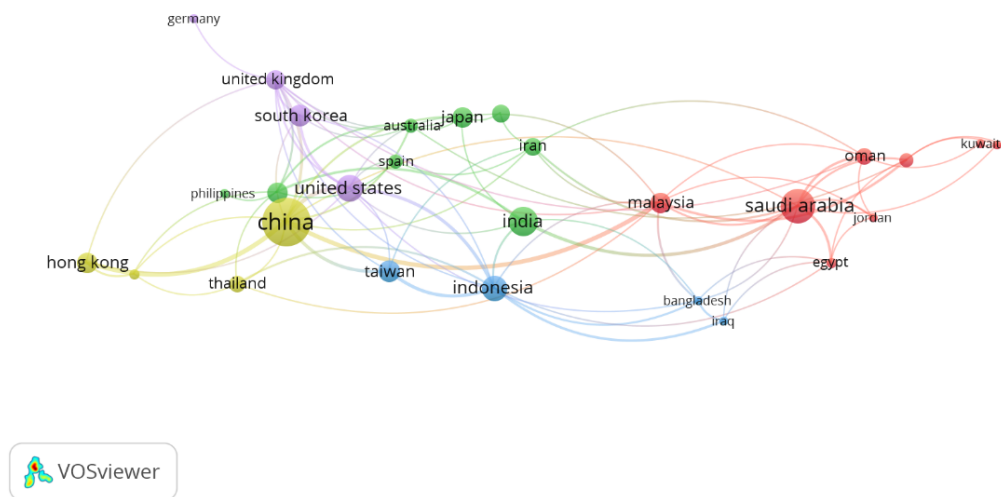


Figure 7. Collaboration World Map. International research collaboration is illustrated and studied using VOS viewer.

4. Analysis of Results

4.1. Tree Map Analysis

The most common keywords were analyzed using a Biblioshiny tree map, as shown in **Figure 8**. The results

showed that “artificial intelligence” was the most frequently occurring term (266), confirming its preeminence as a key focus area in this field. Keywords for AI applications in language learning, such as “ChatGPT” (130), have also emerged, indicating a growing interest in employing intelligent technologies. Other common terms supporting this trend include

“Language Learning” (142), “Students” (111), “Teaching” (77), “Chatbots” (49), and terms such as “English as a Foreign Language” (39), “English as a Foreign Language” (30), and “Foreign Language Learning” (21).

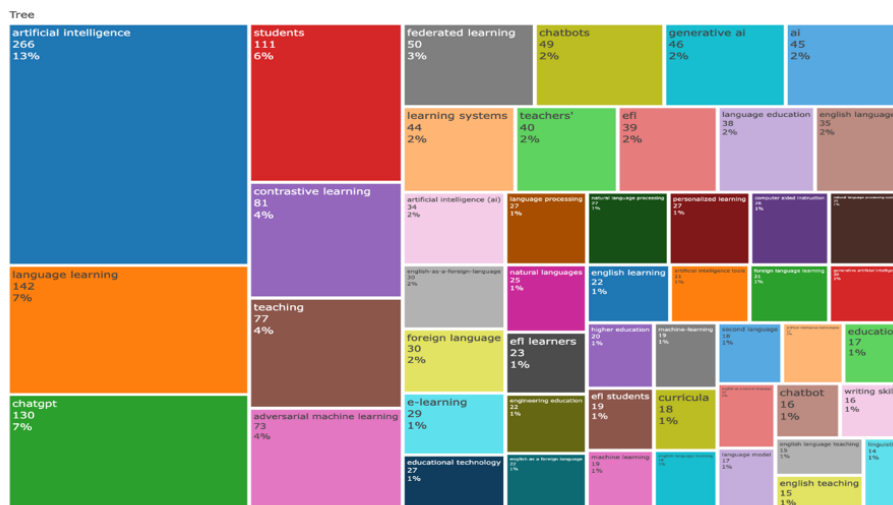


Figure 8. Tree map of the most popular terms. Provides a tree map of the most frequently used keywords, as determined by Biblioshiny.

4.2. Author Keywords Analysis

VOSviewer was used to analyze the author’s keywords. The minimum number of keyword occurrences is set at 5, and only 95 of 1732 keywords fulfill the criterion, resulting

in the highest total link strength.

The network map showed the formation of several clusters, indicating different areas of concentration, with a distinct color and representation, as shown in **Figure 9**.

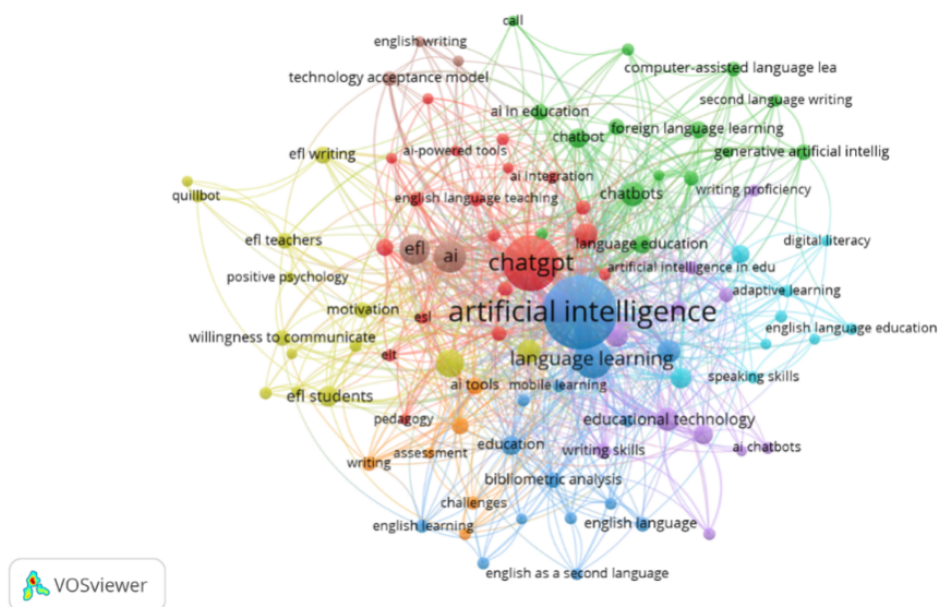


Figure 9. Author Keywords network. The figure illustrates the network of author keywords as assessed by VOS viewer.

As shown in **Table 6**, Cluster 1 represents an applied pedagogical method. This cluster focuses on using AI technologies (such as ChatGPT) to teach English as a foreign language, notably in academic writing and teacher training contexts. Words

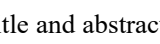
like academic writing, teacher education, and ELT suggest a need for pedagogical frameworks that incorporate AI. Moving on to Cluster 2, as shown in **Table 6**, it indicates AI in language education. This cluster combines AI techniques such

as generative AI and LLMs with their applications in CALL and foreign language learning. It emphasizes basic linguistic concepts such as vocabulary learning and second language writing, with a clear presence of modern educational technologies. According to **Table 6**, Cluster 3, it implies AI research and language education. This cluster includes general and keywords such as artificial intelligence, education, and bibliometric analysis, indicating that it represents the general theoretical framework and interest in research analysis of the topic of AI in language learning. As illustrated in **Table 6**, Cluster 4, symbolizes psychological and behavioral factors in EFL. It focuses on EFL learners' motivation, engagement, psychological skills like paraphrasing and speaking preparedness, as well as specific technology such as QuillBot.

The data in **Table 6** indicate cluster 5, which features AI-powered higher education methodologies. This cluster focuses on the use of artificial intelligence in higher education and personalized learning, with a particular focus on writing, student interaction, and language learning in aca-

demetic contexts, as well as research related to university or para-academic activities. The sixth cluster, as shown in **Table 6**, represents technical skills and feedback. It highlights language learning techniques such as speech recognition, corrective feedback, and personalized feedback, and reflects an interest in techniques for supporting individual skills in education, particularly oral skills. Proceeding to Cluster 7, as shown in **Table 6**, marks the evaluation and comprehension of AI tools. It covers issues such as assessment, feedback, perceptions, and problems, demonstrating the researchers' interest in exploring the challenges and perceptions related to the application of AI technology in education, particularly in the context of writing. The last cluster, Cluster 8, which appears in **Table 6**, deals with technological acceptance and cultural contexts. It contains words such as technology acceptance model and Chinese EFL learners, which refer to studies of students' acceptance of technology and the influence of cultural contexts (such as China) on it, as well as a special focus on English writing.

Table 6. Most common authors' keywords by clusters.

Cluster	Color	Keywords
1		Academic Writing ·AI Chatbot ·AI Integration ·AI-Powered Tools ·ChatGPT ·Conversational AI ·Creativity ·ELT ·English as a Foreign Language ·English Language Teaching ·ESL ·GenAI ·Language Teaching ·Pedagogy ·Plagiarism ·Pre-service Teachers ·Systematic Review ·Teacher Education
2		AI in Education ·Applied Linguistics ·CALL ·Chatbot ·Chatbots ·Computer-Assisted Language Learning ·Conversational Agents ·Foreign Language Learning ·Generative Artificial Intelligence ·L2 Writing ·Language Education ·Large Language Models ·Second Language Acquisition ·Second Language Writing ·Vocabulary Learning
3		Artificial Intelligence ·Bibliometric Analysis ·Education ·English as a Second Language ·English Language ·English Learning ·English Teaching ·Language Learning ·Mobile Learning ·Natural Language Processing ·Self-Efficacy ·Self-Regulated Learning ·Teaching ·Technology ·Virtual Reality
4		AI Literacy ·Artificial Intelligence (AI) ·Artificial Intelligence Tools ·EFL Learners ·EFL Students ·EFL Teachers ·EFL Writing ·Engagement ·Motivation ·Paraphrasing Skills ·Positive Psychology ·QuillBot ·Vocabulary ·Willingness to Communicate
5		Activity Theory ·AI Chatbots ·Artificial Intelligence in Education ·Educational Technology ·Generative AI ·Higher Education ·Language Teaching & Learning ·Personalized Learning ·Second Language Learning ·Student Engagement ·Writing Proficiency ·Writing Skills
6		Adaptive Learning ·Corrective Feedback ·Digital Literacy ·English Language Education ·English Language Learning ·Machine Learning ·Personalized Feedback ·Speaking Skills ·Speech Recognition
7		AI Tools ·Assessment ·Challenges ·Feedback ·Perceptions ·Writing
8		AI ·Chinese EFL Learners ·EFL ·English Writing ·Technology Acceptance Model

4.3. Content Analysis

The title and abstract fields of all texts were put into VOSViewer to find the most regularly recurring words, with a minimum of 10 occurrences per term, and utilizing the thesaurus file to merge synonyms into a single term, while ig-

noring specified words, 245 terms were found out of 13,212. VOSViewer generated a relevance score for each of the 245 items; however, only 60% of the most relevant terms (147) were selected for further investigation. After filtering, the map was created with 56 elements divided into 4 clusters, shown in **Figure 10**.

“Immediate Feedback” (Occ = 16, TLS = 61).

5. Discussion

This bibliometric study aims to explore the field of AI-powered technologies in language learning from 2022 to 2025. It provides an updated overview of the domain and addresses two research questions.

5.1. What are the Patterns of Scientific Productivity and Collaboration in Relation to AI-Powered Technology in Language Learning during 2022–2025?

This study examines a new time, as earlier research has primarily focused on the field’s beginnings. This research provides us with recent information and an overview of the scientific work conducted over the past few years. Previous bibliometric studies have shown that the number of publications in this field has been increasing over time. Our current findings support these findings and indicate that 2024 has the highest number of publications. However, for 2025, we only collected data for the first half of the year, which may not provide a complete picture of the entire year. Although we see an increasing number of publications each year, older publications receive more citations. Looking at the average number of citations for articles from 2023, the average is 12.11, which is higher than for more recent years. This is consistent with what Rahman, Raj, Tomy, and Hameed pointed out: that older, foundational papers are often cited more frequently than recent papers^[14].

This research examines the top ten authors who have made a significant impact in the field of language learning, utilizing AI-powered technologies from 2022 to 2025. The top ten authors’ works address several different concerns related to AI technologies in language learning. They focus on creating intelligent computer programs that facilitate language learning, such as ICALL systems^[15]. Other studies have looked at AI-based assessment methods^[16]. To improve English writing skills, studies have explored the use of AI-powered chatbots to offer personalized writing help, peer feedback, and support in developing argumentative writing^[17–19]. Several studies have examined the effectiveness of QuillBot in helping students improve their paraphrasing skills and motivation in learning English^[20–24]. Additionally,

generative AI tools like ChatGPT have been examined for their potential to improve English communication and writing skills^[25,26]. The focus of other research was on how AI can help with automatic writing evaluation. AWE also aids in vocabulary learning and the use of mobile apps and chatbots to encourage academic engagement^[19,25]. Researchers have also explored the use of AI chatbots as conversation partners to enhance speaking skills. They explored AI tools that create better learning experiences, considering learners’ emotional needs. In speaking assessments, several studies highlighted AI platforms that evaluate speech, such as EAP Talk, which gives automated feedback to help EFL learners speak better. Finally, some research has examined the use of virtual reality, augmented reality, and AI-driven digital characters to enhance language skills and maintain learner engagement.

In terms of countries’ contributions in the field of AI-powered technologies 2022–2025, our research shows that China remains the leader in both the number of research papers published and the number of citations. This finding aligns with previous studies, such as Wahyuni and Jaleniauskienė, which have also reported similar findings. However, Rahman et al. reveals that the United States has more citations, placing China in second place^[14]. The latest data suggests that China’s importance in this field is growing. The study also highlights that other countries, such as India and Saudi Arabia, are significantly increasing their contributions. A study by Wahyuni et al. ranked India seventeenth and Saudi Arabia eleventh^[27]. India moved into second place, while Saudi Arabia has risen to fourth. This shift indicates a significant contribution from these countries during the last period. Finally, since this field is constantly developing and due to its interdisciplinary nature, countries and institutions need to collaborate more effectively. As our findings reveal few contributions in this period, this collaboration could help improve future research in the field.

In terms of publication sources, there are clear similarities between our study and other studies. This study, along with Wahyuni et al., found that the Forum for Linguistic Studies, Education and Information Technologies, and Cogent Education are among the top ten journals in this area^[27]. Also, both this research and Jaleniauskienė et al. highlighted Language Learning and Technology and System as important journals^[28]. This indicates a strong consensus on which

academic sources are recognized for publishing significant work in language learning that utilizes AI.

5.2. What are the Dominant Research Directions and Potential Gaps Related to AI-Powered Technology in Language Learning during 2022–2025?

The second question of the research addresses the main trends in the field during the study period. To answer this question, we used keyword analysis, an author keyword co-occurrence network, and content analysis. These methods provided comprehensive results and deeper insights into AI-powered technologies, language skills, and the factors affecting recent studies. The most notable results from these methods are as follows:

5.2.1. AI-Powered Tools Used in Language Learning During 2022–2025

During the study, a key trend we observed was the increasing variety of AI tools that aid in language learning. Our analysis identified fifteen different tools and technologies, with chatbots, particularly ChatGPT, being the most popular. We also conducted a keyword analysis map using Biblioshiny. While keyword analysis map highlights common terms like “artificial intelligence” and “language learning”, “ChatGPT” was the third most frequently mentioned word. This demonstrates the significant impact of ChatGPT in recent studies. Other research has also highlighted that chatbots, particularly ChatGPT, are among the top AI tools utilized in language education^[29,30]. Additionally, the author keyword network created with VOS viewer further confirmed this trend. One of the main thematic clusters exhibited a strong pedagogical focus, aligning with the findings of Ikramunnisa, who emphasized pedagogy as a central theme in EFL research^[31]. ChatGPT appeared prominently within this cluster, reinforcing its dominant role across all forms of analysis.

5.2.2. Participants Targeted in AI-Powered Language Learning from 2022 to 2025

A clear trend in previous research highlights students as the primary focus when it comes to using AI in language learning. Many studies have highlighted that learners are at the center of how AI is being utilized in English language education^[29,32–35]. This pattern is also seen in our current

study. When we looked at the data, we found a strong focus on learners, with the term “learner” showing a connection strength of 472. Additionally, in the keyword map, “student” appeared as the fourth most common keyword, showing up 6% of the time, which indicates that research on learners remains very popular. However, we noticed an important change in the new data. There seems to be an increasing interest in teachers. Although “teachers” only appeared 2% of the time, their inclusion in the keyword map suggests that researchers are starting to pay more attention to teachers and their roles in using AI for language learning. This supports what Muslimin argued, which is that we need to focus more on teachers in this area^[33]. When it comes to different educational levels, our findings show that most research is focused on higher education, with very few studies examining early childhood or primary education. This is supported by the fifth cluster in the author keyword network, which primarily focuses on higher education research. Previous works have also highlighted the lack of research on K–12 education regarding AI tools^[34]. Our results confirm that this issue persists, as higher education remains the primary focus in studies on AI-related language learning from 2022 to 2025.

5.2.3. Language Skills and Learning Factors Addressed in AI-Powered Studies (2022–2025)

This study examined various language skills and found that writing was the most crucial focus, compared to other skills such as speaking, listening, and reading. The research showed that “writing” came up frequently, highlighting the significant interest in this skill.

Many researchers have examined AI tools that help with writing, such as Grammarly, Quillbot, and ChatGPT^[36,37]. Additionally, there’s growing interest in systems that give feedback on writing automatically, like Automated Writing Evaluation (AWE) tools^[38]. These tools were often linked to the writing of research findings.

In contrast, speaking skill was mentioned far less often. It was connected to more general ideas about AI, rather than specific technologies such as virtual reality, despite virtual reality being present in the network.

Listening skills were not mentioned at all in the findings, and reading also didn’t appear, which shows that writing received much more attention than the other skills.

5.2.4. Research Methods Adopted in AI-Powered Language Learning Studies (2022–2025)

The review of research methods used in the studies shows that most researchers prefer using quantitative approaches. This aligns with the findings of Liang and others^[36], who observed that most studies on using AI in language learning rely on quantitative. This method is popular because it helps measure results clearly, involves many participants, and produces findings that can be generalized to a larger population.

However, Important aspects of language learning such as how students feel, their engagement, and their opinions, may not be fully understood using static data alone. As a result, many experts are calling for more studies that include qualitative and content-based research methods. These methods can give a better understanding of students' personal experiences with AI tools.

5.2.5. Pros and Cons of Using AI-Enhanced Technologies in Language Learning (2022–2025)

The study shows that there are important challenges in using AI in education. One major issue is overreliance on AI tools and concerns over data privacy and integrity. These issues call for clear theoretical frameworks and ethical guidelines to ensure responsible AI use in education. Our research also highlights the positive aspects of integrating AI-powered technologies into language learning. The results reveal numerous advantages of using AI in language learning. Including self-efficacy, confidence, real-time feedback, and critical thinking, which support artificial intelligence's role in language learning.

5.2.6. Critical Interpretation of Trends and Policy-Level Implications

This study examined various language skills and found that writing received the most attention. Pedagogically, this suggests that educators are increasingly relying on AI tools, such as ChatGPT and QuillBot, to enhance students' academic writing. Linguistically, the emphasis on writing may indicate that the development of oral communication and listening skills is currently under-supported. Policy-wise, these findings call for strategies that encourage broader AI integration across all language skills, ensuring balanced skill

development in language learners.

6. Conclusions

6.1. Main Findings

This bibliometric analysis reviewed global research trends in AI-powered language learning from 2022 to 2025 by using data from the Scopus database and tools such as VOSviewer and Biblioshiny. The analysis showed a major increase in the publication output, particularly in 2024, from countries such as China, India, and Saudi Arabia. Tools like ChatGPT, Grammarly, and QuillBot gained considerable attention. The findings demonstrated successful outcomes for higher-level students, which include real-time feedback in language learning and other beneficial effects.

6.2. Limitations

This review exclusively consists of English-language papers that were indexed in Scopus. The data for the year 2025 was also incomplete, and the researchers only used one database for their study, which could have limited the knowledge of the area. We admit that the use of data from Web of Science would have contributed and making the methodology stronger and more comprehensive. However, Scopus remains a dependable and adequate source for this study since it has a wide coverage of top-notch publications in the domain of AI-assisted language learning. Thus, more databases should be considered by future ones to get a larger range and to capture the insights more closely. Moreover, the bibliometric data might not completely reflect the qualitative aspects of the products. The projection and the addition of more AI-related keywords are also very important to making sure that all the studies related to the field get included.

6.3. Implications and Suggestions for Future Research

Future research should explore other areas, including other skills, and consider the young learners and the teachers in the context of AI integration. The perspectives of teachers would offer insights into the experiences of the learners and the outcomes of AI use. Furthermore, educational policies should set up ethical guidelines for the use of AI in language learning.

6.4. Future Research Directions

AI-assisted language learning is anticipated to be the dominant topic of study for many years to come, thus AI-powered research should surely focus on the previously stated gaps that still have to be filled in studies. One of the major directions will be the extension of the intervention from just higher education to all levels of education from early childhood, primary and secondary education. The research on the interaction of very young students with the AI technologies will give educators the required data about the age-appropriate design of instructional materials, the cognitive development, and the motivation in the technology-rich classrooms.

One more important aspect that the study could cover is the area of communication skills, listening, and speaking, which are still not widely recognized. The writing skill is underlined in most all studies but AI integration in education brings along the possibility of using sophisticated speech recognition systems, smart virtual conversational agents, and immersive virtual environments to greatly support oral communication and comprehension of sounds. Educators should then be able to document not only the effectiveness of these tools in terms of the teaching methods used but also the level of students' participation.

Besides, there is an overwhelming demand for a wider application of different research methods. The studies done so far have commonly used the quantitative methods, which are effective in determining the impacts of the intervention; they do not capture the emotional, social, and behavioral aspects of learning. Qualitative and mixed-method studies might do a better job than quantitative studies in capturing the human-centric aspects and thus providing a more profound view of how both learners and instructors are perceiving, adapting to, and reaping the benefits of AI application in the language learning situation.

At last, future studies should also consider policy formation, ethical usage, and teacher professional development as well. The setting up of proper ethical guidelines for data privacy, bias reduction, and responsible AI implementation will lead to an integration that is sustainable and fair. In the same manner, equipping the teachers with the necessary knowledge and skills to work with AI technologies efficiently will bring about an improvement in the quality of teaching as well as the outcomes of learners.

By combining these paths, the result will be a more comprehensive, inclusive, and ethically based comprehension of AI's revolutionary impact in language learning.

Funding

This work was supported by the Deanship of Scientific Research, Vice Presidency for Graduate Studies and Scientific Research, King Faisal University, Saudi Arabia [Grant No. KFU253946].

Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Not applicable.

Data Availability Statement

If needed, please contact the corresponding author for any further information, including all data supporting the findings.

Acknowledgments

The authors gratefully acknowledge the support of the Deanship of Scientific Research, Vice Presidency for Graduate Studies and Scientific Research, King Faisal University, Saudi Arabia, which made this work possible.

Conflicts of Interest

The authors declare no conflict of interest.

References

- [1] Harry, A., 2023. Role of AI in education. *Interdisciplinary Journal and Humanity (INJURITY)*. 2(3), 260–268.
- [2] Rebolledo Font De La Vall, R., González Araya, F., 2023. Exploring the benefits and challenges of AI-language learning tools. *International Journal of Social Sciences and Humanity Invention*. 10(1), 7569–7576.
- [3] Balcı, Ö., 2024. The role of ChatGPT in English as a foreign language (EFL) learning and teaching: A sys-

- tematic review. Available from: <https://zenodo.org/doi/10.5281/zenodo.12544675> (cited 10 September 2025).
- [4] Creely, E., 2024. Exploring the role of generative AI in enhancing language learning: Opportunities and challenges. *International Journal of Change in Education*. 1(3), 158–167.
- [5] Mageira, K., Pittou, D., Papasalouros, A., et al., 2022. Educational AI chatbots for content and language integrated learning. *Applied Sciences*. 12(7), 3239.
- [6] Banh, L., Strobel, G., 2023. Generative artificial intelligence. *Electronic Markets*. 33(1), 63.
- [7] Kasneci, E., Sessler, K., Küchemann, S., et al., 2023. ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences*. 103, 102274.
- [8] Donthu, N., Kumar, S., Mukherjee, D., et al., 2021. How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*. 133, 285–296. DOI: <https://doi.org/10.1016/j.jbusres.2021.04.070>
- [9] Passas, I., 2024. Bibliometric analysis: The main steps. *Encyclopedia*. 4(2), 1014–1025. DOI: <https://doi.org/10.3390/encyclopedia4020065>
- [10] Schotten, M., Meester, W.J., Steinginga, S., et al., 2017. A brief history of Scopus: The world's largest abstract and citation database of scientific literature. In *Research Analytics*. Auerbach Publications: Boca Raton, FL, USA. pp. 31–58.
- [11] Selcuk, A.A., 2019. A guide for systematic reviews: PRISMA. *Turkish Archives of Otorhinolaryngology*. 57(1), 57–58.
- [12] Van Eck, N.J., Waltman, L., 2010. Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*. 84(2), 523–538.
- [13] Hair Jr., J.F., Hult, G.T.M., Ringle, C.M., et al., 2021. *Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R: A Workbook*. Springer Nature: Singapore.
- [14] Rahman, A., Raj, A., Tomy, P., et al., 2024. A comprehensive bibliometric and content analysis of artificial intelligence in language learning: Tracing between the years 2017 and 2023. *Artificial Intelligence Review*. 57(4), 107.
- [15] Chen, X., Meurers, D., Rebuschat, P., 2022. ICALL offering individually adaptive input: Effects of complex input on L2 development. *Language Learning and Technology*. 26(1), 1–21.
- [16] Chen, X.P.X., 2024. Human-in-the-loop: A conceptual framework for business English teachers' AI-empowered assessment. In *Learning Technologies and Systems*. Springer Nature: Singapore. pp. 204–213.
- [17] Guo, K., Li, D., 2024. Understanding EFL students' use of self-made AI chatbots as personalized writing assistance tools: A mixed-methods study. *System*. 124, 103362.
- [18] Guo, K., Pan, M., Li, Y., et al., 2024. Effects of an AI-supported approach to peer feedback on university EFL students' feedback quality and writing ability. *Internet and Higher Education*. 63, 100962.
- [19] Guo, K., Wang, J., Chu, S.K.W., 2022. Using chatbots to scaffold EFL students' argumentative writing. *Assessing Writing*. 54, 100666.
- [20] Mohammad, T., 2024. Challenging traditional EFL writing classroom using AI-mediated tool: A paradigm shift. *World Journal of English Language*. 14(2), 211.
- [21] Mohammad, T., Nazim, M., Alzubi, A.A.F., et al., 2023. Examining EFL students' motivation level in using QuillBot to improve paraphrasing skills. *World Journal of English Language*. 14(1), 501.
- [22] Mohammad, T., Alzubi, A.A.F., Nazim, M., et al., 2023. Assessing the effectiveness of QuillBot-mediated instruction in enhancing EFL students' paraphrasing skills. *International Journal of Instructional Technology*. 24, 8349–8357.
- [23] Mohammad, T., Alzubi, A.A., Nazim, M., et al., 2023. EFL paraphrasing skills with QuillBot: Unveiling students' enthusiasm and insights. *Journal of Pedagogical Research*. 7(5), 359–373.
- [24] Mohammad, T., Falah Alzubi, A.A., Nazim, M.O.H.D., et al., 2024. Evaluating the effectiveness of QuillBot in improving students' paraphrasing skills: Teachers' voices. *Journal of Theoretical and Applied Information Technology*. 102(6), 2556–2567.
- [25] Wang, Y., 2024. Cognitive and sociocultural dynamics of self-regulated use of machine translation and generative AI tools in academic EFL writing. *System*. 126, 103505.
- [26] Wang, Y., 2025. A study on the efficacy of ChatGPT-4 in enhancing students' English communication skills. *Sage Open*. 15(1), 21582440241310644.
- [27] Wahyuni, S., Hidayanto, P.S.P.N., Efendi, A., 2024. Trends in artificial intelligence-infused English language learning: A comprehensive bibliometric and content review. *Advances in Education*. 12(25), 162–178.
- [28] Jaleniauskiene, E., Lisaitė, D., Daniusevičiūtė-Brazaitė, L., 2023. Artificial intelligence in language education: A bibliometric analysis. *Sustainability in Multilingualism*. 23(1), 159–194.
- [29] Yaseen, M.G., Alnakeeb, S.S., 2023. Exploring the evolution of AI integration in English as a foreign language education: A Scopus-based bibliometric analysis (1997–2023). *Mesopotamian Journal of Computer Science*. 2023, 143–158.
- [30] Doğan, Y., Talan, T., 2024. Artificial intelligence in foreign language learning: A bibliometric analysis. *Journal of Pedagogical Research*. Available from: <https://www.ijopr.com/article/artificial-intelligence-in-foreign-language-learning-a-bibliometric-analysis-15741> (cited 9 July 2025).

- [31] Ikramunnisa, E., Mahardika, S., Afandi, A., et al., 2022. Bibliometric analysis on EFL publication trends in 2011–2021 using VOSviewer. *CELT: Journal of Culture, English Language Teaching and Literature*. 22(2), 259–280.
- [32] Hasanah, U., Palangngan, S.T.B., 2024. Bibliometric analysis of AI-driven tools in English language teaching. *Proceedings of ICoLT-Hybrid Conference*. 1(1), 85–100.
- [33] Muslimin, A.I., 2024. Bibliometric analysis of artificial intelligence integration in English as a foreign language education: Trends and patterns. *JET ADI BUANA*. 9(1), 79–92.
- [34] Prahani, B.K., Rizki, I.A., Jatmiko, B., et al., 2022. Artificial intelligence in education research during the last ten years: A review and bibliometric study. *International Journal of Emerging Technologies in Learning (iJET)*. 17(8), 169–188.
- [35] Maphosa, V., Maphosa, M., 2023. Artificial intelligence in higher education: A bibliometric analysis and topic modeling approach. *Applied Artificial Intelligence*. 37(1), 2261730.
- [36] Liang, J.C., Hwang, G.J., Chen, M.R.A., et al., 2023. Roles and research foci of artificial intelligence in language education: An integrated bibliographic analysis and systematic review approach. *Interactive Learning Environments*. 31(7), 4270–4296.
- [37] Zhang, X., Umeanowai, K.O., 2025. Exploring the transformative influence of artificial intelligence in EFL context: A comprehensive bibliometric analysis. *Education and Information Technologies*. 30(3), 3183–3198.
- [38] Huang, X., Zou, D., Cheng, G., et al., 2023. Trends, research issues and applications of artificial intelligence in language education. *Educational Technology and Society*. 26(1), 112–131.