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## ARTIFICIAL INTELLIGENCE IN LANGUAGE LEARNING AND TEACHING: A BIBLIOMETRIC REVIEW

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### Abstract:

This study presents a bibliometric mapping of research on artificial intelligence (AI) in language learning and teaching, offering a systematic overview of trends, influential contributors, and emerging research themes. Despite rapid growth in AI-enhanced education, comprehensive analyses of global patterns and thematic focus remain scarce. Using Scopus advanced search with the keywords “AI,” “teaching,” “learning,” and “language,” 653 publications were retrieved. Data were cleaned and harmonized with OpenRefine to ensure consistency, followed by statistical and graphical analyses using Scopus Analyzer. Network visualizations were generated in VOSviewer, including keyword co-occurrence, country co-authorship, and citation linkages, to uncover research clusters and collaboration patterns. Results indicate that AI, language learning, and educational technology dominate the literature, with China, the United States, and the United Kingdom leading in productivity and international collaboration. Keyword analysis revealed six thematic clusters, highlighting personalized learning, natural language processing, machine learning applications, and AI-driven pedagogical strategies. Country co-authorship generated eight clusters, reflecting strong collaborative networks across East Asia, North America, and Europe. These findings provide critical insights into the structure and evolution of AI in language education, guiding future research priorities, fostering global collaboration, and informing educational policy. The study underscores AI’s transformative potential in language teaching and learning while charting directions for interdisciplinary and cross-national research advancement.

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Artificial Intelligence, Language, Learning, Teaching



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## Introduction

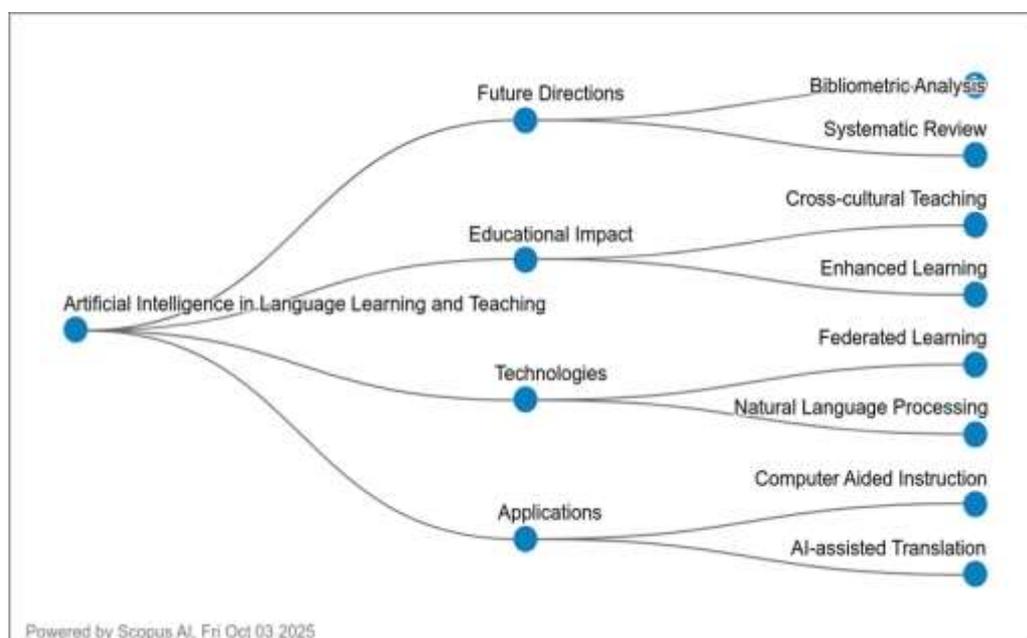
Artificial Intelligence (AI) has revolutionized various sectors, and education is no exception. In the realm of language learning and teaching, AI has introduced innovative tools and methodologies that significantly enhance the learning experience. The integration of AI in language education offers personalized, adaptive, and interactive learning environments that cater to the unique needs of each learner. This transformation is evident in the use of AI-powered tools such as chatbots, intelligent tutoring systems, and adaptive learning platforms, which provide real-time feedback, tailored exercises, and immersive environments for language practice (Janku, 2025; Király, 2024; Tashpolatovna et al., 2025). As AI continues to evolve, its role in language education is becoming increasingly prominent, offering new opportunities and challenges for both educators and learners.

The application of AI in language learning and teaching has been extensively explored in recent years. AI technologies, such as natural language processing (NLP) and machine learning, have been instrumental in developing tools that enhance language acquisition. These tools include chatbots, which provide personalized interaction and immediate feedback, and intelligent tutoring systems that offer customized learning experiences (Király, 2024; Ying Soon et al., 2024). AI-powered platforms have revolutionized traditional language learning models by shifting from a one-size-fits-all approach to a more student-centered model, promoting deeper engagement and improved proficiency (Tariq, 2025; Tashpolatovna et al., 2025). One of the significant advantages of AI in language education is its ability to provide real-time feedback and adapt to individual learning paces. This personalized approach helps learners improve their language skills more efficiently. For instance, AI can assist in pronunciation correction, conversational fluency, grammar, and vocabulary development (Caines et al., 2025; Qassrawi & Al Karasneh, 2025). Additionally, AI tools can streamline teaching methods through automated assessment and personalized content creation, making language learning more accessible and effective (Akinsemolu & Onyeaka, 2025; Qassrawi & Al Karasneh, 2025). However, the integration of AI in language education also presents challenges, such as data privacy concerns, bias in AI models, and the need for teacher training to effectively use these technologies (Akinsemolu & Onyeaka, 2025; Tariq, 2025).

The role of AI in language education is not limited to enhancing language skills but also extends to improving student engagement and motivation. AI-powered gamified learning environments, for example, combine the adaptive support of AI with the motivating elements of gamification, making learning more engaging and participatory (Senanayake et al., 2024).

These environments can facilitate group learning and help students gain a deeper understanding of complex concepts. However, the ethical considerations surrounding the use of AI in education, such as the potential for increased loneliness and reduced student interaction, must be carefully addressed (Senanayake et al., 2024).

Despite the numerous benefits of AI in language education, it is essential to recognize that AI cannot replace human educators. AI excels at providing objective feedback and supporting innovative teaching methods, but it struggles to cultivate essential human skills like cultural sensitivity, emotional intelligence, and critical thinking (Qassrawi & Al Karasneh, 2025). Therefore, a balanced integration of AI and traditional teaching methods is crucial to ensure that learners benefit from the latest technological advancements while still developing the critical human skills needed for effective communication and relationship-building (Janku, 2025; Qassrawi & Al Karasneh, 2025).



**Figure 1: Overview Of Artificial Intelligence (AI) in Language Learning and Teaching**

Source: (Scopus AI, 2025)

Figure 1 illustrates a structured overview of Artificial Intelligence (AI) in language learning and teaching, emphasizing its multi-dimensional scope and future potential. At its center, AI serves as a catalyst that branches into four primary areas: future directions, educational impact, technologies, and applications. In terms of future directions, bibliometric analysis and systematic reviews highlight ongoing research efforts to evaluate patterns, trends, and effectiveness of AI in education. The educational impact dimension focuses on how AI enhances learning outcomes, with particular attention to cross-cultural teaching and personalized learning experiences that foster inclusivity and engagement. The technological dimension features advanced methods such as federated learning, which enables secure and collaborative data use, and natural language processing (NLP), which powers intelligent language tools and adaptive systems. Applications represent tangible practices, such as computer-aided instruction that supports individualized learning paths, and AI-assisted translation that breaks down linguistic barriers for global communication. Taken together, the map illustrates that AI is more than a supplementary tool—it is a transformative force shaping

pedagogy, fostering equity in multilingual contexts, and driving innovative educational practices. Ultimately, AI's integration promises a more adaptive, efficient, and learner-centered future for language education.

In conclusion, the integration of AI in language learning and teaching offers significant potential to enhance the educational experience. AI-powered tools provide personalized, adaptive, and interactive learning environments that cater to the unique needs of each learner, improving language proficiency and engagement. However, the challenges and ethical considerations associated with AI in education must be carefully addressed to ensure a balanced and effective integration of technology and traditional teaching methods. As AI continues to evolve, its role in language education will undoubtedly expand, offering new opportunities for both educators and learners.

This study aims to systematically investigate the research landscape of artificial intelligence in language learning and teaching by addressing the following research questions.

RQ1: What are the research trends in artificial intelligence in language learning and teaching according to the year of publication?

RQ2: What are the most cited articles on artificial intelligence in language learning and teaching?

RQ3: Which are the top 10 countries contributing the highest number of publications on artificial intelligence in language learning and teaching?

RQ4: What are the most prominent keywords used in the research?

RQ5: How do countries collaborate in terms of co-authorship networks?

## **Methodology**

Bibliometrics represents a systematic approach to collecting, structuring, and interpreting bibliographic information derived from scholarly publications (Alves et al., 2021; Assyakur & Rosa, 2022; Verbeek et al., 2002). Rather than being confined to descriptive measures—such as identifying active journals, publication timelines, or leading contributors (Wu & Wu, 2017)—bibliometric research integrates advanced analytical techniques, including document co-citation and network analysis, to reveal intellectual linkages and emerging knowledge structures.

Executing a rigorous literature review therefore demands an iterative and reflective process: selecting precise keywords, refining search strategies, and conducting comprehensive analyses to generate both reliable and replicable findings (Fahimnia et al., 2015). Guided by this principle, the present study concentrated on high-impact publications, recognizing them as critical sources for tracing theoretical foundations and methodological innovations within the field. To ensure the validity and breadth of the dataset, Scopus was adopted as the principal database, given its reputation for comprehensive coverage and robust indexing (Al-Khoury et al., 2022; Di Stefano et al., 2010; Khiste & Paithankar, 2017). In line with quality assurance measures, only peer-reviewed journal articles were considered, while other forms of academic output such as books, book chapters, and lecture notes were intentionally excluded (Gu et al., 2019). The dataset comprised Scopus-indexed publications published between 1984 and October 2025, forming a robust foundation for the subsequent bibliometric analysis.

### **Data Search Strategy**

This study employed the Scopus database for bibliometric data retrieval, as it provides comprehensive and high-quality coverage of peer-reviewed publications across diverse disciplines. Using the SCOPUS Advanced Search function, a targeted Boolean query was constructed: TITLE ( ( "artificial intelligence" OR AI ) AND ( teaching OR learning ) AND language ). This string was designed to capture studies explicitly addressing the intersection of artificial intelligence, pedagogy, and language, while including both “artificial intelligence” and “AI” accounted for variations in terminology. To maintain consistency and reduce potential bias, the search was limited to English-language publications using AND PUBYEAR > 1983 AND PUBYEAR < 2026 AND ( LIMIT-TO ( LANGUAGE , "English" ) ), ensuring interpretability and global scholarly relevance. The search was executed in October 2025 (refer Table 1) , establishing a clear temporal boundary and incorporating the most recent developments in AI-enhanced education. Following retrieval, records underwent systematic screening based on predefined inclusion and exclusion criteria (refer Table 2). Only peer-reviewed journal articles focusing on AI applications in teaching, learning, or language were retained. Duplicates, non-article entries, editorials, conference abstracts, and studies not directly related to educational applications of AI were excluded. This rigorous process resulted in a final dataset of 653 publications, representing a focused and comprehensive corpus suitable for bibliometric and content analysis.

SCOPUS was selected as the sole data source due to its rigorous indexing, broad disciplinary coverage, and continuous updates, ensuring both quality and completeness. The use of an advanced Boolean search string enhanced precision and reproducibility, allowing future researchers to replicate or refine the methodology. Overall, this systematic search and screening strategy produced a reliable and current dataset, providing a strong foundation for analyzing trends, networks, and thematic structures in the field of AI in teaching, learning, and language education.

**Table 1: The Search String**

<b>Scopus</b>	TITLE ( ( "artificial intelligence" OR AI ) AND ( teaching OR LEARNING ) AND LANGUAGE ) AND PUBYEAR > 1983 AND PUBYEAR < 2026 AND ( LIMIT-TO ( LANGUAGE , "English" ) )
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**Table 2: Search and Selection Criteria**

<b>Criterion</b>	<b>Inclusion</b>	<b>Exclusion</b>
<b>Language</b>	English	Non-English
<b>Year of Publication</b>	1984	2025

### **Data Analysis**

VOSviewer, developed by Nees Jan Van Eck and Ludo Waltman at Leiden University, the Netherlands, is one of the most widely adopted tools in bibliometric analysis (Van Eck & Waltman, 2010, 2017). Designed to be user-friendly yet methodologically robust, the software enables researchers to visualize and interpret large volumes of scientific literature. Its core

strength lies in generating intuitive network visualizations, clustering related items, and producing density maps that reveal the structural patterns within research domains. Through the examination of co-authorship, co-citation, and keyword co-occurrence networks, VOSviewer offers a comprehensive means of mapping the intellectual and thematic landscapes of scientific inquiry.

A defining feature of VOSviewer is its ability to translate complex bibliometric datasets into interpretable visual representations. The software's emphasis on network visualization allows for the identification of keyword co-occurrence patterns, clustering of thematically related items, and the creation of density maps. Its accessible interface supports both novice and expert users, while ongoing updates ensure that it remains at the forefront of bibliometric visualization. Beyond visualization, VOSviewer provides flexibility in computing bibliometric metrics, customizing maps, and accommodating diverse bibliometric data sources. This adaptability reinforces its role as a versatile and indispensable tool for researchers seeking meaningful insights into evolving knowledge structures. In this study, datasets containing metadata such as publication year, title, author, journal, citation, and keywords were extracted from the Scopus database in PlainText format, covering the period from 1984 to October 2025. These datasets were subsequently analyzed using VOSviewer software version 1.6.20. By employing VOS clustering and mapping techniques, the software enabled the generation of detailed bibliometric maps. Unlike the conventional Multidimensional Scaling (MDS) approach, which primarily relies on similarity measures such as cosine and Jaccard indices, VOSviewer situates items in low-dimensional spaces where the distance between items reflects their degree of relatedness (Van Eck & Waltman, 2010), (Appio et al., 2014). Importantly, VOS applies a normalization technique based on association strength, defined as:

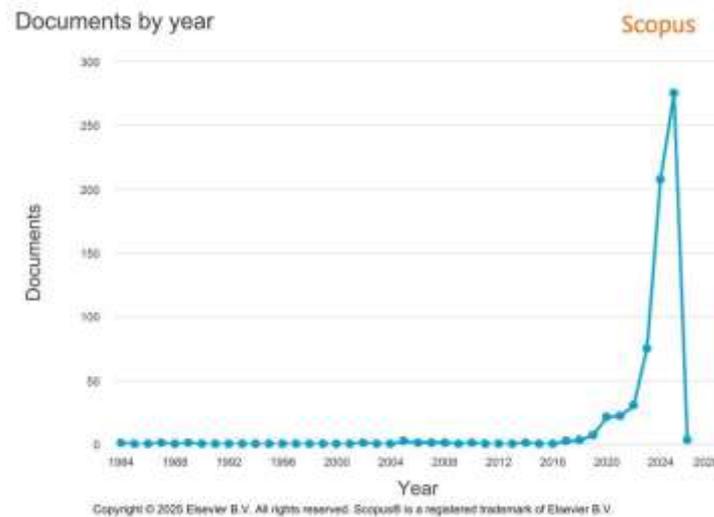
$$AS_{ij} = \frac{C_{ij}}{w_i w_j}$$

which is “proportional to the ratio between on the one hand the observed number of co-occurrences of *i* and *j* and on the other hand the expected number of co-occurrences of *i* and *j* under the assumption that co-occurrences of *i* and *j* are statistically independent” (Van Eck & Waltman, 2007).

## Findings and Discussion

This section presents and interprets the findings in alignment with the research questions, systematically examining publication trends, citation influence, national contributions, keyword dynamics, and international co-authorship patterns. The analysis offers an in-depth overview of the intellectual landscape of artificial intelligence in language learning and teaching, capturing its evolution, thematic development, and global research distribution.

***RQ1: What Are The Research Trends In Artificial Intelligence In Language Learning And Teaching According To The Year Of Publication?***



**Figure 2: Trend Of Research In Artificial Intelligence In Language Learning And Teaching By Years**

Figure 2 highlights how scholarly interest in the field remained limited for decades, with minimal output from 1984 onwards, before accelerating significantly after 2020 and showing a dramatic increase in publications in the most recent years (2023–2025). Between 1984 and 2017, publications were sporadic and minimal, with most years recording only one or two papers. This low output phase reflects the nascent stage of research in the field, possibly due to limited academic interest, scarce resources, or emerging recognition of the topic’s relevance. Between 2018 and 2022, there is a gradual but steady rise, culminating in 30 publications in 2022, which indicates growing scholarly attention, improved research infrastructure, and broader dissemination of knowledge.

A sharp surge is evident from 2023 onward, peaking at 275 publications in 2025. This exponential growth can be attributed to multiple factors, such as the increasing global relevance of the subject, enhanced collaboration among researchers, and the proliferation of digital platforms and journals that facilitate faster publication and visibility. Additionally, this rise may reflect targeted funding, institutional support, or heightened awareness of the field’s impact, suggesting that the topic has entered a phase of maturity and widespread academic engagement. Overall, the trajectory highlights a transition from marginal research activity to a highly active, mainstream scholarly field.

***RQ2. What Are The Most Cited Articles On Artificial Intelligence In Language Learning And Teaching?***

Table 3 presents the most cited articles. The citation analysis of the top 10 articles highlights the strong scholarly interest in artificial intelligence (AI) applications in education, particularly in language learning. The most cited works are concentrated between 2022 and 2024, with Alqahtani et al. (2023) leading at 285 citations, closely followed by Song & Song (2023) with 279. Both articles explore the integration of AI and ChatGPT in higher education and language

learning, reflecting the rapid uptake of generative AI as a transformative tool in teaching and research. Similarly, Wei (2023) with 203 citations and Mohamed (2024) with 224 citations emphasize the impact of AI on motivation, achievement, and faculty perceptions, further underlining the urgent academic and practical interest in the pedagogical use of large language models. This surge in citations within a short time span underscores the timeliness and relevance of the topic amid global debates on AI's role in education.

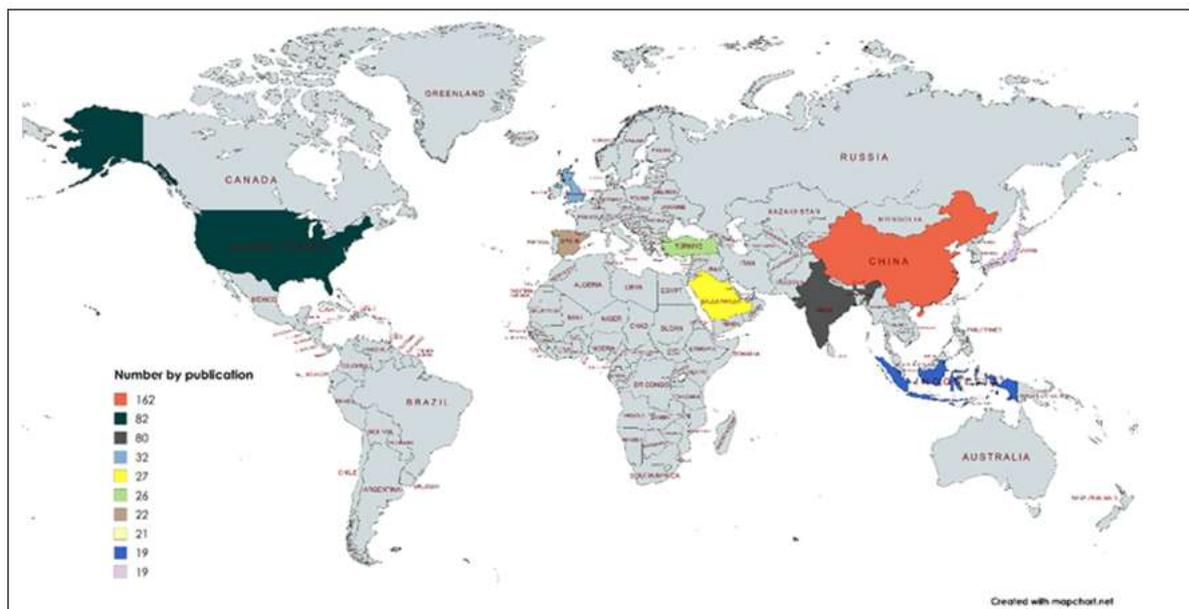
Older works, such as Haristiani (2019) with 169 citations and Belda-Medina & Calvo-Ferrer (2022) with 182, show that the foundation of chatbot-assisted language learning predates the rise of generative AI but has gained renewed attention in light of ChatGPT's prominence. The high citation counts of recent articles, despite their very recent publication dates, suggest that AI in education is a rapidly evolving "hot topic" field where new contributions are quickly recognized and widely referenced. This pattern can be attributed to the global urgency of integrating AI into curricula, the accessibility of AI tools like ChatGPT, and the proliferation of open-access journals that enhance citation visibility. Together, the data reflect a research landscape shaped by both novelty and necessity, where recent scholarship dominates because it directly addresses current educational transformations driven by AI.

**Table 3: Most Cited Authors**

Authors	Title	Year	Source title	Cited by
Law, (2024)	Application of generative artificial intelligence (GenAI) in language teaching and learning: A scoping literature review	2024	Computers and Education Open	140
Mohamed, (2024)	Exploring the potential of an AI-based Chatbot (ChatGPT) in enhancing English as a Foreign Language (EFL) teaching: perceptions of EFL Faculty Members	2024	Education and Information Technologies	224
Alwahedi et al., (2024)	Machine learning techniques for IoT security: Current research and future vision with generative AI and large language models	2024	Internet of Things and Cyber-Physical Systems	148
Alqahtani et al., (2023)	The emergent role of artificial intelligence, natural learning processing, and large language models in higher education and research	2023	Research in Social and Administrative Pharmacy	285
Wang et al., (2023)	What matters in AI-supported learning: A study of human-AI interactions in language learning using	2023	Computers and Education	146

	cluster analysis and epistemic network analysis			
Song & Song, (2023)	Enhancing academic writing skills and motivation: assessing the efficacy of ChatGPT in AI-assisted language learning for EFL students	2023	Frontiers in Psychology	279
Wei, (2023)	Artificial intelligence in language instruction: impact on English learning achievement, L2 motivation, and self-regulated learning	2023	Frontiers in Psychology	203
Belda-Medina & Calvo-Ferrer, (2022)	Using Chatbots as AI Conversational Partners in Language Learning	2022	Applied Sciences (Switzerland)	182
Mageira et al., (2022)	Educational AI Chatbots for Content and Language Integrated Learning	2022	Applied Sciences (Switzerland)	179
Haristiani, (2019)	Artificial Intelligence (AI) Chatbot as Language Learning Medium: An inquiry	2019	Journal of Physics: Conference Series	169

**RQ3: Which Are The Top 10 Countries Contributing The Highest Number Of Publications On Artificial Intelligence In Language Learning And Teaching?**

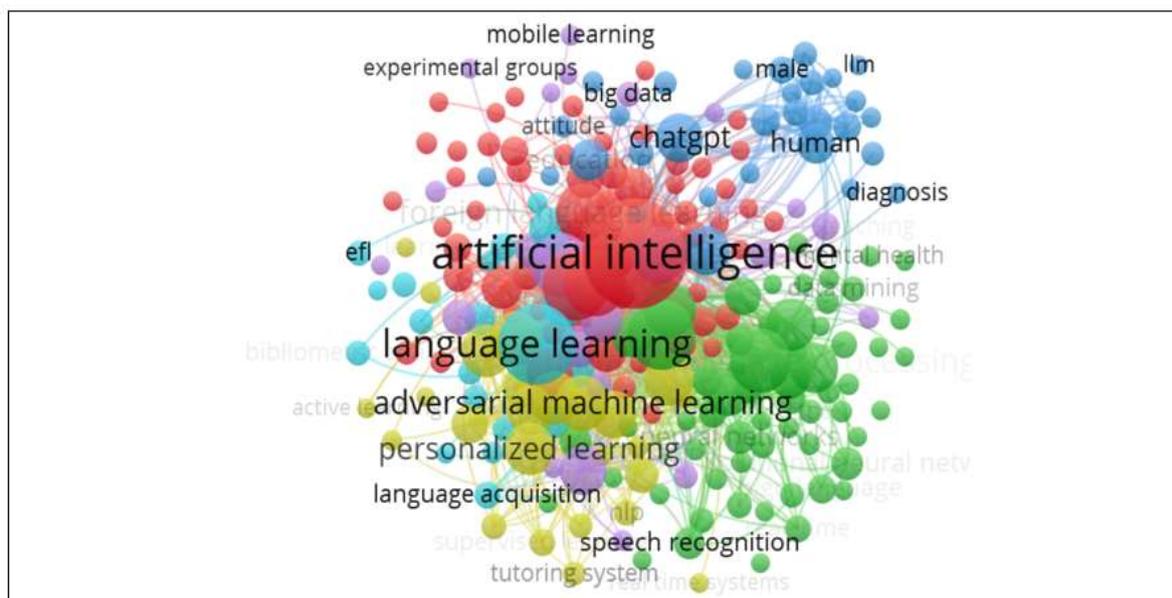


**Figure 3: Country Mapping Based On Number Of Publication**

The distribution of publications by country reveals that China leads with 162 publications, followed by the United States (82) and India (80), indicating that these three countries are the major contributors to the field. This dominance can be linked to their large research communities, substantial investment in science and technology, and government policies encouraging international publication. China's top position also reflects its aggressive research funding strategies, strong institutional collaboration, and the push for global visibility through high-impact journals. Similarly, the United States and India benefit from extensive research networks, advanced academic infrastructure, and a growing emphasis on addressing global issues through interdisciplinary studies.

In contrast, other countries such as the United Kingdom (32), Saudi Arabia (27), and Turkey (26) contribute moderately, while Spain, Hong Kong, Indonesia, and Japan fall within the range of 19–22 publications. These figures suggest an emerging but significant interest from diverse regions, particularly from Asia and the Middle East, reflecting globalization in academic research. The variation across countries can be explained by differences in funding priorities, institutional support, and national strategies for higher education and research visibility. Overall, the data highlights both the concentration of research activity in leading nations and the gradual but notable participation of other countries in advancing the field.

***RQ4: What Are The Most Prominent Keywords Used In The Research?***



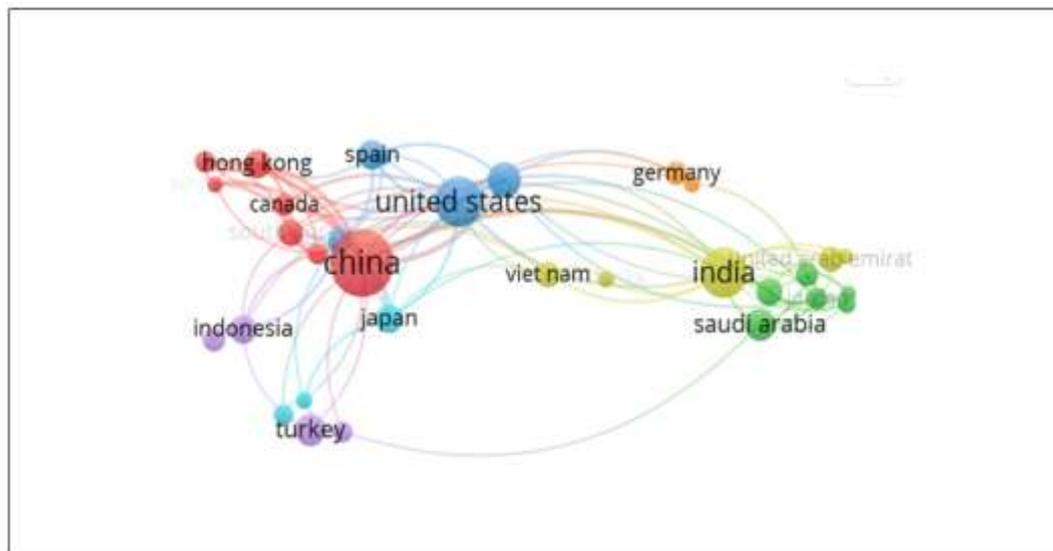
**Figure 4: Network Visualisation Map Of Keywords' Concurrence**

The co-occurrence analysis of author keywords, conducted using VOSviewer, is a bibliometric technique that visualizes the relationships among terms based on their frequency of joint appearance in scholarly publications. The concept relies on the assumption that keywords appearing together in multiple articles are likely to be conceptually or thematically related. By visualizing these connections, researchers can identify prominent topics, research trends, and emerging themes within a field. In this dataset, keywords such as artificial intelligence, language learning, and learning systems show high occurrence and total link strength, indicating they are central and heavily interconnected in studies exploring AI applications in language education. This type of analysis allows scholars to uncover the structure of research

knowledge, understand the clustering of related topics, and highlight areas of high scholarly attention, providing a foundation for targeted literature reviews and research planning.

The map in this analysis was generated using specific settings in VOSviewer: a full counting method, a minimum occurrence threshold of five, and a minimum cluster size of five. Out of 1,895 identified keywords, 224 met the threshold, resulting in six distinct clusters representing thematic groups. Each cluster reflects a set of closely linked concepts, for example, one cluster emphasizes AI and machine learning technologies, another focuses on language teaching and learning strategies, and others highlight educational technology applications or human-computer interaction in language learning. These findings contribute to the body of knowledge by revealing how artificial intelligence integrates with pedagogy, curriculum design, and technology-mediated learning. They also help scholars identify gaps, such as underexplored areas like ethics in AI-assisted learning, personalized learning, or cross-linguistic applications, guiding future research directions in AI-driven language education.

***RQ5: What Is Co-Authorship by Countries' Collaboration?***



**Figure 5: Network Visualization Map Of Co-Authorship By Countries' Collaboration**

Co-authorship analysis by countries using VOSviewer is a bibliometric approach that maps international research collaboration patterns based on the number of publications jointly authored by researchers from different countries. The concept assumes that countries that frequently collaborate on publications share stronger scientific relationships, knowledge exchange, and research networks. By visualizing these connections, one can identify which countries are central in a research domain, observe collaboration intensity, and uncover regional or global research networks. In this dataset, countries such as China, the United States, and the United Kingdom demonstrate high document counts and total link strength, indicating they play pivotal roles in international collaboration in AI and language learning research. This analysis helps scholars and policymakers understand global research dynamics, identify potential partners, and promote cross-border collaboration in emerging scientific areas.

The network map was generated using a full counting method with a minimum threshold of five documents per country and a minimum cluster size of five. Out of 77 identified countries, 35 met the threshold, resulting in eight clusters representing distinct collaborative groups. Each cluster reflects a network of countries that frequently co-author publications together, for instance, one cluster centers on East Asian countries like China, Hong Kong, and Japan, while another emphasizes European collaborations including the United Kingdom, Spain, and France. These findings contribute to the body of knowledge by highlighting the global distribution of research efforts, revealing which countries are key contributors and collaborators, and identifying regions with less collaboration that may benefit from international partnerships. Understanding these networks can inform strategic initiatives to enhance knowledge sharing, strengthen research capacity, and promote more balanced global participation in AI-driven language education research.

## Conclusion

The purpose of this bibliometric analysis was to map the landscape of research on artificial intelligence in language learning and teaching, addressing questions related to publication trends, most cited works, leading countries, influential keywords, and international collaboration networks. The study revealed a sharp increase in research output after 2020, with the highest growth observed in 2025, indicating that this topic has moved from a niche interest to a mainstream academic focus. Highly cited articles largely emphasized the role of generative AI and large language models in education, reflecting their rapid integration into both research and practice. Country-level analysis highlighted China, the United States, and India as the most active contributors, while keyword co-occurrence mapping identified six thematic clusters, including personalized learning, natural language processing, and AI-assisted pedagogy. Co-authorship analysis further demonstrated that eight international collaborative networks are shaping the field, with strong links across East Asia, North America, and Europe. This study contributes to the field by providing a structured overview of how AI has been applied in language education, revealing both dominant themes and underexplored areas such as ethics, inclusivity, and long-term pedagogical outcomes. The results underline the potential of AI to transform teaching and learning practices through adaptive and interactive approaches, while also pointing to the necessity of cross-border collaboration in addressing challenges such as bias, privacy, and teacher preparedness. However, the findings should be interpreted within the limitations of using a single database and focusing only on English-language publications, which may exclude relevant contributions from other sources. Future research could expand the dataset, explore longitudinal impacts of AI applications, and investigate the role of interdisciplinary approaches. Overall, the significance of this study lies in demonstrating how bibliometric analysis can capture the evolution of AI in language education, offering insights that guide both academic inquiry and practical implementation.

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**Ethics Statement:** This study did not involve any human participants, animals, or sensitive data requiring ethical approval. The authors confirm that the research was conducted in accordance with accepted academic integrity and ethical publishing standards.

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## References

- Akinsemolu, A. A., & Onyeaka, H. (2025). The Role of Artificial Intelligence in Transforming Language Learning: Opportunities and Ethical Considerations. *Journal of Language and Education*, 11(1), 148–152. <https://doi.org/10.17323/jle.2025.22118>
- Al-Khoury, A., Hussein, S. A., Abdulwhab, M., Aljuboori, Z. M., Haddad, H., Ali, M. A., Abed, I. A., & Flayyih, H. H. (2022). Intellectual Capital History and Trends: A Bibliometric Analysis Using Scopus Database. *Sustainability (Switzerland)*, 14(18). <https://doi.org/10.3390/su141811615>
- Alqahtani, T., Badreldin, H. A., Alrashed, M., Alshaya, A. I., Alghamdi, S. S., Bin Saleh, K., Alowais, S. A., Alshaya, O. A., Rahman, I., & Al Yami, M. S. (2023). The emergent role of artificial intelligence, natural learning processing, and large language models in higher education and research. *Research in Social and Administrative Pharmacy*, 19(8), 1236–1242. <https://doi.org/10.1016/j.sapharm.2023.05.016>
- Alves, J. L., Borges, I. B., & De Nadae, J. (2021). Sustainability in complex projects of civil construction: Bibliometric and bibliographic review. *Gestao e Producao*, 28(4). <https://doi.org/10.1590/1806-9649-2020v28e5389>
- Alwahedi, F., Aldhaheeri, A., Ferrag, M. A., Battah, A., & Tihanyi, N. (2024). Machine learning techniques for IoT security: Current research and future vision with generative AI and large language models. *Internet of Things and Cyber-Physical Systems*, 4, 167–185. <https://doi.org/10.1016/j.iotcps.2023.12.003>
- Appio, F. P., Cesaroni, F., & Di Minin, A. (2014). Visualizing the structure and bridges of the intellectual property management and strategy literature: a document co-citation analysis. *Scientometrics*, 101(1), 623–661. <https://doi.org/10.1007/s11192-014-1329-0>
- Assyakur, D. S., & Rosa, E. M. (2022). Spiritual Leadership in Healthcare: A Bibliometric Analysis. *Jurnal Aisyah : Jurnal Ilmu Kesehatan*, 7(2). <https://doi.org/10.30604/jika.v7i2.914>
- Belda-Medina, J., & Calvo-Ferrer, J. R. (2022). Using Chatbots as AI Conversational Partners in Language Learning. *Applied Sciences (Switzerland)*, 12(17). <https://doi.org/10.3390/app12178427>
- Caines, A., Buttery, P., & Seed, G. (2025). Towards equitable, diverse and inclusive language models in AI-enhanced education technology for language learners. In *The Routledge Handbook of the Sociopolitical Context of Language Learning* (pp. 401–416). Taylor and Francis. <https://doi.org/10.4324/9781003398172-29>
- Di Stefano, G., Peteraf, M., & Veronay, G. (2010). Dynamic capabilities deconstructed: A bibliographic investigation into the origins, development, and future directions of the research domain. *Industrial and Corporate Change*, 19(4), 1187–1204. <https://doi.org/10.1093/icc/dtq027>
- Fahimnia, B., Sarkis, J., & Davarzani, H. (2015). Green supply chain management: A review and bibliometric analysis. In *International Journal of Production Economics* (Vol. 162, pp. 101–114). <https://doi.org/10.1016/j.ijpe.2015.01.003>
- Gu, D., Li, T., Wang, X., Yang, X., & Yu, Z. (2019). Visualizing the intellectual structure and evolution of electronic health and telemedicine research. *International Journal of Medical Informatics*, 130. <https://doi.org/10.1016/j.ijmedinf.2019.08.007>
- Haristiani, N. (2019). Artificial Intelligence (AI) Chatbot as Language Learning Medium: An inquiry. In I. Ifdil, Y. Yohandri, K. Krismadinata, & R. Rahim (Eds.), *Journal of Physics: Conference Series* (Vol. 1387, Issue 1). Institute of Physics Publishing [helen.craven@iop.org](mailto:helen.craven@iop.org). <https://doi.org/10.1088/1742-6596/1387/1/012020>

- Hubers, M. D., D. Endedijk, M., & Van Veen, K. (2022). Effective characteristics of professional development programs for science and technology education. *Professional Development in Education*, 48(5), 827–846. <https://doi.org/10.1080/19415257.2020.1752289>
- Janku, M. (2025). Working with Artificial Intelligence in German Lessons: A Case Study Using the Example of Chatgpt. *Palimpsest*, 10(19), 227–233. <https://doi.org/10.46763/PALIM251019227j>
- Jiao, S., & Sun, Q. (2021). Digital economic development and its impact on economic growth in china: Research based on the perspective of sustainability. *Sustainability (Switzerland)*, 13(18). <https://doi.org/10.3390/su131810245>
- Khiste, G. P., & Paithankar, R. R. (2017). Analysis of Bibliometric term in Scopus. *International Research Journal*, 01(32), 78–83.
- Király, L. (2024). Artificial Intelligence as a Virtual Language Teacher. *Magyar Nyelv*, 148(5), 649–665. <https://doi.org/10.38143/Nyr.2024.5.649>
- Langley, P., & Leyshon, A. (2017). Platform capitalism: The intermediation and capitalization of digital economic circulation. *Finance and Society*, 3(1), 11–31. <https://doi.org/10.2218/finsoc.v3i1.1936>
- Law, L. (2024). Application of generative artificial intelligence (GenAI) in language teaching and learning: A scoping literature review. *Computers and Education Open*, 6. <https://doi.org/10.1016/j.caeo.2024.100174>
- Mageira, K., Pittou, D., Papasalouros, A., Kotis, K., Zangogianni, P., & Daradoumis, A. (2022). Educational AI Chatbots for Content and Language Integrated Learning. *Applied Sciences (Switzerland)*, 12(7). <https://doi.org/10.3390/app12073239>
- Malik, M. N., Khan, H. H., Chofreh, A. G., Goni, F. A., Klemeš, J. J., & Alotaibi, Y. (2019). Investigating students' sustainability awareness and the curriculum of technology education in Pakistan. *Sustainability (Switzerland)*, 11(9). <https://doi.org/10.3390/su11092651>
- Mohamed, A. M. (2024). Exploring the potential of an AI-based Chatbot (ChatGPT) in enhancing English as a Foreign Language (EFL) teaching: perceptions of EFL Faculty Members. *Education and Information Technologies*, 29(3), 3195–3217. <https://doi.org/10.1007/s10639-023-11917-z>
- Nordlöf, C., Norström, P., Höst, G., & Hallström, J. (2022). Towards a three-part heuristic framework for technology education. *International Journal of Technology and Design Education*, 32(3), 1583–1604. <https://doi.org/10.1007/s10798-021-09664-8>
- Pienimäki, M., Kinnula, M., & Iivari, N. (2021). Finding fun in non-formal technology education. *International Journal of Child-Computer Interaction*, 29. <https://doi.org/10.1016/j.ijcci.2021.100283>
- Qassrawi, R., & Al Karasneh, S. M. (2025). Redefinition of Human-Centric Skills in Language Education in the AI-Driven Era. *Studies in English Language and Education*, 12(1), 1–19. <https://doi.org/10.24815/siele.v12i1.43082>
- Senanayake, S., Karunanayaka, K., & Ekanayake, K. V. J. P. (2024). Review on AI Assistant Systems for Programming Language Learning in Learning Environments. *2024 8th SLAAI - International Conference on Artificial Intelligence, SLAAI-ICAI 2024*. <https://doi.org/10.1109/SLAAI-ICAI63667.2024.10844969>
- Song, C., & Song, Y. (2023). Enhancing academic writing skills and motivation: assessing the efficacy of ChatGPT in AI-assisted language learning for EFL students. *Frontiers in Psychology*, 14. <https://doi.org/10.3389/fpsyg.2023.1260843>

- Tariq, M. U. (2025). The Role of AI in Personalized English Language Learning. In *AI-Powered English Teaching* (pp. 93–123). IGI Global. <https://doi.org/10.4018/979-8-3373-1952-0.ch003>
- Tashpolatovna, S. M., Turgunovna, I. S., & Xikmatullayevna, K. F. (2025). THE ROLE OF Artificial Intelligence In Foreign Language Education: Bridging Traditional And Virtual Methods. *Utilitas Mathematica*, 122, 1383–1391. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-105014953875&partnerID=40&md5=e69bf058855ca145e1dafad72f151a36>
- Tong, S. Y., Li, Y., & Kong, T. Y. (2021). Exploring Digital Economic Agreements to Promote Digital Connectivity in ASEAN. *ERIA Discussion Paper*, 24.
- Van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, 84(2), 523–538. <https://doi.org/10.1007/s11192-009-0146-3>
- Van Eck, N. J., & Waltman, L. (2017). Citation-based clustering of publications using CitNetExplorer and VOSviewer. *Scientometrics*, 111(2), 1053–1070. <https://doi.org/10.1007/s11192-017-2300-7>
- Van Eck, N. J., & Waltman, L. (2007). Bibliometric mapping of the computational intelligence field. *International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems*, 15(5), 625–645. <https://doi.org/10.1142/S0218488507004911>
- Verbeek, A., Debackere, K., Luwel, M., & Zimmermann, E. (2002). Measuring progress and evolution in science and technology - I: The multiple uses of bibliometric indicators. *International Journal of Management Reviews*, 4(2), 179–211. <https://doi.org/10.1111/1468-2370.00083>
- Wang, X., Liu, Q., Pang, H., Tan, S. C., Lei, J., Wallace, M. P., & Li, L. (2023). What matters in AI-supported learning: A study of human-AI interactions in language learning using cluster analysis and epistemic network analysis. *Computers and Education*, 194. <https://doi.org/10.1016/j.compedu.2022.104703>
- Wei, L. (2023). Artificial intelligence in language instruction: impact on English learning achievement, L2 motivation, and self-regulated learning. *Frontiers in Psychology*, 14. <https://doi.org/10.3389/fpsyg.2023.1261955>
- Wu, Y. C. J., & Wu, T. (2017). A decade of entrepreneurship education in the Asia Pacific for future directions in theory and practice. In *Management Decision* (Vol. 55, Issue 7, pp. 1333–1350). <https://doi.org/10.1108/MD-05-2017-0518>
- Ying Soon, G., Binti Abdullah, N. A. C., Binti Abdul Rahman, N. A., Suyan, Z., & Yiming, C. (2024). Integrating AI Chatbots in ESL and CFL Instruction: Revolutionizing Language Learning with Artificial Intelligence. *LatIA*, 2. <https://doi.org/10.62486/latia202411>