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A BIBLIOMETRIC ANALYSIS OF AI-MEDIATED COMMUNICATION IN SECOND AND FOREIGN LANGUAGE LEARNING

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Abstract

Artificial Intelligence-Mediated Communication (AIMC) has become an increasingly influential area in second and foreign language learning, enabling new forms of interaction, feedback, and language support through AI technologies. Despite the rapid growth of this field, a comprehensive understanding of its research development, thematic structure, and emerging directions remains limited. This study maps the intellectual structure, thematic evolution, and research gaps in AIMC studies published between 2020 and 2025. Using bibliometric analysis and visualization techniques in VOSviewer, data were collected from the Scopus database and analyzed through keyword co-occurrence, thematic clustering, temporal overlay mapping, density visualization, and bibliographic coupling. A total of 521 publications were included in the analysis. The findings indicate a substantial increase in scholarly attention to AIMC in language education. Four dominant thematic areas emerged: generative AI and conversational systems; AI-assisted writing and automated evaluation; translation technologies; and socio-educational issues related to language learning. The results show particularly strong connections between AI technologies and writing-related applications, suggesting that writing remains the most extensively explored area in AIMC research. Temporal analysis also demonstrates a shift from earlier attention to machine translation toward generative AI and human–AI collaborative learning practices. However, several areas remain underexplored, particularly AI applications for speaking development, teacher professional development, assessment redesign, and non-English language contexts. These findings provide directions for future research and support more balanced, theoretically informed, and pedagogically meaningful integration of AIMC in language education.

Keywords

AI-mediated communication (AIMC); bibliometric analysis; second language learning; foreign language learning; VOSviewer.

INTRODUCTION

The development of Artificial Intelligence (AI) has significantly reshaped the landscape of language education. In second and foreign-language learning, AI technologies are increasingly used to support interaction, feedback, writing assistance, translation, assessment, and personalized learning. This development marks a further evolution of Computer-Assisted Language Learning (CALL), which initially focused on behaviorist drill-and-practice activities before progressing into communicative, integrative, and intelligent learning environments (Warschauer & Kern, 2000). As AI becomes more embedded in language learning practices, communication among learners, teachers, learning materials, and digital systems is no longer mediated solely by conventional technologies but also by intelligent systems capable of generating, evaluating, translating, and responding to language.

In this context, AI-Mediated Communication (AIMC) refers to communicative processes in which AI technologies facilitate, structure, or intervene in interactions between learners, instructors, and learning content (Kohnke et al., 2025; Zaim et al., 2025). AIMC can include tools such as Google Translate, Grammarly, ChatGPT, automated writing evaluation systems, chatbots, and large language models to help learners produce, revise, understand, and evaluate language. From a sociocultural perspective, these tools may function as mediational resources that provide learners with scaffolding during language learning. In line with Vygotsky's sociocultural theory, AI can be understood as a form of support within the learner's Zone of Proximal Development, particularly when learners use AI-generated feedback, prompts, or explanations to perform language tasks beyond their current independent ability (Vygotsky, 1980).

Previous studies have examined various forms of AI use in second- and foreign-language learning. Alm and Watanabe (2022) investigated online machine translation for L2 writing across languages and proficiency levels, while Borodina et al. (2021) examined the impact of Google Translate on translator training. Brown et al. (2021) highlighted the persistent gap between language students' use of machine translation and teachers' concerns about its pedagogical legitimacy. In writing-related contexts, Dizon and Gold (2023) explored the effects of Grammarly on EFL students' foreign language anxiety and learner autonomy, while Song and Song (2023) investigated the use of ChatGPT to enhance academic writing skills and motivation among EFL learners. More recent studies have also addressed broader pedagogical issues, such as the affordances and challenges of AI in English language teaching (Crompton et al., 2024), students' perceptions of ChatGPT feedback

in writing (Teng, 2024), and teacher professional development for AI-integrated L2 classrooms (Minnillo et al., 2024).

These studies show that AI has been widely explored in relation to machine translation, writing support, learner motivation, feedback, and teacher readiness. However, the existing body of research remains highly diverse across tools, contexts, skills, and theoretical orientations. Many studies focus on individual AI applications or specific classroom contexts, while fewer studies provide a broader mapping of how AIMC research has developed as an interconnected field. As a result, it remains difficult to identify dominant research themes, shifts in scholarly attention, influential sources, and underexplored areas within AIMC studies in second and foreign language learning.

Therefore, a bibliometric analysis is needed to systematically map the intellectual structure and thematic development of AIMC research. Bibliometric analysis enables researchers to examine publication patterns, keyword co-occurrences, citation networks, and thematic evolution in a research field (Donthu et al., 2021). The novelty of this study lies in its focus on AIMC in second- and foreign-language learning from 2020 to 2025, using Scopus-indexed publications and VOSviewer visualizations to identify research trends, thematic clusters, temporal shifts, and emerging gaps. Unlike studies that examine individual AI tools or isolated pedagogical practices, this study provides a broader overview of how AIMC has developed as a research area and where future studies should be directed. This study aims to map the intellectual landscape of AIMC research in second- and foreign-language learning from 2020 to 2025.

METHOD

This study employed a bibliometric analysis to map publication patterns, thematic structures, and research trends in AI-Mediated Communication (AIMC) research on second- and foreign-language learning. Bibliometric analysis was selected because it enables systematic examination of a research field through publication metadata, keyword co-occurrence, citation patterns, and visual mapping (Donthu et al., 2021). VOSviewer version 1.6.20 was used to generate and visualize the bibliometric networks.

The data were collected from the Scopus database on May 18, 2026. Scopus was selected because of its broad multidisciplinary coverage and relevance to education, applied linguistics, and language learning research. The search was limited to English-language journal articles and

conference proceedings published between 2020 and 2025. The following search string was used:

TITLE-ABS-KEY (("google translate" OR "chatgpt" OR "generative ai" OR "grammarly" OR "neural machine translation" OR "ai-mediated" OR "large language model") AND ("second language" OR "L2" OR "foreign language" OR "efl" OR "esl") AND ("pedagog" OR "teach*" OR "instruct*" OR "integrat*" OR "classroom" OR "curriculum")) AND PUBYEAR > 2019 AND PUBYEAR < 2026 AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "cp")) AND (LIMIT-TO (LANGUAGE , "English"))*

The initial search yielded 1,010 records. Publications were included if they addressed AI tools in second- or foreign-language learning contexts, had a pedagogical focus, were published between 2020 and 2025, and were written in English. Duplicate records and irrelevant publications were removed using Rayyan AI, followed by title and abstract screening based on the eligibility criteria. After the screening process, 521 publications were included in the final bibliometric analysis.

The bibliometric data were analyzed using VOSviewer. Keyword co-occurrence analysis was conducted to identify major thematic clusters in AIMC research. A minimum occurrence threshold of 10 was applied to focus on frequently represented concepts and maintain visual interpretability. Network visualization was used to identify relationships among keywords, overlay visualization was used to examine the temporal development of research topics, and density visualization was used to identify concentrated and underexplored areas. Bibliographic coupling was also conducted to examine the structure of author networks in the field.

FINDINGS AND DISCUSSION

Table 1. Publication trends of AIMC research from 2020 to 2025

Year	Number of Publications	Percentage
2020	2	0.4
2021	8	1.5
2022	10	1.9
2023	31	6.0
2024	140	26.9
2025	330	63.3
Total	521	100

Table 1 shows the publication trend of AIMC research on second- and foreign-language learning from 2020 to 2025. The number of publications increased substantially during this period, from only 2 publications in 2020 to 330 publications in 2025. This trend indicates rapid growth in

scholarly attention to AI-supported and AI-mediated language learning, particularly in recent years.

Table 2. Most productive journals in AIMC research

Rank	Journal	Number of Publications	Percentage
1	Arab World English Journal	25	4.8
2	Forum for Linguistic Studies	15	2.9
3	Technology in Language Teaching and Learning	15	2.9
4	Computers and Education: Artificial Intelligence	14	2.7
5	World Journal of English Language	14	2.7
Total	Top five journals	83	15.9

Table 2 presents the five most productive journals in AIMC research. Arab World English Journal contributed the most publications, followed by Forum for Linguistic Studies, Technology in Language Teaching and Learning, Computers & Education: Artificial Intelligence, and World Journal of English Language. These sources show that AIMC research is distributed across journals related to English language teaching, applied linguistics, educational technology, and artificial intelligence in education.

Figure 1. Keyword Co-Occurrence Network

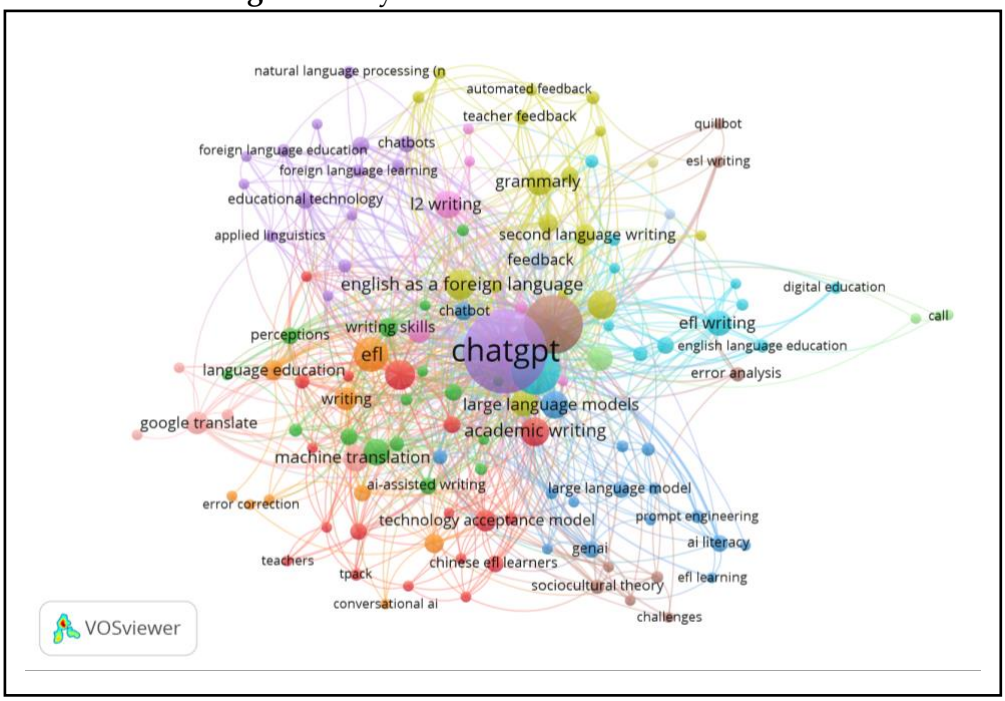

Figure 1 presents the keyword co-occurrence network generated using VOSviewer with a minimum occurrence threshold of 10. The network consists of 130 items organized into thirteen thematic clusters, with 841 links and a total link strength of 1,362. The visualization shows that AIMC research is dominated by keywords related to ChatGPT, artificial intelligence, students, writing, generative AI, and language models.

The thirteen clusters can be synthesized into four broader thematic areas. The first area is generative AI agents and conversational frameworks, represented by keywords such as ChatGPT, large language models, chatbots, generative AI, prompts, and essay writing. The second area is L2 writing pedagogy and automated evaluation, represented by academic writing, L2 writing, Grammarly, writing skills, AI-assisted writing, feedback, and self-regulated learning. The third area is the evolution of translation technology, represented by machine translation, Google Translate, and collaborative writing. The fourth area is the socio-educational ecosystem of AI-mediated language learning, represented by higher education, the Technology Acceptance Model, academic integrity, sociocultural theory, motivation, critical thinking, and teacher education.

Overall, the keyword co-occurrence network indicates that AIMC research is not limited to technological tools, but also includes pedagogical, institutional, psychological, and ethical issues related to AI integration in language education. However, writing-related applications remain the most visible area in the network.

The overlay visualization in Figure 2 reveals a clear temporal progression in research priorities from 2020 to 2025.

Figure 2. Overlay Visualization

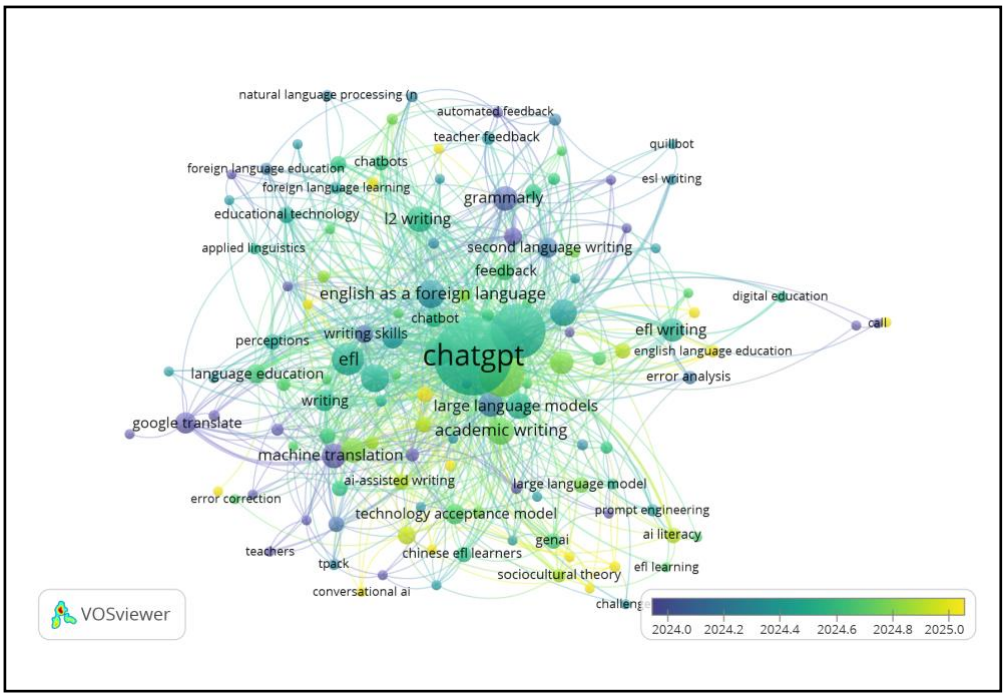

Figure 2 shows the temporal development of AIMC research from 2020 to 2025. The overlay visualization indicates a shift in research focus from machine translation and Google Translate toward ChatGPT, generative AI, and large language models. Earlier studies were more closely

associated with translation technologies, while more recent studies focused on generative AI, AI literacy, student engagement, motivation, critical thinking, teacher identity, and EFL teachers.

This temporal pattern suggests that AIMC research has shifted from examining AI as a translation or writing-support tool to exploring it as an interactive, collaborative, and pedagogical partner in language learning. The emergence of recent keywords related to AI literacy, critical thinking, and teacher identity also indicates growing attention to responsible and meaningful AI integration. The density visualization in Figure 3 highlights areas of concentrated research activity and underexplored topics.

Figure 3. Density Visualization

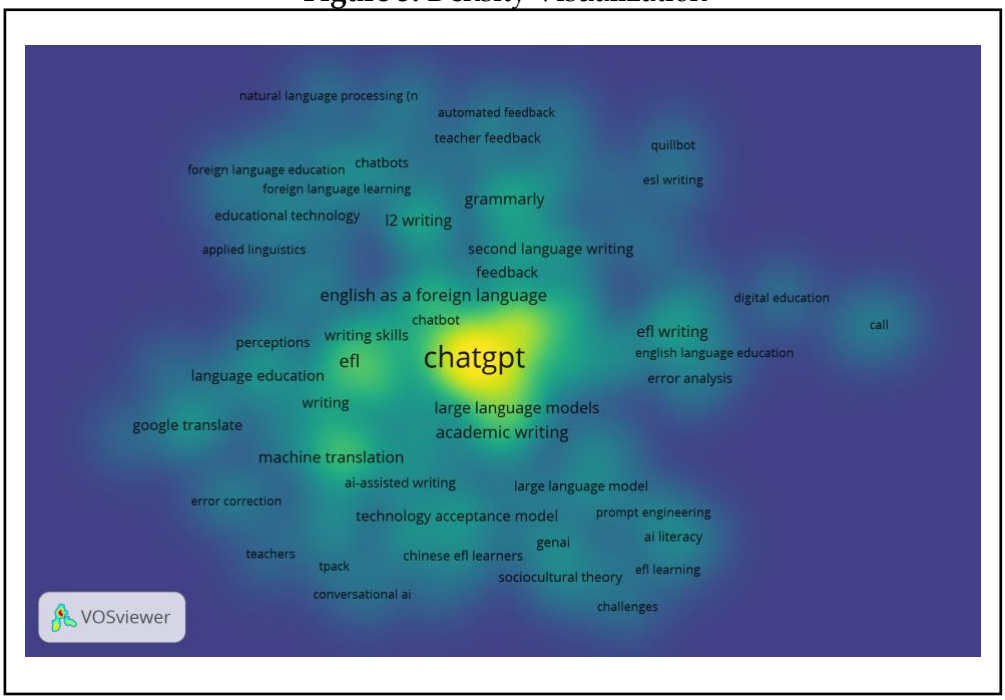

Figure 3 presents the density visualization of AIMC research topics. The highest-density areas are concentrated around ChatGPT, artificial intelligence, writing, feedback, machine translation, and students. These areas represent the most frequently studied topics in the field. The density map confirms that writing and text-based AI applications occupy a central position in AIMC research.

In contrast, lower-density areas indicate topics that remain relatively underexplored. These include AI applications for speaking and pronunciation development, teacher professional development, assessment redesign, and non-English language learning contexts. These lower-density areas point to possible directions for future research.

Figure 4. Bibliographic Coupling of Authors

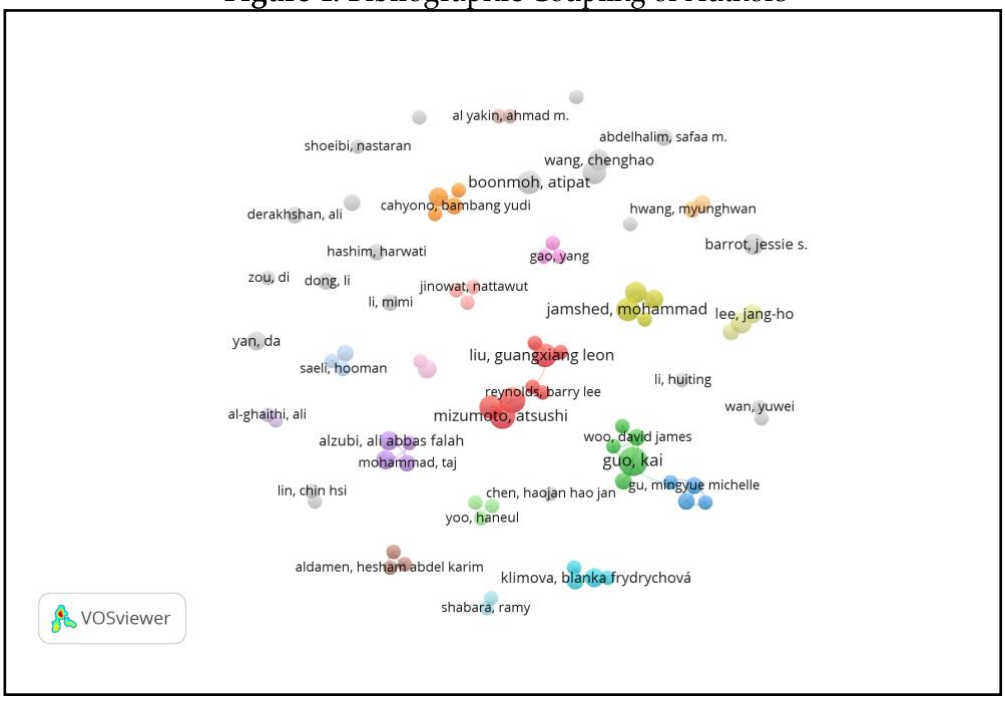

Figure 4 presents the bibliographic coupling of authors in AIMC research. The network shows a decentralized structure, with many small and relatively disconnected author clusters. The largest connected group consists of only nine researchers. This pattern suggests that AIMC research in second- and foreign-language learning remains fragmented and is often conducted by individual researchers or small research teams rather than by large, sustained, and interconnected scholarly networks.

Overall, the findings show that AIMC research has grown rapidly from 2020 to 2025. The field is strongly shaped by generative AI, writing pedagogy, automated feedback, machine translation, and socio-educational concerns. At the same time, the visualizations reveal several underexplored areas, especially speaking development, teacher professional development, assessment redesign, and non-English language contexts.

Discussion

The findings show that AIMC research in second- and foreign-language learning has grown rapidly from 2020 to 2025, especially in recent years. This growth reflects the increasing influence of AI technologies in language education. It confirms that AI is no longer a peripheral tool in language learning, but an important mediator of learning interaction, feedback, and communication. This trend is consistent with Crompton et al. (2024), who argue that AI has created new affordances and challenges in English language teaching. The rapid growth of publications also suggests that the

field is still in an emerging stage, where researchers are actively responding to technological changes and their pedagogical consequences.

The dominance of ChatGPT, artificial intelligence, generative AI, language models, writing, and feedback in the keyword network indicates that text-based and writing-oriented applications strongly shape AIMC research. This finding supports previous studies showing that AI tools are frequently used to support L2 writing, provide automated feedback, facilitate revision, and promote learner autonomy. For example, Dizon and Gold (2023) found that Grammarly influenced EFL students' foreign language anxiety and learner autonomy, while Song and Song (2023) reported ChatGPT's potential to support EFL students' academic writing and motivation. Similarly, Teng (2024) showed that learners perceived ChatGPT as a useful companion for writing feedback. These studies affirm the present finding that writing remains the most visible and mature area of AI-mediated language learning.

From a sociocultural perspective, the prominence of writing support, feedback, and conversational AI suggests that AI tools increasingly function as mediational resources in language learning. In Vygotsky's sociocultural theory, learning occurs through mediated interaction, in which learners receive support that enables them to perform beyond their current independent ability (Vygotsky, 1980). In AIMC contexts, tools such as ChatGPT, Grammarly, machine translation systems, and automated writing evaluation platforms may provide scaffolding through suggestions, explanations, corrections, and alternative language forms. However, this also means that the pedagogical value of AIMC depends not only on the availability of tools but also on how learners and teachers critically use AI-generated support.

The shift from machine translation and Google Translate to ChatGPT, generative AI, and large language models represents an important transformation in the field. Earlier AIMC research tended to view AI as a support tool for translation and text correction, as seen in studies on machine translation and L2 writing (Alm & Watanabe, 2022; Borodina et al., 2021; Brown et al., 2021). More recent research, however, increasingly examines AI as an interactive partner that can generate language, provide feedback, simulate dialogue, and assist learning processes. This shift indicates that AIMC has moved from tool-assisted language learning toward more dynamic human–AI collaboration.

At the same time, the emergence of keywords such as AI literacy, critical thinking, academic integrity, teacher identity, and teacher education indicates that the field is becoming more

pedagogically and ethically complex. This development supports studies that emphasize that AI integration in language education requires more than mere technical adoption. Teachers and learners need the ability to evaluate AI output, use AI responsibly, and redesign learning activities to maintain academic integrity and learner agency. Minnillo et al. (2024) similarly highlight the importance of professional development for language educators, while Tutton and Cohen (2025) argue that generative AI requires a reconsideration of the role of university language teachers. Therefore, the current development of AIMC should be understood not only as a technological shift but also as a pedagogical and institutional challenge.

The density visualization further shows that several areas remain underexplored, particularly speaking and pronunciation development, teacher professional development, assessment redesign, and non-English language contexts. The limited attention to speaking and pronunciation may be due to the greater maturity and accessibility of text-based AI tools compared to speech-based and multimodal systems. However, this gap is important because oral communication remains a central goal in second- and foreign-language learning. Gao et al. (2024) have begun to examine the application of large language models to spoken language learning, but the present findings suggest that this area still requires further investigation.

The lack of research on teacher professional development and assessment redesign also has important implications. If learners increasingly use AI tools, teachers need clear pedagogical frameworks to guide the responsible integration of AI. Without teacher preparation, AI may be used inconsistently or treated mainly as a threat to academic integrity. This concern is reflected in studies discussing teacher readiness, academic integrity, and the need for new assessment practices in AI-integrated classrooms (Chan et al., 2024; Hu & Yu, 2023; Poláková et al., 2024). Therefore, future research should focus not only on whether AI tools are effective, but also on how teachers can design meaningful learning tasks, feedback practices, and assessment models in AI-mediated environments.

Another important gap concerns the limited visibility of non-English language contexts. Although AIMC research is growing rapidly, much of the field remains centered on English language learning and dominant research contexts. This may limit the generalizability of findings across different linguistic, cultural, and educational settings. Studies on Arabic, Russian, and other language contexts show that AI-mediated language learning can operate differently depending on linguistic structure, technological availability, and local pedagogical expectations (Al Jamali &

Abdalla, 2025; Sabtan et al., 2024; Sysoyev & Filatov, 2024). Future research should therefore expand beyond English-dominant contexts to produce a more inclusive understanding of AIMC.

Finally, the bibliographic coupling analysis reveals that AIMC research remains fragmented, with many small and disconnected author clusters. This fragmentation suggests that scholars are often working in parallel rather than through sustained collaborative networks. As AIMC involves applied linguistics, educational technology, AI ethics, assessment, teacher education, and language pedagogy, stronger interdisciplinary collaboration is needed. Greater collaboration may help the field develop more coherent theoretical frameworks, shared research agendas, and practical guidelines for the responsible integration of AI in second- and foreign-language learning.

Overall, the discussion shows that AIMC research has moved from early attention to translation technologies toward generative AI, writing support, and broader socio-educational concerns. The field is expanding rapidly, but it still requires stronger theoretical grounding, wider linguistic and geographical coverage, greater attention to oral communication, and clearer pedagogical frameworks for both teaching and assessment. These directions are essential to ensure that AIMC supports language learning in ways that are pedagogically meaningful, ethical, and inclusive.

CONCLUSION

This study mapped the intellectual structure, thematic development, and emerging research gaps in AI-Mediated Communication (AIMC) research on second- and foreign-language learning from 2020 to 2025. Using Scopus-indexed publications and VOSviewer analysis, the study found that AIMC research has grown rapidly, especially in recent years. The findings show that the field is strongly shaped by generative AI, ChatGPT, automated feedback, writing pedagogy, machine translation, and broader socio-educational issues related to AI integration in language education.

The keyword co-occurrence, overlay, density, and bibliographic coupling analyses reveal that AIMC has moved from earlier attention to machine translation and writing-support tools toward more complex discussions of generative AI, human–AI collaboration, AI literacy, teacher readiness, academic integrity, and pedagogical implementation. However, the field remains unevenly developed. Writing-related and text-based AI applications dominate the literature, while speaking and pronunciation development, teacher professional development, assessment redesign, non-English language contexts, and sustained scholarly collaboration remain relatively

underexplored.

These findings have several implications. For researchers, the study highlights the need to expand AIMC research beyond writing and translation toward oral communication, multilingual contexts, assessment practices, and teacher education. For educators, the findings suggest that AI integration should not be limited to tool adoption but should involve critical AI literacy, responsible use, and pedagogically meaningful task design. For institutions and policymakers, the study underscores the need to develop clearer guidelines and professional development programs to support teachers and learners in AI-mediated language learning environments.

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