

PAPER

Interactive Mobile Technologies in Second Language Learning: A Global Bibliometric Mapping

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ABSTRACT

The increasing integration of mobile technologies into language education has attracted growing research attention in second language learning, yet the intellectual structure and thematic evolution of this field remain insufficiently understood. To address this gap, this study conducts a bibliometric analysis of research on mobile technologies in second language learning. A total of 262 articles retrieved from the Web of Science Core Collection (WoSCC) between 2016 and 2025 were included after PRISMA-based screening. Publication trends, citation patterns, collaboration networks, and major research themes were examined using VOSviewer. The results show a steady increase in both publications and citations, indicating growing scholarly interest in mobile-assisted language learning (MALL). The analysis also reveals that research in this area is internationally distributed and shaped by multiple productive countries, institutions, and cross-national collaborations. Four thematic clusters were identified, focusing on mobile applications, speaking and pronunciation development, language learning platforms, and mobile learning design. Overall, these findings map the intellectual structure of the field and show that mobile technologies in second language learning are increasingly associated with learner support, language skill development, digital interaction, and instructional design.

KEYWORDS

mobile technologies, second language learning, mobile-assisted language learning (MALL), bibliometric analysis, thematic structure

1 INTRODUCTION

The rapid advancement of digital technologies has transformed educational practices across many disciplines, including language education. Among these innovations, mobile technologies have become widely used tools supporting learning in both formal and informal contexts. With the global spread of smartphones, tablets, and wireless connectivity, learners can access learning materials and participate in learning activities beyond traditional classroom settings. These developments enable more flexible and continuous learning experiences and provide new opportunities for second

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language learning [1]. Mobile technologies support language learning through applications and platforms that provide vocabulary exercises, pronunciation tools, interactive quizzes, and communication functions for language practice. Previous studies have shown that mobile devices can facilitate language learning activities such as reading and vocabulary development through interactive learning materials [2]–[4].

Within language education research, the concept of mobile-assisted language learning (MALL) has emerged as an important area of study. MALL refers to the integration of mobile devices into language learning activities to support the development of language skills, including vocabulary, speaking, reading, and writing. Research has demonstrated that mobile-assisted learning environments can enhance learners' engagement and vocabulary development through interactive learning activities [5]. In addition, task-based mobile learning approaches have been shown to improve learners' oral production in English as a foreign language [6]. Mobile technologies also enable collaborative learning through communication tools such as messaging applications and online discussion platforms, which facilitate interaction and feedback during language learning processes.

Researchers have also explored the educational potential of different types of mobile learning tools and platforms. Gamified mobile platforms such as Quizizz have been examined in EFL grammar instruction, showing positive learner attitudes, motivation, engagement, perceived usefulness, and satisfaction in mobile-supported grammar learning [7]. Mobile communication tools further enable learners to practice language skills through peer interaction and collaborative activities. For example, messaging applications such as WeChat have been used to support communication in MALL environments [8], while mobile instant messaging platforms can facilitate corrective feedback during language learning processes [9]. In addition, recent technological developments such as chatbots and artificial intelligence (AI) have expanded the capabilities of mobile language learning systems by supporting automated feedback, interaction, and language practice in mobile English teaching contexts [10].

Another research strand focuses on learners' perceptions and attitudes toward MALL environments. Previous studies indicate that learners often view mobile learning as convenient, engaging, and supportive of independent learning. For instance, university students have reported positive perceptions of smartphone-assisted language learning environments [11]. Mobile technologies can also support learner autonomy by allowing individuals to control their learning pace and select learning resources according to their needs. Studies grounded in behavioral and motivational theories have further examined factors influencing learners' adoption and continued use of mobile learning technologies [12]. In addition, research has explored how perceived usefulness and motivational factors affect learners' continuance intention to use language learning applications [13], [14]. Despite these benefits, challenges remain regarding instructional design, technological integration, and pedagogical implementation.

Although research on mobile technologies in language education has grown rapidly [15], the overall development patterns of this study field remain fragmented. Many studies focus on specific learning tools or instructional interventions rather than examining the broader intellectual structure, international collaboration patterns, and thematic evolution of research on mobile technologies in second language learning. Understanding how this study field has evolved, which scholars and institutions contribute most actively, and what research themes dominate the literature is therefore important for identifying future research directions. Bibliometric analysis provides an effective method for examining the development of a research field from a broader perspective [16]. By analyzing large collections of academic publications, bibliometric techniques can reveal patterns of research productivity, citation

impact, and collaboration networks. These methods also allow researchers to visualize relationships among keywords, authors, and institutions, thereby identifying the knowledge structure of a research domain.

Given the rapid expansion of research on mobile technologies in second language learning, a systematic examination of this literature is needed to clarify the development and research focus of the field. Therefore, this study provides a bibliometric analysis of research on mobile technologies in second language learning. Unlike recent bibliometric studies that have examined mobile learning in higher education more broadly [17], this study focuses specifically on mobile technologies in second language learning. It extends existing work by clarifying how mobile applications, mobile devices, language learning platforms, and mobile learning design shape the thematic structure of MALL research. More specifically, it examines how these themes relate to key areas of MALL research, including learner support, language skill development, digital interaction, and pedagogical implementation. To achieve this aim, the following research questions guide the study:

- RQ1.** What are the publication and citation trends in research on mobile technologies in second language learning?
- RQ2.** Which documents, journals, authors, institutions, and countries have the greatest scholarly influence in this research field?
- RQ3.** What are the major research themes and knowledge structures in studies on mobile technologies in second language learning?

2 METHODOLOGY

2.1 Research design

This study adopts a bibliometric analysis of research on mobile technologies in second language learning. Bibliometric analysis is a quantitative method used to analyze academic publications and reveal the development trends and knowledge structure of a research field [18], [19]. With the rapid advancement of mobile technologies, MALL has become an important area of research in second language learning [20]. Therefore, bibliometric analysis can help examine the development of this field and identify its main research characteristics. The purpose of this study is to investigate research trends in mobile technologies in second language learning and identify key research themes in this field. Unlike traditional systematic reviews, bibliometric analysis focuses on the quantitative analysis and visualization of bibliographic data. This approach helps reveal the overall development of a research field and offers guidance for future studies.

2.2 Data source and search strategy

We used the Web of Science Core Collection (WoSCC) database to retrieve the data for this study. WoSCC was selected because it is widely used in bibliometric research and provides standardized citation records, reliable indexing, and detailed bibliographic metadata required for bibliometric mapping. Its records include authors, affiliations, countries/regions, abstracts, keywords, references, and citation information, which are necessary for performance analysis and co-word analysis. In addition, using a single database helped maintain data consistency and reduced duplication caused by differences in indexing formats across databases. All records were retrieved and exported on 15 February 2026. To identify studies related to mobile technologies in second language learning, a topic search (TS) strategy was applied. Boolean operators

(“OR” and “AND”) were used to construct the search query to ensure both the relevance and coverage of the search results. The search query was as follows:

TS = ((“mobile learning” OR “mobile-assisted language learning” OR “MALL” OR “mobile app” OR “mobile technology*” OR “smartphone-based learning”) AND (“second language” OR “second language learning” OR “second language acquisition” OR “second language teaching” OR “second language instruction” OR “L2 learning” OR “L2 teaching” OR “L2 instruction” OR “L2 acquisition” OR “foreign language learning” OR “foreign language teaching” OR “SLA”))*

2.3 Data screening and selection

To ensure the consistency and suitability of the research data, the retrieved records were screened following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework [21], as shown in Figure 1. The process included four stages: identification, screening, eligibility, and inclusion. First, 506 records were identified in the WoSCC, and a total of 96 publications outside the selected time range of 2016–2025 were removed. Next, the remaining 410 records were screened by document type, and 132 non-research article types were excluded. After screening by publication year and document type, the remaining 278 records were assessed according to the inclusion and exclusion criteria. Sixteen publications were excluded because they were unrelated to second or foreign language learning, did not include a clear mobile technology component, focused on first-language literacy or general education, or lacked sufficient bibliographic information. Finally, 262 publications were included in the bibliometric analysis. The detailed screening process is presented in Figure 1. These screening decisions were made according to the predefined criteria to improve the transparency and reproducibility of the dataset.

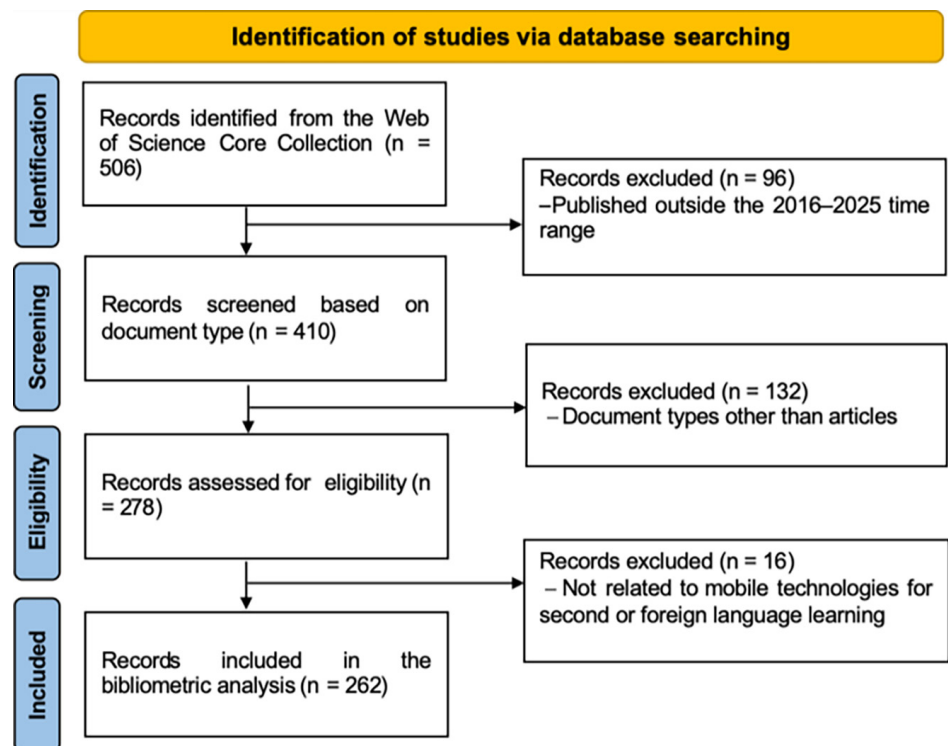


Fig. 1. PRISMA flowchart

Source: Adapted from Page et al. [21].

2.4 Bibliometric analysis tools and techniques

This study used VOSviewer (version 1.6.20) to conduct bibliometric analysis and visualize the retrieved publication data. VOSviewer is widely used in bibliometric research because it can construct and display networks among bibliographic elements, such as authors, institutions, countries, and keywords. Two main analytical approaches were applied: performance analysis and co-word analysis. Performance analysis was used to examine the overall development of the field, while co-word analysis was used to identify major research themes and emerging topics. For the keyword co-occurrence network, the minimum occurrence threshold was set at 8 to balance coverage and interpretability. Lower thresholds produced fragmented and less interpretable networks, whereas higher thresholds excluded some relevant keywords. Thematic clusters were generated based on keyword co-occurrence patterns in VOSviewer. The interpretation and labeling of clusters were not based solely on the software output. Instead, the authors examined the high-frequency keywords and co-occurrence relationships within each cluster. Cluster labels were then assigned according to the dominant concepts reflected by the core keywords in each cluster. This procedure helped ensure that the thematic labels were analytically grounded and accurately reflected the intellectual structure of the field.

3 RESULTS

3.1 Descriptive overview of the field

As illustrated in Figure 2, scholarly research on mobile technologies in second language learning has shown consistent growth over the last decade. The dataset analyzed in this study covers publications from 2016 to 2025, demonstrating increasing academic attention toward MALL and smartphone-supported language instruction. Throughout this period, both the number of publications and citation counts have progressively increased, reflecting the expanding interest of researchers in integrating mobile technologies into second language education. These trends indicate that mobile learning research has moved beyond its initial exploratory phase and is gradually developing into a more established and visible area within the field of language education research.

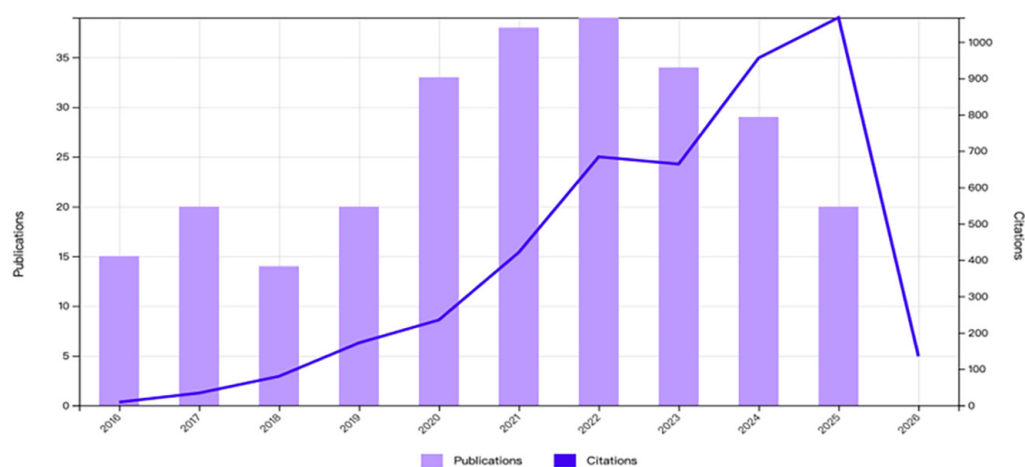


Fig. 2. Annual publications and citations

Source: WoS database.

Table 1 presents the main bibliometric indicators derived from the WoSCC dataset. The analysis includes 262 publications ($n = 262$), which together received 4,457 citations from 3,316 citing articles. When self-citations are excluded, the dataset still records a considerable citation impact, with 4,202 citations generated from 3,198 citing articles. The average citation rate is 17.01 citations per publication, while the H-index of 38 suggests the presence of multiple highly cited studies within the dataset. These indicators outline the overall citation performance of the retrieved publications and provide a quantitative foundation for the bibliometric analyses that follow.

Table 1. General bibliometric indicators

Metric	Value (2016 to 2025)
Total publications	$n = 262$
Total citing articles	3,316 (3,198 excluding self-citations)
Total citations	4,457 (4,202 excluding self-citations)
Average citations per item	17.01
H-index	38

Source: WoS database.

3.2 Leading documents shaping the field

Table 2 shows the ten most frequently cited publications related to mobile technologies in second language learning. Among them, Loewen et al. [22] is the most influential study with 186 citations, followed by Lee [23] with 89 citations and Chen et al. [24] with 84 citations. Other notable contributions include Ma [25], Andujar [26], and Chen et al. [27], each receiving more than 80 citations. These highly cited studies commonly examine the use of mobile devices, language learning applications, and instant messaging tools in language education. They focus on learning outcomes such as vocabulary acquisition, writing development, learner perceptions, and speaking performance. The prominence of these studies reflects the growing importance of MALL in second language education and points to their contribution to shaping the field's intellectual base.

Table 2. Top 10 most cited documents

Author	Titles	Cites
Loewen et al. [22]	Mobile-assisted language learning: A Duolingo case study	186
Lee [23]	Informal digital learning of English and second language vocabulary outcomes: Can quantity conquer quality?	89
Chen et al. [24]	The effects of using mobile devices on language learning: a meta-analysis	84
Ma [25]	A multi-case study of university students' language-learning experience mediated by mobile technologies: a socio-cultural perspective	83
Andujar [26]	Benefits of mobile instant messaging to develop ESL writing	81
Chen et al. [27]	Effects of a mobile game-based English vocabulary learning app on learners' perceptions and learning performance: A case study of Taiwanese EFL learners	81

(Continued)

Table 2. Top 10 most cited documents (*Continued*)

Author	Titles	Cites
Xu and Peng [28]	Investigating mobile-assisted oral feedback in teaching Chinese as a second language	76
Klimova [29]	Mobile phones and/or smartphones and their apps for teaching English as a foreign language	75
Zou et al. [30]	Supporting Speaking Practice by Social Network-Based Interaction in Artificial Intelligence (AI)-Assisted Language Learning	71
Nicolaidou et al. [31]	Comparing immersive Virtual Reality to mobile applications in foreign language learning in higher education: a quasi-experiment	69

3.3 Key journals serving as primary publication outlets

Table 3 shows the most cited journals in research on mobile technologies in second language learning, while Figure 3 visualizes the citation network of sources using VOSviewer. *Computer Assisted Language Learning* leads the field with 560 citations across 19 publications, followed by *ReCALL* (n = 8; 392 citations) and *Education and Information Technologies* (n = 12; 301 citations), both of which also show strong citation performance. Notably, *Computer Assisted Language Learning* occupies a central position in the network, with extensive links to journals across different clusters, reflecting its role in connecting research from different areas. In contrast, journals such as *International Journal of Emerging Technologies in Learning* and *Arab World English Journal* show relatively lower citation counts and appear more peripheral in the network. Overall, the network appears to be well connected but remains organized into distinct citation clusters, with several specialized journals occupying prominent positions.

Table 3. Top 10 most cited journals

Rank	Journals	Documents	Citations
1	<i>Computer Assisted Language Learning</i>	19	560
2	<i>ReCALL</i>	8	392
3	<i>Education and Information Technologies</i>	12	301
4	<i>Language Learning & Technology</i>	11	246
5	<i>Interactive Learning Environments</i>	6	206
6	<i>Sustainability</i>	5	175
7	<i>System</i>	5	135
8	<i>International Journal of Emerging Technologies in Learning</i>	7	111
9	<i>Frontiers in Psychology</i>	7	103
10	<i>Arab World English Journal</i>	5	58

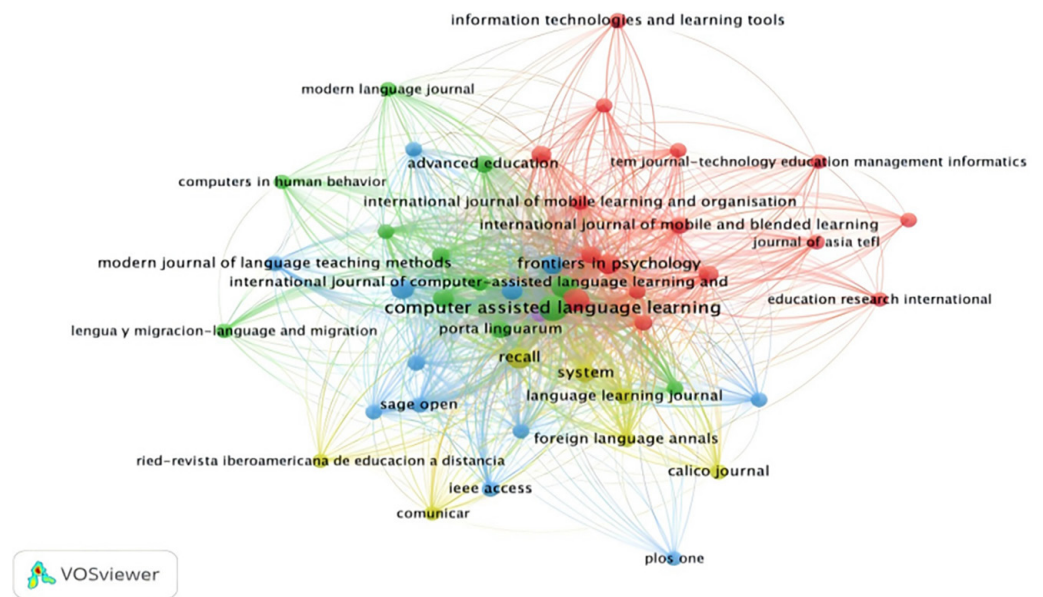


Fig. 3. Citation network of sources (VOSviewer visualization)

3.4 Core authors driving the research agenda

Table 4 lists the most cited authors in research on mobile technologies in second language learning. Figure 4 illustrates the author collaboration network generated using VOSviewer. Among them, Loewen, Shawn ($n = 4$; 285 citations) exhibits the highest citation impact. Isbell, Daniel R. ($n = 2$; 237 citations) is another key contributor, followed by Klimova, Blanka ($n = 5$; 177 citations), who demonstrates the highest level of publication productivity. Other key contributors include Andujar, Alberto ($n = 3$; 157 citations) and Ma, Qing ($n = 4$; 136 citations), whose studies have significantly advanced research on MALL. The collaboration network further indicates that these scholars are connected through cooperative relationships, forming several clusters of active researchers. This network structure suggests that the research landscape is shaped by multiple interacting author groups whose collaborative efforts contribute to the continued development of MALL research.

Table 4. Top 10 most cited authors

Rank	Authors (Year)	Documents	Citations
1	Loewen, Shawn	4	285
2	Isbell, Daniel R.	2	237
3	Klimova, Blanka	5	177
4	Andujar, Alberto	3	157
5	Ma, Qing	4	136
6	Munday, Pilar	2	117
7	Fouz-González, Jonás	3	111
8	Peng, Hongying	2	94
9	Viberg, Olga	3	78
10	Zou, Di	2	77

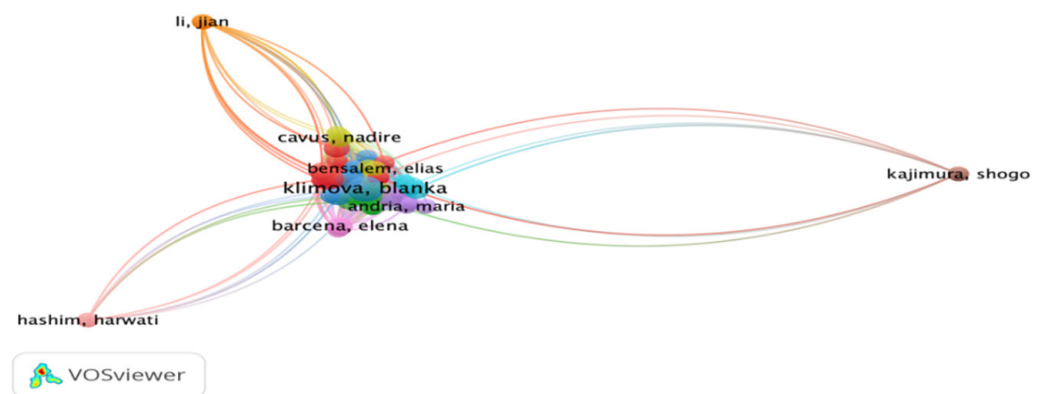


Fig. 4. Author collaboration network (VOSviewer visualization)

3.5 Institutions acting as central research hubs

Table 5 displays the most cited institutions in research on mobile technologies in second language learning. Figure 5 illustrates the institutional collaboration network generated using VOSviewer. Michigan State University ($n = 4$; 285 citations) ranks first in citation impact, followed by the Education University of Hong Kong ($n = 10$; 274 citations) and the University of Hradec Králové ($n = 5$; 177 citations). Other highly cited institutions include the University of Almería ($n = 4$; 173 citations) and the University of Murcia ($n = 5$; 156 citations). The collaboration network further illustrates that these institutions are connected through research partnerships that form several institutional clusters. This pattern suggests that the development of research on MALL is supported by multiple institutional centers distributed across different regions.

Table 5. Top 10 most cited institutions

Rank	Organizations	Documents	Citations
1	Michigan State University	4	285
2	Education University of Hong Kong	10	274
3	University of Hradec Králové	5	177
4	University of Almería	4	173
5	University of Murcia	5	156
6	Ministry of Education	4	129
7	Near East University	7	110
8	Prince Sattam bin Abdulaziz University	4	87
9	Open University	5	75
10	Nanyang Technological University	4	74

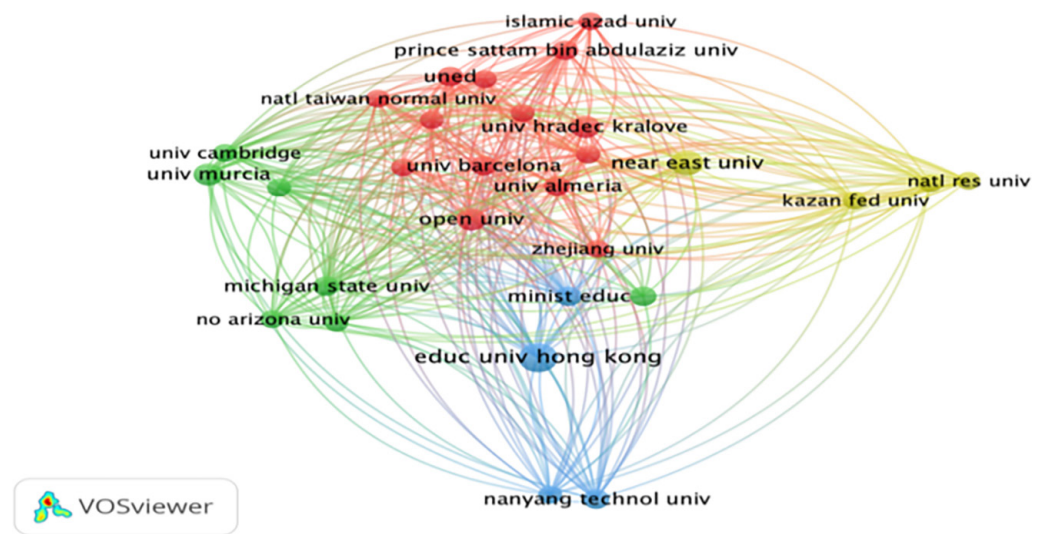


Fig. 5. Institutional collaboration network (VOSviewer visualization)

3.6 Countries contributing dominant scholarly influence

Table 6 summarizes the most productive countries in research on mobile technologies in second language learning, while Figure 6 presents the country collaboration network generated using VOSviewer. China ($n = 61$; 1,255 citations) ranks first in both publication output and citation impact, indicating its leading position in this field of research. It is followed by the United States ($n = 34$; 1,009 citations) and Spain ($n = 30$; 494 citations), both of which also demonstrate strong research productivity and visibility. Several other countries, including Saudi Arabia, Turkey, and the United Kingdom, also contribute actively to this area. This distribution indicates that research on mobile-assisted second language learning is internationally distributed rather than concentrated in a single region. The collaboration network further reveals that knowledge production in this area is shaped by multiple international hubs and cross-national linkages.

Table 6. Top 10 most cited regions

Rank	Regions	Documents	Citations
1	China	61	1255
2	USA	34	1009
3	Spain	30	494
4	Saudi Arabia	15	328
5	Turkey	14	298
6	Czech Republic	6	178
7	Iran	12	171
8	Australia	11	165
9	UK	13	157
10	South Korea	6	154

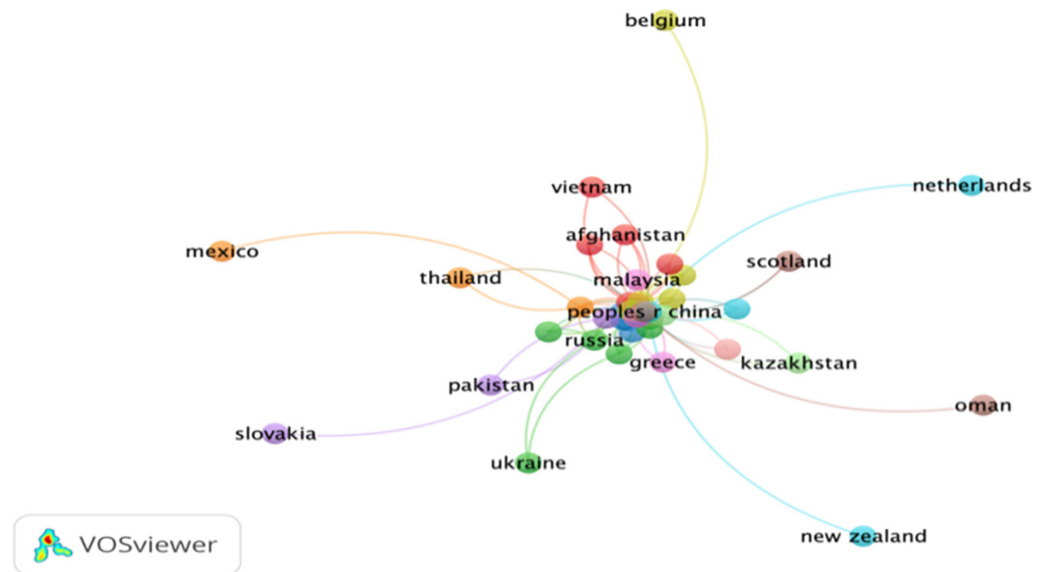


Fig. 6. Country collaboration network (VOSviewer visualization)

3.7 Keyword co-occurrence and thematic clustering

Figure 7 presents the co-word network visualization generated using VOSviewer, while Table 7 summarizes the clustering results. In the network, node size represents keyword frequency, links indicate co-occurrence relationships, and colors denote different thematic clusters. The visualization shows that MALL and mobile learning occupy central positions, highlighting their importance in the research field. Other keywords, such as learners, performance, pronunciation, vocabulary, and devices, are closely connected, indicating that mobile technologies are widely studied in relation to language learning outcomes. Four major thematic clusters were identified.

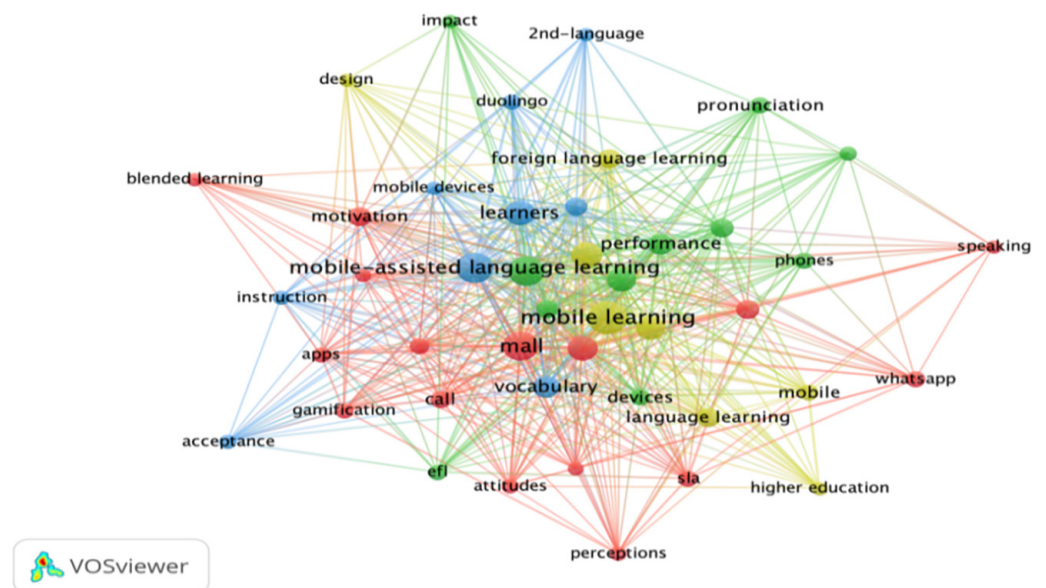


Fig. 7. Co-word network (VOSviewer visualization)

Cluster 1 (Red), identified as “Mobile Apps in Language Learning,” comprises 16 keywords and focuses on the pedagogical use of mobile applications in language learning. Key terms include MALL, vocabulary learning, motivation, apps, and perceptions. These keywords suggest that many studies examine how mobile applications support vocabulary acquisition and learner motivation. Research in this cluster also explores learners’ experiences and perceptions of MALL environments [32], [33]. This cluster reveals that mobile apps have become a central strand of mobile-assisted second language learning research, with a strong focus on personalized vocabulary practice, learner motivation, and autonomous learning.

Cluster 2 (Green), termed “Mobile Devices for EFL Speaking and Pronunciation,” contains 11 keywords and reflects research on mobile-supported oral language development. Keywords such as performance, devices, pronunciation, and EFL indicate the main focus of this cluster. Studies frequently investigate how mobile devices may support pronunciation accuracy and speaking performance in EFL contexts. These findings highlight the potential of mobile technologies for supporting oral communication skills [34], [35]. This cluster shows that research on mobile devices has expanded from general technology use to the support of oral language development. In particular, it highlights repeated pronunciation practice, feedback, and flexible speaking activities beyond the classroom.

Cluster 3 (Blue), designated as “Mobile Language Learning Platforms in SLA,” consists of 9 keywords and reflects growing interest in digital platforms for second language learning. Keywords include SLA, Duolingo, learners, and instruction. These terms highlight the role of language learning platforms in this study area. Studies in this cluster often examine how such platforms support language instruction and facilitate second language learning processes [36], [37]. This cluster indicates that mobile language learning platforms are becoming an important instructional environment in SLA research. These platforms provide structured, app-based, and self-paced opportunities for second language learning.

Cluster 4 (Yellow), referred to as “Mobile Learning Design in Language Education,” includes 8 keywords and focuses on the design and integration of mobile technologies in language education. Representative terms include mobile learning, technology, language learning, design, and higher education. These keywords indicate that research in this cluster explores how mobile learning environments are structured and implemented in educational contexts. Many studies particularly address the integration of mobile learning in higher education settings [38], [39]. This cluster highlights a broader shift from viewing mobile technologies as isolated learning tools to examining how mobile learning can be pedagogically designed, integrated, and sustained in formal language education. Overall, these clusters suggest that mobile-assisted second language learning research has become more diversified. Rather than focusing mainly on mobile apps and vocabulary learning, the field now also addresses oral language development, platform-based instruction, and pedagogical design.

Table 7. Co-word analysis of mobile technologies in language learning

Clusters	Labels	Keywords	Rep Keywords	Occurrences
1 (Red)	Mobile Apps in Language Learning	16	Mobile-Assisted	39
			Language Learning	
			Vocabulary Learning	21
			Motivation	15
			Apps	10
2 (Green)	Mobile Devices for EFL Speaking and Pronunciation	11	Perceptions	9
			Mobile Assisted	38
			Language Learning	
			Performance	18
			Devices	12
3 (Blue)	Mobile Language Learning Platforms in SLA	9	Pronunciation	12
			EFL	10
			SLA	11
			Duolingo	10
			Learners	10
4 (Yellow)	Mobile Learning Design in Language Education	8	Instruction	9
			MALL	9
			Mobile Learning	46
			Technology	25
			Language Learning	15
			Design	8
			Higher Education	8

4 DISCUSSION

Based on the bibliometric results, several notable developments can be observed in research on mobile technologies in second language learning. With the widespread adoption of mobile devices and digital learning environments worldwide, mobile technologies have received increasing attention in language education research, and MALL has developed into an important area of technology-enhanced language education [40]. The thematic patterns identified in this study suggest that recent research is paying greater attention to the role of mobile technologies in supporting language learning processes and pedagogical practices, rather than viewing them merely as instructional tools. This may reflect a broader shift toward more flexible, interactive, and technology-mediated learning environments. Specifically, these findings suggest that interactive mobile technologies are increasingly discussed in relation to learner-centred design, flexible implementation, digital interaction, and mobile-supported language practice in second language learning. Previous studies suggest that smartphones and mobile applications expand access to language learning resources beyond the classroom [41]. These broader developments are also reflected in the reviewed literature, where mobile applications and digital platforms are frequently discussed in relation to vocabulary development, speaking practice, and learner engagement [42].

Beyond these thematic developments, the geographical distribution of research also reflects an important feature of the field. Research output is concentrated mainly in countries with relatively strong digital infrastructure and more mature applications of educational technology. The prominence of China, the United States, and Spain in both publication output and citation impact may, to some extent, reflect the

influence of research investment, technological support, and international academic exchange. Meanwhile, the cross-national collaboration network suggests that this field is not limited to a few individual countries, but is associated with visible knowledge connections across different national and regional contexts. However, this distribution also points to an imbalance in the literature. Research from countries and regions with weaker digital infrastructure or fewer international publication resources may remain less visible in the WoS-indexed literature. The thematic results also suggest that existing studies have focused mainly on mobile applications, vocabulary learning, speaking practice, and learner engagement. In contrast, issues such as long-term implementation, teacher support, curriculum integration, and equity of access appear to have received less attention. These gaps suggest that future research should examine not only the effectiveness of mobile technologies, but also how MALL can be sustainably implemented across diverse educational contexts. On the whole, research on mobile technologies in second language learning is expanding in thematic scope and international reach, although important gaps remain in regional representation, long-term implementation, and equitable access.

4.1 Theoretical implications

The findings of this study provide several theoretical implications for research on mobile technologies in second language learning. First, the findings indicate that MALL is increasingly discussed as more than the use of mobile tools and is positioned as an important research area within technology-enhanced language education. This pattern suggests a growing research emphasis on participation, interaction, and learner autonomy, all of which are central to constructivist learning theory [43]. In particular, recent studies increasingly discuss how mobile technologies may support more active engagement with language learning tasks and interaction with digital learning resources [44]. Second, the thematic structure identified in this study offers a broader way of understanding research on MALL. Although the specific technologies, teaching settings, and learner groups may differ across educational contexts, the reviewed literature commonly addresses several recurring dimensions: learning support, language skill development, digital interaction, and instructional design [45], [46]. In other words, these four dimensions appear to reflect not the functions of any single tool, but recurring pedagogical concerns in MALL research across national, regional, and institutional contexts. As such, this perspective may help explain the connections among existing research themes and offer a broader conceptual basis for understanding MALL across different educational systems and international settings. Theoretically, these dimensions help illustrate how recent MALL research has been organized around issues of learning support, language skill development, digital interaction, and instructional design.

4.2 Practical implications

The findings of this study also offer several practical implications for language education. As mobile technologies are increasingly discussed in contemporary language learning research, educators may integrate mobile applications and digital platforms according to specific pedagogical purposes [47]. Rather than focusing on particular tools, these findings highlight several practical areas for the use of mobile technologies, including learning support, language skill development,

digital interaction, and instructional design. This means that teachers can select and integrate mobile technologies according to pedagogical purposes rather than technological novelty alone.

For example, teachers may design mobile-supported activities such as vocabulary practice through language learning applications, pronunciation exercises using speech-recognition tools, or collaborative discussions through mobile communication platforms [48]. These approaches may help extend learning beyond the classroom, support ongoing language practice, and encourage more active learner engagement. In addition, digital platforms may facilitate communication, feedback, and collaborative learning among students, thereby enriching language learning experiences [49]. These practical implications may also be adaptable across contexts. Schools and institutions may differ in terms of resources, technological access, and learner needs. Even so, mobile-supported language teaching may be adapted by focusing on several broad areas of practice, namely supporting learning activities, developing language skills, promoting interaction, and aligning technology use with instructional design.

4.3 Limitations and future research

This study has several limitations that should be acknowledged. First, the dataset was derived solely from the WoSCC. Although WoSCC is widely used in bibliometric research and provides standardized citation records, the use of a single database may have limited the coverage and representativeness of the findings. Relevant publications indexed in other databases, such as Scopus and Dimensions, may not have been included. Therefore, the findings should be interpreted as a bibliometric map of WoSCC-indexed research rather than a complete representation of all research on mobile technologies in second language learning. Second, this study relied primarily on bibliometric methods to analyze publication trends, collaboration networks, and research themes. While these methods are effective in revealing the intellectual structure of a research field, they provide limited insights into the methodological characteristics and empirical findings of individual studies. In addition, the analysis focused on publications from 2016 to 2025, which may not fully capture earlier developments in MALL research. Future studies may therefore consider incorporating multiple databases, extending the temporal scope of analysis, and combining bibliometric approaches with systematic reviews or content analyses. Such efforts would contribute to a more comprehensive understanding of the role of mobile technologies in supporting second language learning across diverse educational contexts and language skills.

5 CONCLUSION

This study provides a comprehensive bibliometric overview of research on mobile technologies in second language learning and offers a systematic understanding of the development of this field. By examining publication trends, influential contributions, collaboration patterns, and thematic structures, the study suggests that research on MALL has grown steadily and has become increasingly international in its research scope and collaborative connections. The findings also offer a broader understanding of MALL through several recurring dimensions, including learning support, language skill development, digital interaction, and instructional design. Overall, this study identifies major patterns in recent MALL research and provides a

basis for understanding how the field has developed in relation to pedagogical and technological change.

6 ETHICS STATEMENT

This study used only publicly available bibliographic records retrieved from academic databases. No human participants were involved in the data collection or analysis. Therefore, ethical approval and informed consent were not required.

7 DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

The authors used AI-assisted tools solely for language refinement, clarity improvement, and grammar correction. The authors carefully reviewed and revised all AI-assisted outputs and take full responsibility for the final manuscript.

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