



The role of e-books in language learning: A bibliometric analysis

**Sari Rakhmawati¹, Setiawan Edi Wibowo¹, Aditya Dwi Hanggara², Shakila Che Dahalan³,
Hafizhah Rahmiati Auliya¹, Ika Susianti¹**

¹Department of Primary Education, Universitas Negeri Yogyakarta
Colombo Street No 1, Karangmalang Yogyakarta 55281, Indonesia

²Sekolah Indonesia Jeddah
5415 Az-Zilaq Street in the Al Rehab District of Jeddah, Saudi Arabia

³Department of History, Universiti Pendidikan Sultan Idris
35900 Tanjong Malim, Perak Darul Ridzuan, Malaysia

*Corresponding Author. E-mail: sarirakhmawati.2023@student.uny.ac.id

Received: 2 June 2025; Revised: 24 June 2025; Accepted: 7 May 2026

Abstract: Technological advancements have facilitated access to electronic books (e-books), which are increasingly used as language learning media due to their interactive multimedia features. This study aims to map the development of research on e-books in language learning. Data were collected from the Scopus database using predefined search strings and analyzed using bibliometric techniques with the Bibliometrix package. The findings reveal that the literature is primarily centered on themes of reading literacy and the integration of educational technology, with e-books playing a significant role in enhancing reading comprehension and learner motivation. The results also indicate that research output is predominantly contributed by developed countries, particularly China, the United States, and Japan, supported by strong institutional funding, while international collaboration remains relatively limited. This study contributes by providing a comprehensive overview of publication trends, collaboration networks, and dominant research themes in the field of e-books for language learning, as well as identifying research gaps that may inform future studies and encourage stronger global research collaboration.

Keywords: bibliometric analysis, electronic books (e-books), digital literacy, language learning

How to Cite: Rakhmawati, S., Wibowo, S. E., Hanggara, A. D., Dahalan, S. C., Auliya, H. R., & Susanti, I. (2026). The role of e-books in language learning: A bibliometric analysis. *Jurnal Prima Edukasia*, 14(2), 285-306. DOI: <https://doi.org/10.21831/jpe.v14i2.86080>



Introduction

Technological advancement has significantly transformed educational practices across disciplines. Among these innovations, electronic books (e-books) emerge as a digital format offering more accessible and higher-quality information than traditional print media (Amirtharaj et al., 2023; Bresó-Grancha et al., 2022; Santoso et al., 2018; Yuan et al., 2018). E-books are increasingly popular as learning resources due to their support for more interactive and flexible learning environments. Their multimedia features, such as animations, videos, and interactive quizzes, enhance learner engagement and comprehension (Désiron et al., 2025; Herianto et al., 2022). These features are widely integrated into instructional content. Zhang et al. (2020) reported that such interactive elements, including multimedia, feedback, gamification, and personalization, are commonly applied in e-book-based language learning and have a positive impact on language learning outcomes. This suggests that e-books can enhance the learning experience and support learners' competence development across various educational contexts.

In the context of language learning, the use of e-books has also gained considerable attention. Several studies have found that e-books are frequently employed in foreign language instruction, particularly in teaching English (Chen et al., 2023; Almadhi & Alanazi, 2024; Xodabande & Hashemi,

This is an open access article under the [CC-BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.



2023). Research on the use of e-books in language learning has shown a steady increase, particularly in studies focusing on early age groups, such as preschool and primary school students, as well as those in higher education (Almadhi & Alanazi, 2024; R. Zhang et al., 2020). In line with this view, Saptono (2023) noted that the use of e-books in primary school learning activities has a positive impact on students' cognitive learning outcomes. These studies often employ guided learning strategies, with reading skills as the primary instructional focus, an approach supported by the development of illustrated story books which effectively enhance both beginning reading skills and learner motivation (Utomo, 2018). Another finding by Alice Chen et al. (2023) revealed that in studies on e-books for English as a Foreign Language (EFL) learning, three key areas of focus are reading comprehension, learning strategies, and student engagement. Numerous studies have demonstrated the positive impact of e-book use in supporting vocabulary acquisition, text comprehension, and overall student learning behavior (Day et al., 2025; Egert et al., 2022; Zhu et al., 2024). This effectiveness is further evidenced in the application of innovative formats such as digital pop-up books, which have been shown to significantly improve learning outcomes in elementary education (Ayuningtyas & Widodo, 2026).

The use of e-books in language learning naturally integrates digital literacy. Within the framework of language education, digital literacy encompasses not only basic technical skills but also the ability to leverage the affordances of digital media, which open up “new ways of doing, making meaning, connecting, thinking, and being” for learners (Jones, 2022; Zaidi & Sah, 2024). In this context, students are required to navigate features such as hyperlinks, multimedia (audio/video), and digital annotations within e-books, thereby sharpening their digital literacy competencies as part of the learning process (Jati & Purwati, 2024). The mastery of these digital competencies is inherently tied to the enhancement of reading literacy, ensuring students can effectively comprehend and engage with texts in a digitized learning environment (Dayu & Setyaningsih, 2022). Vorobel et al. (2021) found that language learners search for and evaluate digital texts based on their relevance, credibility, appeal, language quality, and usefulness to the learning community. This indicates that engaging with e-books requires digital literacy skills such as the use of search tools and the evaluation of online sources. In other words, e-books serve as practical tools for developing students' digital literacy, particularly when the reading materials follow a process-based design approach to facilitate comprehension (Irawan, 2017), as they learn to filter digital information and utilize interactive e-book features to support foreign language comprehension (Alakrash & Razak, 2021; Egert et al., 2022; López-Escribano et al., 2021).

The cognitive approach to learning emphasizes internal mental processes such as perception, memory, and comprehension that occur as individuals interact with learning materials. Reading activities can foster interest and motivation in both the reader and their environment. It is evident, therefore, that reading requires goal-directed mental activity to capture and understand the ideas embedded behind every symbol (Wahyuningsih & Kiswaga, 2019). In the context of reading, cognitive theory examines how text is processed in the brain (Craig & Lockhart, 1972; Sridhar et al., 2023; Suggate & Lenhard, 2022). Cognitively, instructional media should be designed to minimize extraneous cognitive load so that learners can concentrate on processing essential information, for example, through the structured presentation of multimedia (de Jong, 2010; Mayer & Moreno, 2003; Skulmowski & Xu, 2022a; Sweller, 2005).

To gain a comprehensive understanding of this domain, a bibliometric study is essential. While bibliometric methods are well-suited for mapping fragmented scientific fields (Aria & Cuccurullo, 2017), their application in the specific intersection of e-books and language learning remains fragmented. Most existing reviews tend to focus narrowly on pedagogical outcomes (Alice Chen et al., 2023) or digital reading habits in general (Yu et al., 2023), often overlooking the structural dynamics of the research field itself. Specifically, there is a lack of longitudinal analysis that tracks how research themes have evolved over decades and a significant void in understanding how institutional funding (sponsorship) shapes the global research agenda. This creates a critical gap: without mapping the synergy between collaboration networks, funding patterns, and thematic shifts, the trajectory of e-book integration in language education remains poorly understood.

Table 1. Previous Studies

Author	Value Added by the Study	Limitations/Gaps
Alice Chen et al. (2023)	This study recommends the development of e-book features that support EFL instruction, with future research focusing on pedagogical aspects and feature innovation.	Focused only on pedagogical aspects; lacks analysis of funding and global collaboration.
Yu et al. (2023)	This study provides valuable insights into the development of digital reading, with implications for publishers, researchers, librarians, educators, and teachers.	Broad digital reading focus; not specific to language learning linguistics; data coverage is older.
Present Study	Global research landscape (2002-2025).	Comprehensive analysis including funding (sponsorship), thematic evolution, and policy-oriented recommendations.

This study addresses these gaps by providing a multi-dimensional bibliometric analysis of e-book research in language learning, with three distinct points of novelty. First, unlike previous reviews, this study provides the most current data coverage by including publications through late 2025, capturing the post-pandemic surge in digital education. Second, it expands the analytical scope beyond simple keyword mapping to include an investigation of research sponsorships and cross-country collaboration networks, revealing the socio-economic drivers of scientific production. Third, it utilizes thematic evolution mapping to visualize the transition from basic technical adoption to complex pedagogical integration. The findings are intended not only to identify research gaps for future scholars but also to provide strategic policy recommendations for digital curriculum development and institutional investment in language learning technologies

Methods

This study employed bibliometric analysis and science mapping to investigate the literature on the role of e-books in language learning. The bibliometric approach was chosen for its ability to provide a systematic and objective review of a vast body of literature. The workflow of the bibliometric analysis followed the standard stages outlined by Zupic & Čater (2015): (1) study design, defining the research questions and the analysis period (2002–2025); (2) data collection, constructing search queries and selecting the appropriate database; (3) data analysis, calculating bibliometric indicators; (4) visualization, mapping the results using graphical or network-based representations; and (5) interpretation, contextualizing the findings within the relevant body of knowledge. These steps were designed to meet the requirements of a structured and quantitatively grounded literature review.

Data analysis was conducted using the bibliometrix package in the R environment, an open-source tool specifically developed for bibliometric analysis and science mapping. The package supported the entire bibliometric workflow, including importing and converting publication data into R data frames, conducting descriptive analyses, and constructing citation and collaboration networks. R provides comprehensive statistical algorithms and integrated visualization tools, making it suitable for processing large bibliographic datasets. Using bibliometrix, this study calculated quantitative indicators, including the annual number of publications, country-level productivity, and major funding sponsors. It also generated collaboration networks among authors and thematic maps of the research field. The resulting tables and figures were produced using the relevant functions available in the bibliometrix package.

Publication data were retrieved from the Scopus database, which was recognized as one of the most curated and high-quality citation data sources (Baas et al., 2020). The literature search was conducted using keywords related to e-books and language learning (see Table 2), covering the publication period from 2002 to 2025 (until March). A total of 388 documents were obtained from the search. No limitations were applied at this stage, although preprint articles were excluded from the dataset. All bibliographic data were then exported in a format readable by the analysis software (comma-separated values, CSV format).

Table 2 illustrated the list of keywords and their variants used in the search process. Furthermore, Table 3 detailed two sets of Boolean search strings used for literature retrieval: Set 1 included terms

related to e-books, while Set 2 consisted of terms associated with language learning. Set 1 and Set 2 were combined using the AND operator to ensure that the search results encompassed both aspects.

Table 2. List of Keywords and Their Variants

Category	Type	Keywords
Ebook	Main	ebook, "electronic book", "digital book"
	Synonyms and Variations of Writing	"e-book", eTextbook, "online book", "virtual book"
	Educational Context	"educational ebook", "learning materials in ebook format", "ebooks in education"
	Context of Technology and Media	"digital resources", "technology-mediated books"
Language Learning	Main	"language learning", "language teaching", "language acquisition"
	Synonyms and Variations	"foreign language learning", "second language acquisition", "linguistic learning", "multilingual learning"
	Context of Language Skills	"vocabulary acquisition", "grammar learning", "reading comprehension", "speaking skills", "writing skills"
	Digital Context	"digital tools for language learning", "online language education", "virtual language learning"

Refer to Table 3, which presented two sets of Boolean search strings used for the literature retrieval process: Set 1 included terms related to e-books, while Set 2 consisted of terms associated with language learning.

Table 3. Boolean Search Strings for Literature Retrieval

Set	Boolean String
1	ebook OR "electronic book" OR "digital book" OR "e-book" OR eTextbook OR "online book" OR "virtual book" OR "educational ebook" OR "learning materials in ebook format" OR "ebooks in education" OR "digital resources" OR "technology-mediated books"
2	"language learning" OR "language teaching" OR "language acquisition" OR "foreign language learning" OR "second language acquisition" OR "linguistic learning" OR "multilingual learning" OR "vocabulary acquisition" OR "grammar learning" OR "reading comprehension" OR "speaking skills" OR "writing skills" OR "digital tools for language learning" OR "online language education" OR "virtual language learning"

Note: Set 1 and Set 2 were combined using the AND operator to ensure that the search results encompassed both aspects, namely terms related to e-books and terms related to language learning.

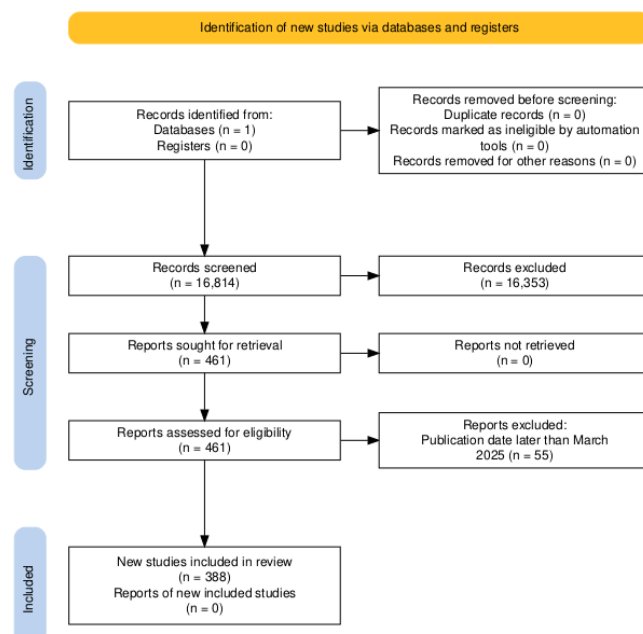


Figure 1. PRISMA Flow Diagram

Results and Discussion

Results

Descriptive Analysis

Annual Publication Distribution

The graph presented in Figure 2 illustrates the trend in the number of publications per year during the period 2002–2025. It shows a sharp increase in publications beginning in the early 2010s. Over the analyzed period, a total of 388 documents were recorded, with the highest peak occurring in 2024, reaching approximately 59 publications. This significant rise indicates a growing research interest in the use of e-books for language learning in recent years.

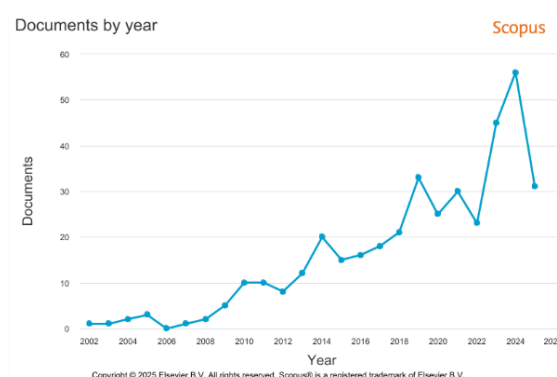


Figure 2. Year-Wise Distribution of Documents (Source: Scopus)

Publication Distribution by Country

Figure 3 illustrates the number of documents based on the authors' country affiliations. The United States emerges as the most productive country (approximately 70 documents), followed by Taiwan (~50), China (~30), Japan, Spain, Indonesia, the United Kingdom, Russia, Australia, and South Korea. These results indicate a concentration of research output primarily in the U.S. and several countries in Asia and Europe. Notably, Indonesia also appears as a significant contributor, ranking among the most productive countries in this research domain.

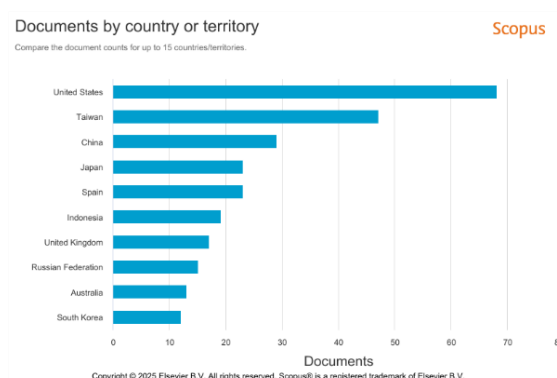


Figure 3. Country-Wise Distribution of Documents (Source: Scopus)

Major Research Sponsors

The analysis of research sponsorship reveals the most frequently acknowledged funding institutions. The Ministry of Science and Technology, Taiwan ranks at the top, followed by the Japan Society for the Promotion of Science (JSPS) and the New Energy and Industrial Technology Development Organization (Japan). Other prominent institutions include the Institute of Education Sciences (USA) and the U.S. Department of Education. This pattern is illustrated in Figure 4, which compares the number of documents associated with each major sponsor.

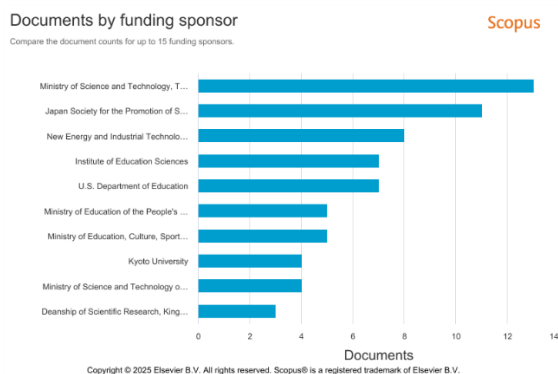


Figure 4. Sponsorship (Source: Scopus)

Science Mapping

The science mapping conducted in this study encompasses various bibliometric and co-word analyses. The bibliometric analysis includes: globally most-cited documents; authors (most relevant authors, author productivity over time, local impact based on the H-index, collaboration networks, and co-authorship analysis); affiliations (most relevant institutions and their productivity over time); and countries (corresponding author countries and most-cited countries). In addition, co-word analysis was carried out to identify the most relevant terms, generate a word cloud, trace trending topics, and map co-word networks.

Globally Most-Cited Documents

Figure 5 presents the ten most-cited documents in the bibliometric review of the role of e-books in language learning. The most highly cited article is Krcmar & Cingel (2014) in *Media Psychology* with 150 citations, followed by Jeong (2012) in *The Electronic Library* with 139 citations. Danaei et al. (2020) in *Computers & Education* has received 102 citations, while N.-S. Chen et al. (2011), also published in *Computers & Education*, recorded 85 citations. Song (2008) in *RECALL* obtained 80 citations, and Owston et al. (2009) in *Computers & Education* garnered 75 citations. More recent contributions include Rowe (2018) in *The Reading Teacher* with 71 citations and Wu & Chen (2018) in *Computers & Education* with 57 citations. Two additional studies by Palacios Hidalgo et al. (2020) in *Technology, Knowledge and Learning* and Vázquez-Cano (2012) in *New Educational Review* each received 54 citations. Overall, these highly cited works predominantly focus on digital reading comprehension, technology-enhanced learning environments, and the pedagogical effectiveness of e-books in language learning contexts.

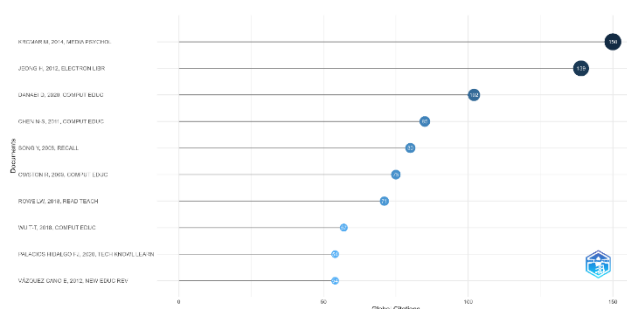


Figure 5. Most Global Cited Documents (Source: Biblioshiny)

Author

Most Relevant Authors

Figure 6 displays the top ten authors based on the number of publications. Hiroaki Ogata leads with 15 publications, followed by Yueh-Min Huang, Noriko Uosaki, Ting-Ting Wu, and an unspecified author (NA), each with 6 documents. In the subsequent ranks, Kousuke Mouri and Adina Shamir have

Author	N. of Documents
OGATA, HIROSHI	15
HIRANO, YUJI-KEN	2
UOZUMI, KUNIO	2
INO, TOSHITSUGU	2
HIRANO, KENJI	2
KODAIRA, KOUICHI	1
SHIMIZU, KENJI	1
CHEN, TIAN-CHENG	1
ISHINO, SHOUJI	1
KIMURA, OHTA	1

Figure 7 illustrates the temporal distribution of publications by the leading authors from 2011 to 2023. Hiroaki Ogata began publishing in 2013 and maintained a consistent output, peaking at two articles per year during 2020–2021, with continued contributions through 2023. Noriko Uosaki, Ting-Ting Wu, and Kousuke Mouri were active primarily during the mid-decade, exhibiting more sporadic publication patterns. Nian-Shing Chen stood out during 2011–2012, recording the highest total citations per year (TC/year) in 2011. Adina Shamir and Ofra Korat also began their publication activities in 2011, while Yueh-Min Huang and Gwo-Jen Hwang demonstrated intensive scholarly output from 2013–2019 and 2019–2023, respectively.

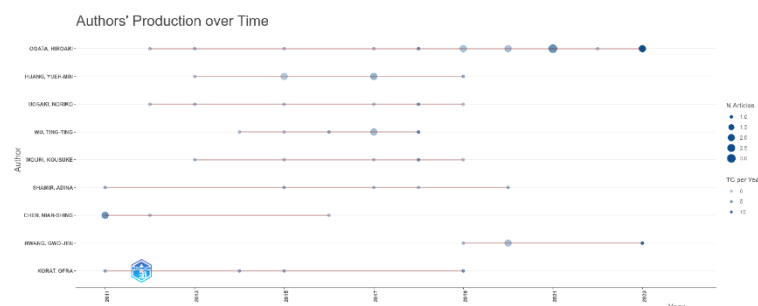
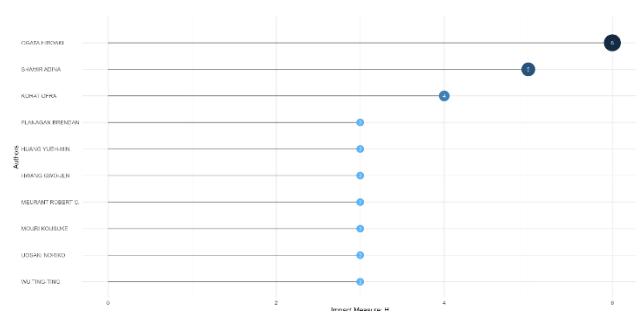


Figure 8 presents the local H-index within the research network on e-books and language learning. Hiroaki Ogata leads with an H-index of 6, followed by Adina Shamir (H = 5) and Ofra Korat (H = 4). Several other authors, including Brendan Flanagan, Yueh-Min Huang, Gwo-Jen Hwang, Robert C. Meurant, Kousuke Mouri, Noriko Uosaki, and Ting-Ting Wu, each have an H-index of 3, indicating their influence in peer citations within this scholarly domain.



Copyright © 2026, Jurnal Prima Edukasia, ISSN 2338-4743 (print), ISSN 2460-9927 (online)

Collaboration Network

Figure 9 maps the author collaboration network in the field of e-books and language learning. Hiroaki Ogata appears as the central figure within the largest cluster, collaborating closely with Noriko Uosaki, Kousuke Mouri, Brendan Flanagan, and several other researchers. His position reflects the highest betweenness centrality, underscoring his key role in bridging sub-networks. Additional notable clusters include Adina Shamir–Ofra Korat, Yueh-Min Huang–Gwo Dong Chen–Chih Kai Chang, and Veronika Makarova–Zhi Li, each representing thematic areas such as interactive e-book usage, adaptation of language materials, and digital learner behavior analysis. This collaboration structure highlights the importance of cross-institutional partnerships in advancing innovation in e-book-based language education.

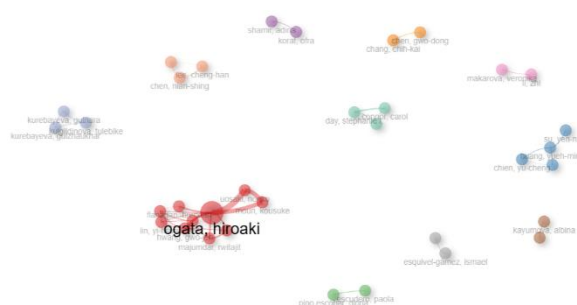


Figure 9. Collaborative Analysis (Source: Biblioshiny)

Countries

The analysis of contributions by country and institution provides insights into regional research priorities and organizational expertise. High publication output from specific countries or institutions often indicates an active research ecosystem supported by strong regulatory, governmental, or financial frameworks. Countries such as China, the United States, and Indonesia rank among the top in terms of publication volume. China and the U.S. dominate the field with a significant margin, while Indonesia stands out as an active contributor from Southeast Asia. This geographic perspective underscores how regional contexts and infrastructure support directly influence global academic output.

Most Relevant Affiliations

Publication data from various universities reveal active and distributed contributions from multiple academic institutions. Kyoto University leads with 24 publications, reflecting its dominant role in research on e-books and language learning. It is followed by the University of California (15 publications) and Middle Tennessee State University (12 publications), both of which demonstrate consistent research productivity. Three other universities, namely Bar-Ilan University, National Taiwan University of Science and Technology, and Asia University, contribute 11 and 8 publications, respectively, indicating their engagement in the development of educational technologies and language studies (Figure 10).

Institutional Productivity Over Time

The distribution of publications by year reveals dynamic growth among academic institutions. Kyoto University has experienced significant growth since 2017, emerging as the fastest-growing institution in terms of publication output leading up to 2023. The University of California and Middle Tennessee State University have also demonstrated a steady upward trend in publication volume over the past decade. Bar-Ilan University began its contributions in 2011 and has consistently increased its output through 2023. These data reflect strong institutional research initiatives and a growing interest in the topic of e-books in language learning over time (Figure 11).

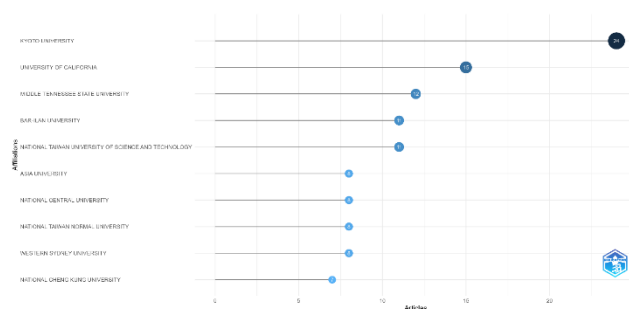


Figure 10. Most Relevant Affiliation (Source: Biblioshiny)

Corresponding Author Countries

The distribution of corresponding author countries reveals broad global representation in scientific publications. China and the United States prominently occupy the top positions, with over 50 and 40 documents respectively. Indonesia and Japan follow as active contributors from Asia, each with nearly 20 publications. The majority of publications are the result of single-country collaborations (SCP), although instances of multiple-country collaborations (MCP) are also evident in countries such as the U.S. and Japan. This highlights the emergence of collaborative networks and underscores the importance of cross-national approaches in studies on e-books and language learning (Figure 12).

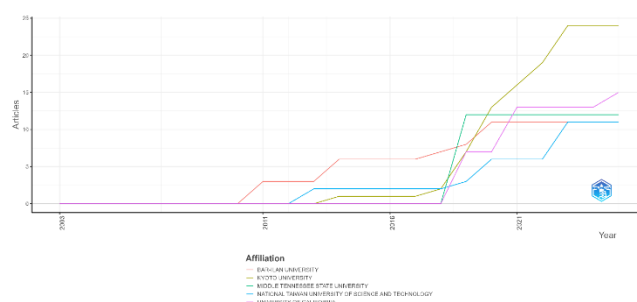


Figure 11. Affiliations' Production over Time (Source: Biblioshiny)

Most Cited Countries

Citation data indicate that the United States has the greatest research impact, with a total of 639 citations. It is followed by China (468 citations) and South Korea (237 citations), demonstrating substantial influence within the global academic community. Israel and Spain also stand out with 159 and 133 citations respectively, reflecting significant contributions despite their relatively lower publication volume. This trend suggests that the quality and relevance of research from these countries are widely recognized in the fields of educational technology and applied linguistics (Figure 13).

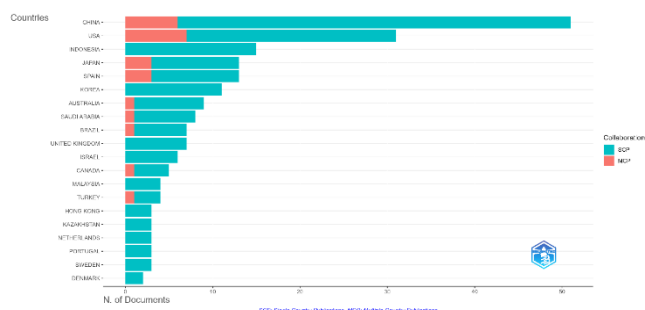


Figure 12. Corresponding Author's Countries (Source: Biblioshiny)

Co-Word Analysis

Keyword and trend analysis identifies the evolving dynamics of research focus over time, revealing both established and emerging themes. By tracking frequently occurring keywords and their interrelations, it is possible to uncover the conceptual structure of this research domain and to identify

Country	Citations
USA	800
CHINA	650
KOREA	450
SPAIN	250
ITALY	200
JAPAN	150
UK	120
CANADA	100
NETHERLANDS	80
SOUTH AFRICA	50

Word	Count
education	58
electronic publishing	52
reading comprehension	42
learning	38
keywords plus	32
ebooks	30
e-learning	28
digital resources	25
language learning	22
electronic document exchange	18
internet systems	12

[illegible]

Copyright © 2026, Jurnal Prima Edukasia, ISSN 2338-4743 (print), ISSN 2460-9927 (online)

Figure 16 illustrates the temporal dynamics of keyword emergence over the years. Terms such as *electronic publishing*, *e-learning*, and *reading comprehension* have maintained high consistency from around 2016 through 2023. In contrast, topics like *language education*, *language learning*, and *learning systems* have shown growth since 2018, coinciding with the increasing adoption of digital technologies in language education. The emergence of keywords such as *digital devices* and *artificial intelligence* also indicates a potential expansion of research toward smart-device-supported and AI-driven learning approaches.

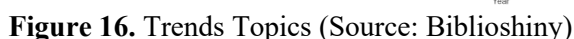


Figure 17. maps the thematic positioning of research topics based on two key dimensions: density (degree of development) and centrality (degree of relevance). The largest cluster appears in the basic themes quadrant, including terms such as *students*, *electronic publishing*, and *reading comprehension*, which represent the conceptual foundation of e-book research in language learning. Meanwhile, clusters such as *e-learning*, *digital resources*, and *learning systems* also appear in the basic themes quadrant but are trending toward the motor themes area, indicating potential for becoming more central. The cluster comprising *teaching*, *technology*, and *information technology* is located in the motor themes quadrant, suggesting that ini topics are both highly developed and central, forming the core of the research structure.



The keyword co-occurrence network (Figure 18) illustrates the conceptual relationships that have emerged within the literature. *Students* and *electronic publishing* are the most dominant nodes, acting as central connectors across clusters. Terms such as *e-learning*, *teaching*, and *language learning* form the red cluster, reflecting a pedagogical and interactive focus. In contrast, the green cluster links keywords like *reading comprehension*, *e-books*, and *experimental groups*, highlighting the relationship between technology use and learning outcome evaluation. The blue cluster demonstrates a concentration on linguistic aspects and child development.

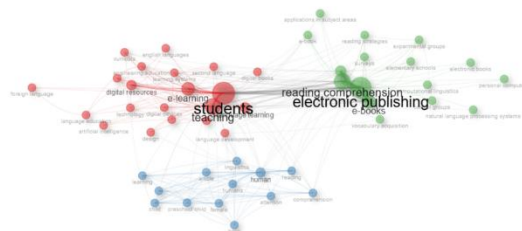


Figure 18. Co-word Network (Source: Biblioshiny)

Overall Thematic Network

Figure 19 visualizes the overall thematic network based on keyword occurrences and their interconnections. The visualization shows that terms such as *students*, *electronic publishing*, and *reading comprehension* occupy central positions within the network, reinforcing their role as conceptual foundations in e-book-related studies. The complexity of this network highlights that research on e-books in language learning is not solely technology-driven but is also deeply intertwined with pedagogical, cognitive, and social dimensions.

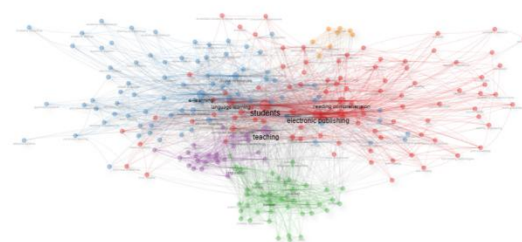


Figure 19. Co-occurrence Keyword (Source: Biblioshiny)

Critical Interpretation

This study reveals a rapidly evolving knowledge landscape concerning the use of e-books in the context of basic education, particularly in relation to reading literacy and digital learning technologies. The bibliometric analysis presents several key findings (see table 4 for summary), organized into major thematic categories. These findings are then critically interpreted to provide a deeper understanding of the direction and dynamics of research in this field.

Publication Activity and General Trends

Between 2002 and 2025, a total of 388 documents from 277 sources were analyzed, with an annual growth rate of 16.1%, indicating a significant increase in academic attention to this topic. The average number of citations per document reached 7.843, demonstrating the relevance and substantial contribution of the works examined. A total of 923 authors were identified, with an international collaboration rate of 12.37%, suggesting that the topic is receiving cross-national and institutional attention.

Critical Interpretation

The high publication growth rate reflects the increasing recognition of e-books as viable learning media within the broader framework of digital education. However, the moderate level of international collaboration indicates that research in this area tends to be regionally or nationally concentrated. A key challenge lies in the linguistic diversity among countries, which may hinder broader, global integration of research efforts.

Most Influential Sources and Documents

Journals such as *Computers and Education*, *Educational Technology & Society*, and *Interactive Learning Environments* emerged as the primary sources, characterized by a high number of publications

and elevated H-index values. The most globally cited documents include works by Krcmar & Cingel (2014), Jeong (2012), and Danaei et al. (2020), which reflect a strong focus on media psychology, digital literacy, and e-learning interventions.

Critical Interpretation

The dominance of educational technology journals highlights that the topic of e-books is not isolated but rather embedded within broader systems such as e-learning, blended learning, and digital literacy. Highly cited articles also demonstrate the effective integration of psychological approaches and educational technology in the design of learning media.

Leading Countries, Institutions, and Authors

The United States and China occupy the top positions in both citation count and number of publications, with notable contributions also from South Korea, Japan, and Spain. At the institutional level, Kyoto University, the University of California, and Middle Tennessee State University emerge as the most productive institutions. At the author level, Hiroaki Ogata, Noriko Uosaki, and Yueh-Min Huang stand out as leading contributors in this field.

Critical Interpretation

Centers of research excellence are concentrated in East Asia and North America, reflecting substantial investments in educational technology. The absence of institutions from developing countries, such as Indonesia, among the top-ranked contributors highlights a persistent gap in scientific publication output. This calls for strategic responses in the form of strengthened international collaboration and enhanced local research capacity building.

Conceptual Structure and Thematic Connectivity

The co-occurrence network analysis reveals that keywords such as students, electronic publishing, reading comprehension, e-learning, and teaching serve as central nodes within the conceptual map. This aligns with the results of the TreeMap and Word Cloud visualizations, which highlight the high frequency of these terms. Further thematic mapping classifies “*students–electronic publishing–reading comprehension*” as basic themes, while “*teaching–technology–information technology*” are positioned as motor themes.

Critical Interpretation

The basic themes emphasize the application of e-books to support students in enhancing reading comprehension, whereas the motor themes reflect the central role of technology and digital pedagogy as key drivers of instructional innovation. These findings reinforce the framework that e-books are not merely reading aids but are integral components of a broader transformation toward technology-enhanced learning.

Topic Trends and Temporal Dynamics

The topic trend graph and keyword frequency over time show consistent growth in terms such as digital resources, electronic publishing, and reading comprehension since 2012, with a significant surge occurring after 2018. In contrast, keywords related to computational linguistics and second language appear to have stagnated or declined.

Critical Interpretation

The rising intensity of research on e-books and digital resources post-2018 is likely driven by the digital revolution and the global pandemic, which necessitated the rapid shift to remote learning. This reflects a shift in focus from the structural aspects of language toward the use of digital technologies in education. Nevertheless, the limited exploration of in-depth linguistic dimensions and adaptive pedagogical strategies highlights areas of research that remain underdeveloped and ripe for further inquiry.

Scientific Evolution and Implications

These findings indicate that research on e-books in education has diversified in terms of approaches, topics, and institutional affiliations. However, there is a tendency for the majority of studies to remain descriptive or evaluative in nature, with relatively few employing experimental intervention designs.

Critical Interpretation

Research in this area requires a more interdisciplinary approach, one that goes beyond assessing media effectiveness to encompass the affective, motivational, and sociocultural dimensions of e-book use, particularly at the elementary level. Future studies should explore the integration of e-books with differentiated pedagogy and the advancement of critical and digital literacy among school-aged children.

Table 4. Summary of Findings

Aspect	Critical Findings	Implications
Topic Dominance	Focus on students, teaching, and reading comprehension	Potential for developing adaptive, high-literacy-oriented learning media
Academic Leadership	Japan and China lead in number of publications; the U.S. leads in citations	Developing countries need strategies for international collaboration and reputable research
Research Paradigm	Shift from technology-oriented to pedagogy- and outcome-oriented studies	Stronger longitudinal and experimental research is required
Emerging Keywords	Terms like AI, language education, and learning analytics are gaining ground	Future research lies in smart and personalized education
Collaboration	Co-authorship and cross-national collaboration remain limited	Global academic network strengthening is necessary

Discussion

The rapid growth of publications on e-books in language learning reflects the increasing recognition of e-books as a key component in the digital education era. Since the early 2010s, there has been a significant surge in research activity, peaking in 2024, indicating growing academic interest in this topic. This trend aligns with the rising importance of digital literacy in modern education (Gilster, 1997; Ng, 2012). Language learners today are expected not only to possess linguistic proficiency but also to navigate digital environments effectively. E-books offer a platform that integrates text with multimedia, featuring hyperlinks, audio, video, and interactivity, thus facilitating a more engaging and autonomous language learning experience. These findings support previous studies suggesting that e-books enhance both the learning experience and language learning outcomes (Almadhi & Alanazi, 2024; X. Zhang et al., 2021). This reflects a paradigmatic shift from a mere focus on e-book technology to an emphasis on how such technology is pedagogically integrated and supports students' digital literacy competencies. In other words, e-books are increasingly viewed as an integral part of the broader e-learning and blended learning ecosystems, rather than as standalone tools, as implied by the dominance of related publications in leading educational technology journals such as *Computers & Education* and *Educational Technology & Society*.

The key contributors identified in this analysis suggest that centers of excellence in e-book-based language learning research are concentrated in specific regions. At the author level, several prolific scholars stand out, such as Hiroaki Ogata, Noriko Uosaki, and Yueh-Min Huang, each making significant contributions through numerous publications. The dominance of researchers from Japan and Taiwan aligns with institutional data, where Kyoto University emerges as the most productive institution (with approximately two dozen publications), followed by other leading universities such as the University of California and Middle Tennessee State University. This pattern reflects a strong institutional investment and strategic focus on e-book research in developed countries, particularly in East Asia and North America. Institutional support and research funding appear to play a crucial role: funding agencies such as the Ministry of Science and Technology, Taiwan, and the Japan Society for the Promotion of Science are identified as major research sponsors, indicating that governmental policies in both countries prioritize innovation in digital learning. As a result, scholars in these regions are encouraged to produce high-quality research on e-books. On the other hand, while the United States is also a leading contributor in terms of publication volume and total citations (holding the highest global citation count), institutional representation from developing countries remains limited among the top-ranked institutions. For example, Indonesia has begun to emerge as a notable contributor (ranking among the top ten most productive countries), yet no Indonesian institutions are prominently positioned at the top. This absence signals a capacity gap in research infrastructure. Therefore, strategic efforts are needed

to strengthen research support in developing countries, including enhancing international collaboration and building the capacity of local researchers to compete on the global stage (Marín & Castañeda, 2023).

From a collaboration network perspective, current research on e-books in language learning remains geographically segmented. Cross-country author collaboration is still limited, with only about 12% of publications involving authors from more than one country. The majority of works are the result of domestic collaborations within individual countries. Language barriers and local educational contexts may act as constraints to broader global collaboration, particularly in language learning research, which often focuses on specific linguistic settings. However, from the standpoint of social constructivism, cross-cultural interaction and collaborative learning can enrich the knowledge-building process (Vygotsky & Cole, 1978). More intensive international collaboration holds the potential to broaden research perspectives, for instance, by facilitating the sharing of best practices across countries and testing the effectiveness of e-books in diverse cultural and linguistic contexts. Such cross-national research aligns with Vygotsky's Zone of Proximal Development (ZPD), in which collaboration with peers or experts from different backgrounds fosters scaffolding that accelerates learner development (Shabani et al., 2010). Therefore, strengthening global research networks is essential. Our findings suggest that certain key countries, such as the United States and Japan, have begun to engage in international collaboration, as evidenced by the presence of multi-country publications. This trend needs to be expanded: for example, researchers from Indonesia and other developing countries could initiate research partnerships with groups in the U.S., Europe, or East Asia to complement one another's expertise. Support from international funding bodies and the establishment of joint research agendas would greatly facilitate this global synergy. In practical terms, cross-national collaboration can lead to the development of e-book innovations that are more universal and inclusive, by incorporating the rich variability of language learning contexts across the globe.

The analysis of themes and temporal trends reveals a conceptual landscape in e-book language learning research that centers around several core topics. Keywords such as *students*, *reading comprehension*, *electronic publishing*, *e-learning*, and *teaching* emerge as the most dominant nodes in the co-word network. This indicates a balanced research focus between pedagogical aspects (*students*, *teaching*, and *reading comprehension*) and technological aspects (*electronic publishing* and *e-learning*). The identified basic theme clusters, such as the combination of *students*, *electronic publishing*, and *reading comprehension*, emphasize that the primary goal of many studies is to leverage e-books to enhance students' reading comprehension. This aligns with cognitive theories of reading, which emphasize how learners process information (Craik & Lockhart, 1972; Mangen et al., 2019). A substantial body of research seeks to understand how the shift from print to digital texts affects readers' cognitive processes (Liao et al., 2024; Stiegler-Balfour et al., 2023). Our bibliometric findings affirm that researchers consistently regard reading comprehension as a key indicator of the effectiveness of e-book usage. This is supported by studies in the Indonesian primary education context, which demonstrate that thematic-integrative pictorial books are crucial for improving the reading comprehension skills of elementary students (Gunawan & Suhardi, 2019). From a theoretical standpoint, the dominance of this theme reflects the scholarly community's effort to ensure that the integration of e-books does not compromise comprehension quality, especially in light of ongoing concerns about differences in reading effectiveness between screen and paper (Mangen et al., 2013; Støle et al., 2020). On the contrary, e-books are increasingly expected to enhance comprehension through their interactive features.

The identification of *teaching*, *technology*, and *information technology* as motor themes reflects a shifting research focus toward a more integrated relationship between pedagogy and technology. This indicates that current studies no longer examine e-books in isolation, but rather as integral components of innovative instructional strategies. It supports the notion that e-books contribute significantly to the transformation of technology-based learning. The central positioning of teaching and technology in the thematic network highlights a growing effort to link e-book utilization with learning theories and instructional design. For instance, dual coding theory (Paivio, 1991) and cognitive load theory (Mayer, 2009; Sweller, 2005) are frequently used as theoretical frameworks in the design of e-book content. Multimodal features of e-books, such as read-aloud text or dynamic illustrations, are intended to engage both the verbal and visual channels simultaneously, in line with dual coding principles, thereby enhancing students' memory retention and comprehension (Li et al., 2022; Rupley et al., 2015).

Similarly, the layout and navigation of e-books are often carefully designed to avoid overloading students' working memory, aligning with recommendations from cognitive processing and multimedia learning theories (Mayer & Moreno, 2003; Skulmowski & Xu, 2022b). The prevalence of students as a core topic also underscores a learner-centered orientation in this body of research, consistent with constructivist views that learners construct knowledge through active interaction with content (Vygotsky & Cole, 1978). Students are no longer seen as passive recipients; rather, e-book use encourages interactive engagement with texts, emphasizing their active role in the learning process. Notably, some studies have explored collaborative features within e-books (C. M. Chen et al., 2020; Spencer et al., 2020), allowing learners to share notes and engage in online discussions. This represents a concrete application of sociocultural theory in a digital context, where e-books function as social mediators that enable collaborative learning across time and space (Mercer et al., 2019; Vorobel et al., 2021).

Furthermore, temporal analysis illustrates how thematic trends have evolved over the past two decades. Terms such as *digital resources*, *electronic publishing*, and *e-learning* began to appear frequently in the mid-2010s and surged sharply after 2018. This increase was likely driven by the accelerated digital transformation in education, particularly the impact of the global COVID-19 pandemic, which necessitated widespread adoption of technology-mediated distance learning (Liao et al., 2024). In other words, the pandemic acted as an innovation accelerator: e-books and digital resources suddenly became essential tools to ensure learning continuity, thereby catalyzing research in this area. As a result, the focus of research has shifted more strongly toward the practical use of e-books as viable solutions for educational access during times of disruption. In contrast, topics related to linguistic content, such as *computational linguistics* or *second language (acquisition)*, have remained stagnant or declined in frequency. This suggests that, rather than examining e-books for deep linguistic analysis, the research community is more interested in their pedagogical and technological aspects. Current research priorities revolve around how e-books are used and their impact on learning, rather than the language content itself. Furthermore, while most studies focus on reading, there is a clear opportunity to expand research into other literacy domains, such as developing writing skills through story-based digital media in elementary schools (Zainuddin et al., 2023). The recent emergence of keywords such as *artificial intelligence (AI)* and *learning analytics* is also noteworthy. Although still in early stages, their presence signals a potential new direction: integrating AI into e-books to create smarter and more adaptive language learning environments. For example, some studies have developed interactive e-books to teach students about AI concepts (X. Zhang et al., 2021), or have used analytics to track students' reading progress. In the future, e-books may be equipped with intelligent agents or recommendation systems capable of automatically adjusting content to match learners' skill levels, aligning with the idea of technology-driven scaffolding, akin to Vygotsky's Zone of Proximal Development (ZPD). This presents a compelling research gap: the integration of e-books with AI or machine learning to create personalized, data-driven language learning experiences, a topic that remains underexplored yet highly promising for future inquiry.

This bibliometric analysis extends previous reviews by offering a comprehensive mapping of research on e-books in language learning up to 2025, revealing not only dominant themes and influential contributors but also structural patterns of collaboration and funding that shape the field. By synthesizing these findings, this study offers three critical implications: *First*, in terms of theoretical implications, our findings signal a shift from a technology-driven paradigm to a pedagogy-centered one. This transition highlights the necessity of interdisciplinary approaches in early reading development, where digital tools must be designed to foster both linguistic competence and character building (Sabilillah & Kurniaman, 2019). The dominance of *reading comprehension* and *student engagement* as core themes validates the continued relevance of Cognitive Load Theory and Dual Coding Theory in digital environments. Furthermore, the emergence of AI-related keywords suggests an evolution of the Zone of Proximal Development (ZPD) concept, where technology-driven scaffolding, through adaptive learning and AI agents, is poised to become the new mediator in social-constructivist language learning. This theoretical bridge provides a foundation for future scholars to explore more nuanced interactions between human cognition and intelligent digital texts.

Second, regarding methodological implications, this study demonstrates the necessity of longitudinal and multi-dimensional bibliometric workflows. By extending the data coverage to late

2025, we capture the complete *post-pandemic surge*, which previous studies (e.g., (Alice Chen et al., 2023; R. Zhang et al., 2020) could not fully account for. Additionally, by incorporating *research sponsorship* as an analytical variable, this study establishes a new methodological standard for bibliometric reviews in education, moving beyond simple keyword mapping to reveal the socio-economic drivers behind scientific production. This approach allows researchers to identify not just what is being studied, but why certain regions dominate the discourse based on institutional support.

Finally, this study provides significant policy implications. The identified disparity between developed and developing nations highlights an urgent need for *research equity*. For policymakers in countries like Indonesia, the findings suggest that curriculum digitalization must be accompanied by robust funding for local research infrastructure and international mentorship programs. Governments should prioritize *evidence-based education policy* by incentivizing collaborative research with global hubs (e.g., Japan or the U.S.) to bridge the capacity gap. In this regard, a recent meta-analysis provides the empirical *gold standard* for such policies, demonstrating that picture book-based interventions yield a moderate pooled effect (*Hedges' g* = 0.71) on literacy development, with even more pronounced impacts on scientific literacy (*g* = 3.21), justifying their systematic integration into national curricula (Auliya et al., 2026). Moreover, publishers and educators should utilize these thematic trends to develop "AI-ready" e-books that are inclusive and adaptable to various linguistic contexts, ensuring that the digital divide does not hinder language acquisition in underprivileged regions.

While this study offers a comprehensive map of the field up to 2025, it has several limitations. First, the data were exclusively retrieved from the Scopus database; future research could incorporate other sources like Web of Science or Google Scholar to capture a broader range of grey literature. Second, the current analysis remains primarily descriptive and evaluative. Future studies should prioritize longitudinal experimental designs to measure the long-term impact of e-book interventions on diverse linguistic groups. Lastly, as *artificial intelligence* emerges as a burgeoning topic, future investigations should focus on the ethics and effectiveness of AI-integrated e-books in personalized language learning.

Conclusion

Overall, this bibliometric analysis reveals the rapid growth of publications on the role of e-books in language learning since the 2010s, with central themes including reading comprehension, electronic publishing, and the learner's role as key areas of research focus. Key contributors, including authors, institutions, and countries, have been identified, highlighting the concentration of research within several leading academic hubs. However, international collaboration remains relatively limited, and large-scale experimental methods have yet to be widely implemented. Nonetheless, the emergence of new topics such as artificial intelligence and learning analytics signals the next frontier of innovation aimed at creating more adaptive and personalized learning experiences. This study contributes by offering a comprehensive map of the research landscape on e-books in language education, while also identifying research gaps that need to be addressed, particularly through the integration of e-books with adaptive pedagogy and intelligent technologies to enhance the effectiveness and inclusivity of language learning in the future.

References

- Alakrash, H. M., & Razak, N. A. (2021). Technology-based language learning: Investigation of digital technology and digital literacy. *Sustainability*, 13(21), Article 12304. DOI: <https://doi.org/10.3390/su132112304>
- Almadhi, M. A., & Alanazi, M. Z. (2024). The effect of e-book reading on EFL Saudi learners' reading comprehension and reading attitudes. *Cogent Education*, 11(1), Article 2416356. DOI: <https://doi.org/10.1080/2331186X.2024.2416356>
- Amirtharaj, A. D., Raghavan, D., & Arulappan, J. (2023). Preferences for printed books versus e-books

- among university students in a Middle Eastern country. *Heliyon*, 9(6), Article e16776. DOI: <https://doi.org/10.1016/j.heliyon.2023.e16776>
- Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, 11(4), 959–975. DOI: <https://doi.org/10.1016/j.joi.2017.08.007>
- Auliya, H. R., Sayekti, O. M., Wibowo, S. E., Rakhmawati, S., Suryani, L., & Haliem, T. D. (2026). Learning through picture books: A meta-analysis of their impact on literacy development. *Reading and Writing*. Advance online publication. DOI: <https://doi.org/10.1007/s11145-025-10753-6>
- Ayuningtyas, F. I., & Widodo, S. T. (2026). Development of a digital pop-up book for Pancasila education to improve learning outcomes. *Jurnal Prima Edukasia*, 14(1). DOI: <https://doi.org/10.21831/jpe.v14i1.95104>
- Baas, J., Schotten, M., Plume, A., Côté, G., & Karimi, R. (2020). Scopus as a curated, high-quality bibliometric data source for academic research in quantitative science studies. *Quantitative Science Studies*, 1(1), 377–386. DOI: https://doi.org/10.1162/qss_a_00019
- Bresó-Grancha, N., Jorques-Infante, M. J., & Moret-Tatay, C. (2022). Reading digital- versus print-easy texts: A study with university students who prefer digital sources. *Psicologia: Reflexão e Crítica*, 35(1), Article 10. DOI: <https://doi.org/10.1186/s41155-022-00212-4>
- Chen, C.-M., Li, M.-C., & Chen, T.-C. (2020). A web-based collaborative reading annotation system with gamification mechanisms to improve reading performance. *Computers & Education*, 144, Article 103697. DOI: <https://doi.org/10.1016/j.compedu.2019.103697>
- Chen, M.-R. A., Hwang, G.-J., Majumdar, R., Toyokawa, Y., & Ogata, H. (2023). Research trends in the use of e-books in English as a foreign language education from 2011 to 2020: A bibliometric and content analysis. *Interactive Learning Environments*, 31(4), 2411–2427. DOI: <https://doi.org/10.1080/10494820.2021.1888755>
- Chen, N.-S., Teng, D. C.-E., Lee, C.-H., & Kinshuk. (2011). Augmenting paper-based reading activity with direct access to digital materials and scaffolded questioning. *Computers & Education*, 57(2), 1705–1715. DOI: <https://doi.org/10.1016/j.compedu.2011.03.013>
- Craik, F. I. M., & Lockhart, R. S. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior*, 11(6), 671–684. DOI: [https://doi.org/10.1016/S0022-5371\(72\)80001-X](https://doi.org/10.1016/S0022-5371(72)80001-X)
- Danaei, D., Jamali, H. R., Mansourian, Y., & Rastegarpour, H. (2020). Comparing reading comprehension between children reading augmented reality and print storybooks. *Computers & Education*, 153, Article 103900. DOI: <https://doi.org/10.1016/j.compedu.2020.103900>
- Day, S. L., Hwang, J. K., Arner, T., McNamara, D. S., & Connor, C. M. (2025). Choose your own adventure: Interactive e-books to improve word knowledge and comprehension skills. *Journal of Computer Assisted Learning*, 41(2), Article e70023. DOI: <https://doi.org/10.1111/jcal.70023>
- Dayu, D. P. K., & Setyaningsih, N. D. (2022). Big books to increase fifth-grade students' reading literacy. *Jurnal Prima Edukasia*, 10(1), 1–8. DOI: <https://doi.org/10.21831/jpe.v10i1.41115>
- de Jong, T. (2010). Cognitive load theory, educational research, and instructional design: Some food for thought. *Instructional Science*, 38(2), 105–134. DOI: <https://doi.org/10.1007/s11251-009-9110-0>
- Désiron, J. C., Schmitz, M. L., & Petko, D. (2025). Teachers as creators of digital multimedia learning materials: Are they aligned with multimedia learning principles? *Technology, Knowledge and*

Learning, 30(2), 637–653. DOI: <https://doi.org/10.1007/s10758-024-09770-1>

- Egert, F., Cordes, A.-K., & Hartig, F. (2022). Can e-books foster child language? Meta-analysis on the effectiveness of e-book interventions in early childhood education and care. *Educational Research Review*, 37, Article 100472. DOI: <https://doi.org/10.1016/j.edurev.2022.100472>
- Gilster, P. (1997). *Digital literacy*. Wiley Computer Publishing.
- Gunawan, A., & Suhardi, S. (2019). Thematic-integrative-based pictorial books for improving elementary school students' reading comprehension skills. *Jurnal Prima Edukasia*, 7(2), 150–161. DOI: <https://doi.org/10.21831/jpe.v7i2.14993>
- Herianto, H., Wilujeng, I., & Lestari, D. P. (2022). Effect of interactive multimedia e-books on lower-secondary school students' curiosity in a science course. *Education and Information Technologies*, 27(7), 9619–9639. DOI: <https://doi.org/10.1007/s10639-022-11005-8>
- Irawan, D. (2017). Developing a process approach-based reading textbook for fourth-grade students. *Jurnal Prima Edukasia*, 5(2), 139–150. DOI: <https://doi.org/10.21831/jpe.v5i2.13745>
- Jati, A. R., & Purwati, P. D. (2024). Development of multimedia-based e-folklore to improve fourth-grade elementary school students' reading comprehension. *Jurnal Prima Edukasia*, 12(2), 325–332. DOI: <https://doi.org/10.21831/jpe.v12i2.75433>
- Jeong, H. (2012). A comparison of the influence of electronic books and paper books on reading comprehension, eye fatigue, and perception. *The Electronic Library*, 30(3), 390–408. DOI: <https://doi.org/10.1108/02640471211241663>
- Jones, R. H. (2022). Digital literacies and language learning. In C. A. Chapelle (Ed.), *The Routledge handbook of practical second language teaching and learning* (pp. 184–194). Routledge. DOI: <https://doi.org/10.4324/9781003106609-15>
- Krcmar, M., & Cingel, D. P. (2014). Parent–child joint reading in traditional and electronic formats. *Media Psychology*, 17(3), 262–281. DOI: <https://doi.org/10.1080/15213269.2013.840243>
- Li, W., Yu, J., Zhang, Z., & Liu, X. (2022). Dual coding or cognitive load? Exploring the effect of multimodal input on English as a foreign language learners' vocabulary learning. *Frontiers in Psychology*, 13, Article 834706. DOI: <https://doi.org/10.3389/fpsyg.2022.834706>
- Liao, S., Yu, L., Kruger, J. L., & Reichle, E. D. (2024). Dynamic reading in a digital age: New insights on cognition. *Trends in Cognitive Sciences*, 28(1), 43–55. DOI: <https://doi.org/10.1016/j.tics.2023.08.002>
- López-Escribano, C., Valverde-Montesino, S., & García-Ortega, V. (2021). The impact of e-book reading on young children's emergent literacy skills: An analytical review. *International Journal of Environmental Research and Public Health*, 18(12), Article 6510. DOI: <https://doi.org/10.3390/ijerph18126510>
- Mangen, A., Olivier, G., & Velay, J.-L. (2019). Comparing comprehension of a long text read in print book and on Kindle: Where in the text and when in the story? *Frontiers in Psychology*, 10, Article 38. DOI: <https://doi.org/10.3389/fpsyg.2019.00038>
- Mangen, A., Walgermo, B. R., & Brønnick, K. (2013). Reading linear texts on paper versus computer screens: Effects on reading comprehension. *International Journal of Educational Research*, 58, 61–68. DOI: <https://doi.org/10.1016/j.ijer.2012.12.002>
- Marín, V. I., & Castañeda, L. (2023). Developing digital literacy for teaching and learning. In O. Zawacki-Richter & I. Jung (Eds.), *Handbook of open, distance and digital education* (pp. 1089–

- 1108). Springer. DOI: https://doi.org/10.1007/978-981-19-2080-6_64
- Mayer, R. E. (2009). *Multimedia learning* (2nd ed.). Cambridge University Press. DOI: <https://doi.org/10.1017/CBO9780511811678>
- Mayer, R. E., & Moreno, R. (2003). Nine ways to reduce cognitive load in multimedia learning. *Educational Psychologist, 38*(1), 43–52. DOI: https://doi.org/10.1207/S15326985EP3801_6
- Mercer, N., Hennessey, S., & Warwick, P. (2019). Dialogue, thinking together, and digital technology in the classroom: Some educational implications of a continuing line of inquiry. *International Journal of Educational Research, 97*, 187–199. DOI: <https://doi.org/10.1016/j.ijer.2017.08.007>
- Ng, W. (2012). Can we teach digital natives digital literacy? *Computers & Education, 59*(3), 1065–1078. DOI: <https://doi.org/10.1016/j.compedu.2012.04.016>
- Owston, R., Wideman, H., Ronda, N. S., & Brown, C. (2009). Computer game development as a literacy activity. *Computers & Education, 53*(3), 977–989. DOI: <https://doi.org/10.1016/j.compedu.2009.05.015>
- Paivio, A. (1991). Dual coding theory: Retrospect and current status. *Canadian Journal of Psychology/Revue Canadienne de Psychologie, 45*(3), 255–287. DOI: <https://doi.org/10.1037/h0084295>
- Palacios-Hidalgo, F. J., Huertas-Abril, C. A., & Gómez-Parra, M. E. (2020). MOOCs: Origins, concept, and didactic applications: A systematic review of the literature (2012–2019). *Technology, Knowledge and Learning, 25*(4), 853–879. DOI: <https://doi.org/10.1007/s10758-019-09433-6>
- Rowe, L. W. (2018). Say it in your language: Supporting translanguaging in multilingual classes. *The Reading Teacher, 72*(1), 31–38. DOI: <https://doi.org/10.1002/trtr.1673>
- Rupley, W. H., Paige, D. D., Rasinski, T. V., & Slough, S. W. (2015). Multi-touch tablets, e-books, and an emerging multi-coding/multi-sensory theory for reading science e-textbooks: Considering the struggling reader. *Journal of Education and Training Studies, 3*(4). DOI: <https://doi.org/10.11114/jets.v3i4.790>
- Sabilillah, N. S., & Kurniaman, O. (2019). Developing a conservation-character-based big book for early reading. *Jurnal Prima Edukasia, 7*(2), 162–171. DOI: <https://doi.org/10.21831/jpe.v7i2.22855>
- Santoso, T. N. B., Siswandari, S., & Sawiji, H. (2018). The effectiveness of e-books versus printed books in rural Indonesian schools in the modern learning era. *International Journal of Educational Research Review, 3*(4), 77–84. DOI: <https://doi.org/10.24331/ijere.453512>
- Saptono, B. (2023). The effectiveness of e-books in learning: An analysis of trends in elementary schools. *Jurnal Prima Edukasia, 11*(2), 206–214. DOI: <https://doi.org/10.21831/jpe.v11i2.59484>
- Shabani, K., Khatib, M., & Ebadi, S. (2010). Vygotsky's zone of proximal development: Instructional implications and teachers' professional development. *English Language Teaching, 3*(4), 237–248. DOI: <https://doi.org/10.5539/elt.v3n4p237>
- Skulmowski, A., & Xu, K. M. (2022). Understanding cognitive load in digital and online learning: A new perspective on extraneous cognitive load. *Educational Psychology Review, 34*(1), 171–196. DOI: <https://doi.org/10.1007/s10648-021-09624-7>
- Sridhar, S., Khamaj, A., & Asthana, M. K. (2023). Cognitive neuroscience perspective on memory: Overview and summary. *Frontiers in Human Neuroscience, 17*, Article 1217093. DOI: <https://doi.org/10.3389/fnhum.2023.1217093>

- Stiegler-Balfour, J. J., Roberts, Z. S., LaChance, A. S., Sahouria, A. M., & Newborough, E. D. (2023). Is reading under print and digital conditions really equivalent? Differences in reading and recall of expository text for higher- and lower-ability comprehenders. *International Journal of Human-Computer Studies*, 176, Article 103036. DOI: <https://doi.org/10.1016/j.ijhcs.2023.103036>
- Støle, H., Mangen, A., & Schwippert, K. (2020). Assessing children's reading comprehension on paper and screen: A mode-effect study. *Computers & Education*, 151, Article 103861. DOI: <https://doi.org/10.1016/j.compedu.2020.103861>
- Suggate, S., & Lenhard, W. (2022). Mental imagery skill predicts adults' reading performance. *Learning and Instruction*, 80, Article 101633. DOI: <https://doi.org/10.1016/j.learninstruc.2022.101633>
- Sweller, J. (2005). Implications of cognitive load theory for multimedia learning. In R. E. Mayer (Ed.), *The Cambridge handbook of multimedia learning* (pp. 19–30). Cambridge University Press. DOI: <https://doi.org/10.1017/CBO9780511816819.003>
- Utomo, F. B. B. (2018). Developing illustrated storybooks to improve beginning reading skills and learning motivation. *Jurnal Prima Edukasia*, 6(2), 118–128. DOI: <https://doi.org/10.21831/jpe.v6i2.16456>
- Vorobel, O., Voorhees, T. T., & Gokcora, D. (2021). Language learners' digital literacies: Focus on students' information literacy and online reading practices. *Journal of Computer Assisted Learning*, 37(4), 1127–1140. DOI: <https://doi.org/10.1111/jcal.12550>
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes* (M. Cole, V. Jolm-Steiner, S. Scribner, & E. Souberman, Eds.). Harvard University Press.
- Wahyuningsih, A., & Kiswaga, G. E. (2019). The effectiveness of the CIRC learning model and PQ4R learning model on elementary school students' reading comprehension skills. *Jurnal Prima Edukasia*, 7(1), 82–93. DOI: <https://doi.org/10.21831/jpe.v7i1.9701>
- Wu, T.-T., & Chen, A.-C. (2018). Combining e-books with mind mapping in a reciprocal teaching strategy for a classical Chinese course. *Computers & Education*, 116, 64–80. DOI: <https://doi.org/10.1016/j.compedu.2017.08.012>
- Xodabande, I., & Hashemi, M. R. (2023). Learning English with electronic textbooks on mobile devices: Impacts on university students' vocabulary development. *Education and Information Technologies*, 28(2), 1587–1611. DOI: <https://doi.org/10.1007/s10639-022-11230-1>
- Yu, W., Jiang, Y., & Fu, T. (2023). Digital reading: A bibliometric and visualization analysis. *Library Hi Tech*. Advance online publication. DOI: <https://doi.org/10.1108/LHT-06-2023-0240>
- Yuan, W., Van Ballegooie, M., & Robertson, J. L. (2018). E-books versus print books: Format preferences in an academic library. *Collection Management*, 43(1), 28–48. DOI: <https://doi.org/10.1080/01462679.2017.1365264>
- Zaidi, R., & Sah, P. K. (2024). Affordances of multilingual and multimodal literacy engagements of immigrant high school students: A scoping review. *SAGE Open*, 14(1). DOI: <https://doi.org/10.1177/21582440241228122>
- Zainuddin, M., Saifudin, A., Lestariningsih, L., & Nahdiyah, U. (2023). Developing literacy skills in writing stories for elementary school students using big books. *Jurnal Prima Edukasia*, 11(2), 197–205. DOI: <https://doi.org/10.21831/jpe.v11i2.59419>
- Zhang, R., Zou, D., Xie, H., Au, O. T. S., & Wang, F. L. (2020). A systematic review of research on e-book-based language learning. *Knowledge Management & E-Learning*, 12(1), 106–128. DOI: <https://doi.org/10.34105/j.kmel.2020.12.006>

- Zhang, X., Tlili, A., Shubeck, K., Hu, X., Huang, R., & Zhu, L. (2021). Teachers' adoption of an open and interactive e-book for teaching K–12 students artificial intelligence: A mixed-methods inquiry. *Smart Learning Environments*, 8(1), Article 34. DOI: <https://doi.org/10.1186/s40561-021-00176-5>
- Zhu, T., Zhang, Y., & Irwin, D. (2024). Second- and foreign-language vocabulary learning through digital reading: A meta-analysis. *Education and Information Technologies*, 29(4), 4531–4563. DOI: <https://doi.org/10.1007/s10639-023-11969-1>
- Zupic, I., & Čater, T. (2015). Bibliometric methods in management and organization. *Organizational Research Methods*, 18(3), 429–472. DOI: <https://doi.org/10.1177/1094428114562629>