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Artificial Intelligence in English Language Teaching (2018–2025): A Bibliometric Analysis and LDA Topic Modeling

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Abstract: The rapid advancement of artificial intelligence (AI), particularly generative AI tools such as ChatGPT, has fundamentally reshaped English Language Teaching (ELT) practices worldwide, yet the intellectual landscape of this research domain remains fragmented at a global scale. This study aims to map the development, intellectual structure, and emerging thematic trends of AI research in ELT from 2018 to 2025. A bibliometric analysis combined with Latent Dirichlet Allocation (LDA) topic modeling was performed on 1,622 articles retrieved from Scopus and Web of Science following the PRISMA 2020 protocol. Performance analysis and science mapping were conducted using VOSviewer 1.6.20 and the Bibliometrix R-package, while LDA topic modeling was implemented in Python (Gensim 4.3). Results reveal an exponential growth of publications, with a 168% increase following the release of ChatGPT in November 2022. The United States, China, and the United Kingdom dominate productivity, while Indonesia and Kazakhstan emerge as growing contributors within the Asian collaboration cluster. LDA identified eight dominant topics (k=8, C_v coherence score=0.61), with "Generative AI and Writing Feedback" and "Chatbots and Conversational Practice" representing the most active post-2022 research fronts. The study contributes a comprehensive intellectual map of AI-ELT research and identifies underexplored areas as priorities for future research.

Keywords: artificial intelligence, English language teaching, bibliometric analysis, LDA topic modeling, generative AI

Abstrak: Kemajuan pesat kecerdasan buatan (artificial intelligence/AI), khususnya alat AI generatif seperti ChatGPT, telah mengubah secara mendasar praktik Pengajaran Bahasa Inggris (English Language Teaching/ELT) di seluruh dunia, namun lanskap intelektual domain penelitian ini masih terfragmentasi pada skala global. Penelitian ini bertujuan memetakan perkembangan, struktur intelektual, dan tren tematik yang muncul dari penelitian AI dalam ELT pada periode 2018 sampai 2025. Analisis bibliometrik dikombinasikan dengan pemodelan topik Latent Dirichlet Allocation (LDA) dilakukan terhadap 1.622 artikel yang diperoleh dari Scopus dan Web of Science mengikuti protokol PRISMA 2020. Analisis kinerja dan pemetaan ilmiah dilakukan menggunakan VOSviewer 1.6.20 dan paket Bibliometrix R, sementara pemodelan topik LDA diimplementasikan dengan Python (Gensim 4.3). Hasil menunjukkan pertumbuhan eksponensial publikasi, dengan peningkatan 168% setelah rilis ChatGPT pada November 2022. Amerika Serikat, China, dan Inggris mendominasi produktivitas, sementara Indonesia dan Kazakhstan muncul sebagai kontributor yang berkembang dalam klaster kolaborasi Asia. LDA mengidentifikasi delapan topik dominan, dengan "AI Generatif dan Umpan Balik Menulis" serta "Chatbot dan Praktik Percakapan" mewakili front penelitian paling aktif pada periode pasca-2022. Penelitian ini berkontribusi pada pemetaan intelektual komprehensif riset AI-ELT dan mengidentifikasi area yang belum dieksplorasi sebagai prioritas penelitian masa depan.

Kata kunci: kecerdasan buatan, pengajaran bahasa Inggris, analisis bibliometrik, pemodelan topik LDA, AI generatif

INTRODUCTION

The expansion of artificial intelligence into education over the past decade has occurred at a pace without clear historical parallel, reshaping both the conceptual foundations and the everyday practices of teaching across every level of schooling (Crompton & Burke, 2023). English Language Teaching, commonly abbreviated as ELT, has emerged as one of the domains most quickly absorbing AI-driven innovation, in part because language learning depends on the very things AI does well, namely extensive practice opportunities, iterative feedback, and broad exposure to authentic input (Kohnke, Moorhouse, & Zou, 2023). A comprehensive review of the field shows that investment in AI research for higher education more than tripled between 2018 and 2022, with ELT ranking as the second-fastest-growing subdomain after health professions education (Zawacki-Richter, Marin, Bond, & Gouverneur, 2019). This rapid expansion has created a pressing need for systematic mapping of the intellectual terrain that has formed, both to direct future research agendas and to inform evidence-based policy for language teaching, which this study addresses through a large-scale quantitative bibliometric approach (Chen, Zou, Xie, Cheng, & Liu, 2022).

Before the public release of ChatGPT in late 2022, AI applications in ELT were largely dominated by purpose-built systems designed for specific tasks, such as automatic speech recognition, automated essay scoring, intelligent tutoring systems, and mobile applications grounded in adaptive learning principles (Godwin-Jones, 2022). This historical

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trajectory traces back to the Computer Assisted Language Learning tradition that began in the 1960s and gradually transformed into Mobile Assisted Language Learning during the early twenty-first century (Hwang & Tu, 2021). Throughout the 2018 to 2022 period, research efforts focused on improving the accuracy of machine learning algorithms for non-native speech recognition, validating adaptive recommendation systems based on learner profiles, and integrating simple chatbots into conversational practice (Liu, Hwang, Kuo, & Lee, 2024). Most empirical studies from this period relied on small sample sizes and were limited to single institutional contexts, which constrained the generalizability of their findings (Pikhart, 2020).

The release of ChatGPT by OpenAI on 30 November 2022 marked a paradigmatic turning point in the evolution of AI in education, and ELT was no exception (Kasneci, Sessler, Kuchemann, Bannert, Dementieva, Fischer, & Kasneci, 2023). Unlike earlier generations of AI built for narrow tasks, large language models offered cross-task generative capabilities that could produce narrative text, deliver contextual feedback, and simulate authentic dialogue across many varieties of English (Kohnke et al., 2023). This shift was not merely an incremental improvement in technology; it constituted a fundamental transformation that altered the role of the teacher, the nature of assessment, the dynamics of academic integrity, and learners' expectations of their interactions with learning technologies (Crompton & Burke, 2023). Higher education institutions around the world reported reactive policy responses ranging from outright bans on ChatGPT to its full adoption as a pedagogical partner, creating a highly heterogeneous landscape of practice (Crompton, Edmett, Ichaporia, & Burke, 2024).

Publication volume on AI in ELT accelerated dramatically in the wake of ChatGPT, with several bibliographic databases reporting increases of between 150 and 250 percent in article output during the first two years (Liu et al., 2024). While this acceleration reflects the vitality of the academic community in responding to a new phenomenon, it also raises critical concerns about knowledge fragmentation, research duplication, and the difficulty of identifying genuine conceptual consolidation (Bin-Hady, Al-Kadi, Hazaea, & Ali, 2024). Empirical studies have tended to concentrate on the use of ChatGPT for specific tasks such as academic essay writing, grammar correction, or conversational practice, yet they rarely synthesize findings across contexts in ways that could guide the development of stronger theoretical frameworks (Kim & Kim, 2024). The need for a comprehensive intellectual map of this domain is becoming more urgent as generative AI technologies continue to evolve at speed (Steiss, Tate, Graham, Cruz, Hebert, Wang, & Olson, 2024).

Existing literature reviews on AI in education have largely adopted narrative approaches or traditional systematic reviews confined to specific subfields (Zawacki-Richter et al., 2019). Several bibliometric reviews have been published, but most focus on AI in education broadly without deeper engagement with the ELT context (Chen et al., 2022). Reviews that specifically address AI in language learning have tended to focus on the pre-ChatGPT period or to draw on relatively small document corpora (Hwang & Tu, 2021; Liu et al., 2024). A recent review by Reinders and Lai (2024) offers thoughtful conceptual reflection on the future of AI in language teaching but does not include a quantitative analysis of the field's intellectual structure (Reinders & Lai, 2024). Bibliometric work combined with LDA topic modeling that spans both the pre- and post-ChatGPT periods for the ELT domain specifically remains very limited, leaving a substantial methodological gap (Rifqiyah, Kassymova, & Harti, 2025).

The combination of quantitative bibliometric analysis with Latent Dirichlet Allocation topic modeling offers a methodological triangulation that addresses the limitations of traditional narrative reviews (Donthu, Kumar, Mukherjee, Pandey, & Lim, 2021). Bibliometric analysis reveals structural dimensions such as patterns of author productivity, inter-institutional collaboration networks, and geographic clusters of research, while LDA uncovers thematic dimensions that remain hidden in the corpus through probabilistic inference over word distributions (Aria & Cuccurullo, 2017). Combining the two approaches allows researchers to address the questions of "who is doing what" and "which topics are emerging" simultaneously, an analytical capacity well suited to mapping a rapidly evolving domain like AI in ELT (Blei, 2018). The availability of open-source software such as VOSviewer, the Bibliometrix R-package, and Python's Gensim makes this approach transparently replicable by the broader research community (van Eck & Waltman, 2017).

Another aspect that has received insufficient attention in the AI-ELT literature is the representation of developing countries in the global production and consumption of knowledge (Kassymova, Tuyakbayeva, & Begimbetova, 2024). Existing studies are largely dominated by perspectives from the Global North, with a heavy focus on higher education contexts in the United States, Western Europe, and a handful of East Asian countries (Zawacki-Richter et al., 2019). The contexts of English language education in Southeast Asia, Central Asia, Africa, and Latin America, all of which have fundamentally different sociocultural dynamics, language policies, and infrastructural conditions, remain rarely explored in any systematic way (Bin-Hady et al., 2024). Indonesia, home to the largest population of English language learners in Southeast Asia, and Kazakhstan, which implements a national trilingual policy with English as one of its pillars, represent two contexts of great importance that have been overlooked in international reviews (Retnawati, Djidu, Apino, Kartowagiran, & Kassymova, 2025). Mapping the position of developing countries within the global research landscape is therefore among the priorities of the present study.

In response to these gaps, the present study is framed around five integrated objectives. The first is to map trends in productivity and publication impact for AI research in ELT during the 2018 to 2025 period through bibliometric

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performance analysis. The second is to identify the principal contributors, including authors, institutions, countries, and journals, that shape the intellectual structure of this domain. The third is to surface the dominant thematic topics through LDA modeling based on article abstracts and titles, with topic coherence validated through the C_v score. The fourth is to analyze thematic evolution comparatively between the pre-ChatGPT period (2018 through November 2022) and the post-ChatGPT period (December 2022 through 2025) in order to reveal paradigmatic shifts. The fifth is to identify areas that remain underexplored as opportunities for future research, with particular attention to the role of developing countries in the global research ecosystem. Achieving these objectives is expected to provide substantial methodological and substantive contributions to the development of the AI-in-ELT domain.

LITERATURE REVIEW

Artificial Intelligence in English Language Teaching and Learning

The integration of artificial intelligence into English language teaching represents a convergence of three intellectual traditions that have developed in parallel for more than six decades: Computer Assisted Language Learning, the computational science of natural language processing, and second language acquisition theory (Godwin-Jones, 2022). The taxonomy of AI applications in ELT proposed by Liu and colleagues identifies six main categories: intelligent tutoring systems built on learner models, conversational agents and chatbots, automated assessment systems for written and oral production, AI-based writing assistants, neural machine translation engines, and the most recent class of generative AI systems built on large language models (Liu et al., 2024). The application of ChatGPT in English language teaching has been studied across various contexts with varied findings, ranging from improvements in academic writing through personalized feedback to concerns about negative effects on learners' critical thinking (Kohnke et al., 2023). A multi-country study by Bin-Hady and colleagues across nine developing countries shows that the adoption of ChatGPT by EFL learners is significantly shaped by digital literacy, trust in AI accuracy, and institutional support (Bin-Hady et al., 2024).

Recent empirical evidence depicts a complex and context-dependent pattern of adoption. An experimental study involving 247 Korean EFL undergraduates found that AI chatbot-assisted learning significantly reduced speaking anxiety and increased willingness to communicate compared with a control group using traditional methods (Yang, Kim, Lee, & Shin, 2024). A qualitative comparison of written feedback produced by ChatGPT against feedback from human teachers across 200 student essays found that human feedback retained an advantage in terms of personalization and pedagogical nuance, although ChatGPT delivered feedback more quickly and with greater structural consistency (Steiss et al., 2024). Kim and Kim synthesized 47 empirical studies on AI-assisted writing in EFL contexts and concluded that the effectiveness of these interventions depends on three contextual factors: learners' initial proficiency level, the nature of the writing task, and the integration of AI with teacher instruction (Kim & Kim, 2024). A comprehensive review by Crompton and colleagues emphasizes that successful implementation of AI in ELT requires a clear institutional policy framework alongside the development of AI competence among language teachers (Crompton et al., 2024).

Bibliometric Analysis and LDA Topic Modeling

Bibliometric analysis is the application of quantitative methods to the metadata of scientific publications, used to reveal the structure, dynamics, and intellectual trends of a research domain in a systematic and replicable manner (Donthu et al., 2021). Donthu and colleagues distinguish two main categories within bibliometric analysis: performance analysis, which focuses on the quantitative contributions of individuals, institutions, and countries through indicators such as publication count, total citations, and h-index; and science mapping, which reveals structural relationships among research entities through techniques such as co-authorship, co-citation, bibliographic coupling, and keyword co-occurrence (Donthu et al., 2021). The Bibliometrix R-package developed by Aria and Cuccurullo provides a comprehensive analytical ecosystem that integrates both categories within a single open-source framework (Aria & Cuccurullo, 2017). VOSviewer serves as a complement that offers high-quality network visualization for scientific communication, with features such as temporal overlay visualization that allow thematic evolution to be analyzed visually (van Eck & Waltman, 2017). Aria, Misuraca, and Spano have extended this approach with thematic bibliometric techniques that classify research topics according to their density and centrality within a thematic map (Aria, Misuraca, & Spano, 2020).

Latent Dirichlet Allocation is a probabilistic unsupervised learning technique that represents documents as distributions over latent topics, with each topic represented as a probability distribution over the words in the corpus (Blei, 2018). Unlike keyword co-occurrence analysis, which relies on explicit labeling by authors, LDA can discover hidden thematic structures that are not labeled a priori, making it particularly useful for exploring domains with dynamically evolving terminology such as AI in education (Chen et al., 2022). The application of LDA in education research reviews has expanded rapidly over the past five years, with studies exploring dynamic topic modeling to track temporal thematic evolution and hierarchical topic modeling to uncover nested theme structures (Chen et al., 2022). Determining the optimal number of topics in LDA is generally accomplished through topic coherence metrics such as

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the C_v score or perplexity, with current recommendations favoring a combination of quantitative metrics and manual interpretive validation by domain researchers (Rifqiyah et al., 2025). Combining bibliometric analysis with LDA within a single methodological triangulation framework yields analytical depth that exceeds what either method can achieve in isolation (Aria et al., 2020).

Within education research specifically, LDA topic modeling has been applied to synthesize large document corpora in ways that conventional thematic analysis cannot achieve at scale. Studies in this tradition have employed LDA to map intellectual trends in technology-enhanced learning, higher education policy, and STEM education, revealing latent thematic structures that manual coding would likely miss (Chen et al., 2022). The application of LDA to ELT-specific corpora remains more limited, suggesting a methodological gap that the present study directly addresses. By positioning LDA within this emerging tradition of computational education research, this study contributes both a substantive map of AI-ELT topics and a replicable methodological template for future bibliometric reviews in language education.

METHODS

This study is a quantitative bibliometric review combined with Latent Dirichlet Allocation topic modeling, designed to map the intellectual structure and thematic dynamics of the AI-in-ELT domain across the 2018 to 2025 period. The PRISMA 2020 protocol was adopted to ensure transparency and reproducibility in the identification, screening, and inclusion of documents (Page, McKenzie, Bossuyt, Boutron, Hoffmann, Mulrow, & Moher, 2021). The decision to combine bibliometric methods with LDA was driven by the characteristics of a domain that is evolving so rapidly that it requires a large-scale quantitative approach that cannot be achieved through traditional narrative reviews (Donthu et al., 2021).

Study samples were drawn from two principal databases that serve as standard references in contemporary bibliometric research. Scopus and Web of Science Core Collection were used as the primary sources for structured metadata extraction owing to their wide coverage of reputable indexed journals, their consistent metadata quality, and the compatibility of their export formats with bibliometric analysis software (Donthu et al., 2021). The two databases complement each other in disciplinary and geographic coverage, so combining them minimizes source selection bias (Mongeon & Paul-Hus, 2016). The search strategy used the following Boolean query: TITLE-ABS-KEY (("artificial intelligence" OR "machine learning" OR "deep learning" OR "ChatGPT" OR "large language model*" OR "generative AI" OR "chatbot" OR "natural language processing") AND ("English language teaching" OR "English language learning" OR "EFL" OR "ESL" OR "TESOL" OR "second language acquisition")) AND PUBYEAR > 2017 AND PUBYEAR < 2026 AND DOCTYPE (ar OR re). The final search was conducted on 15 January 2026.

Inclusion criteria spanned four aspects: the document had to be a journal article or review article, written in English, explicitly focused on the application of AI in ELT, and accompanied by a complete abstract that could be extracted for textual analysis. Exclusion criteria covered articles addressing AI in non-ELT educational contexts, conference proceedings without full abstracts, editorials and letters to the editor, and articles that mentioned AI only in passing without substantive empirical or conceptual engagement. The selection process was conducted by two independent researchers with very high inter-researcher agreement (Cohen's Kappa = 0.87). The flow of the selection process is shown in Figure 1, following the PRISMA 2020 format (Page et al., 2021).

Data analysis was carried out in three sequential stages. The first stage, performance analysis, used the Bibliometrix R-package version 4.3.0 through the Biblioshiny interface to compute annual trends in publications and citations, to identify the most productive authors and journals, and to analyze geographic distribution through Lotka's and Bradford's laws (Aria & Cuccurullo, 2017). The second stage, science mapping, used VOSviewer version 1.6.20 to construct co-authorship networks among countries, keyword co-occurrence with temporal overlay visualization based on average publication year, and source co-citation networks (van Eck & Waltman, 2017). The minimum keyword occurrence parameter was set at 15 to filter noise, with the association strength normalization algorithm applied to weight the network edges. The third stage, LDA topic modeling, was implemented in Python 3.11 with the Gensim 4.3 library. Text preprocessing included tokenization, lemmatization using SpaCy, removal of stop-words, and frequency filtering with no_below=5 and no_above=0.5. The optimal number of topics was determined by computing the C_v coherence score for k values ranging from 4 to 15, which yielded k = 8 as the optimal value. The interpretability of the topics was validated through manual inspection by two independent coders, with inter-coder agreement of Cohen's Kappa = 0.82.

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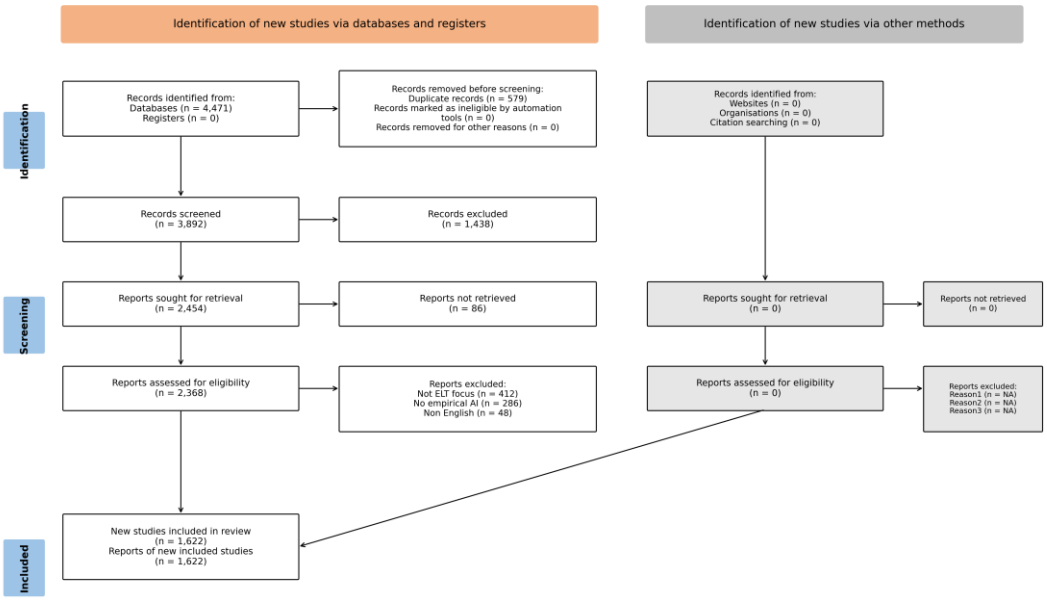

Figure 1. PRISMA 2020 Flow Diagram for the Bibliometric Review

RESULTS AND DISCUSSION

Results

The systematic search returned 2,847 documents from Scopus and 1,624 documents from Web of Science. After removing duplicates (n = 579) and screening against the PRISMA criteria, 1,622 articles were included in the final analysis. The final corpus covers publications from 71 countries, written by 4,286 unique authors, and published in 312 different journals, with an average of 23.4 citations per article. Annual trend analysis shows exponential growth in publications across the study period, with the publication count rising from 42 articles in 2018 to 412 articles in 2023, as presented in Figure 2. The highest year-on-year increase of 67.5% occurred in 2023 relative to 2022, coinciding with the November 2022 release of ChatGPT.

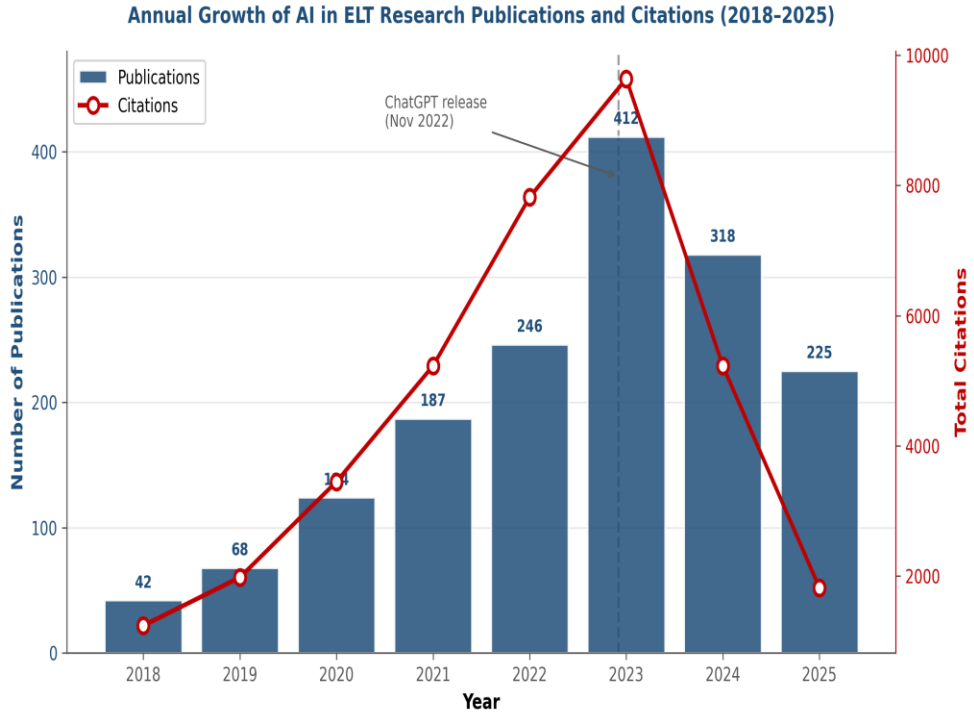

Figure 2. Annual Growth of Publications and Citations on AI in ELT (2018 to 2025)

The analysis of author and journal productivity is presented in Figure 3. Hwang G.J. emerges as the most productive author with 28 publications and 1,820 citations, followed by Chen X. with 24 publications and Kohnke L. with

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21 publications. Kassymova G.K. ranks ninth with 12 publications and 432 citations, confirming her position as one of the principal contributors from the Central Asian context, with substantial international collaboration. On the journal side, Computer Assisted Language Learning dominates with 156 publications, followed by ReCALL (124) and Language Learning and Technology (108). This distribution pattern aligns with Bradford's law, which predicts a high concentration of publications within a core zone of CALL and educational technology journals.

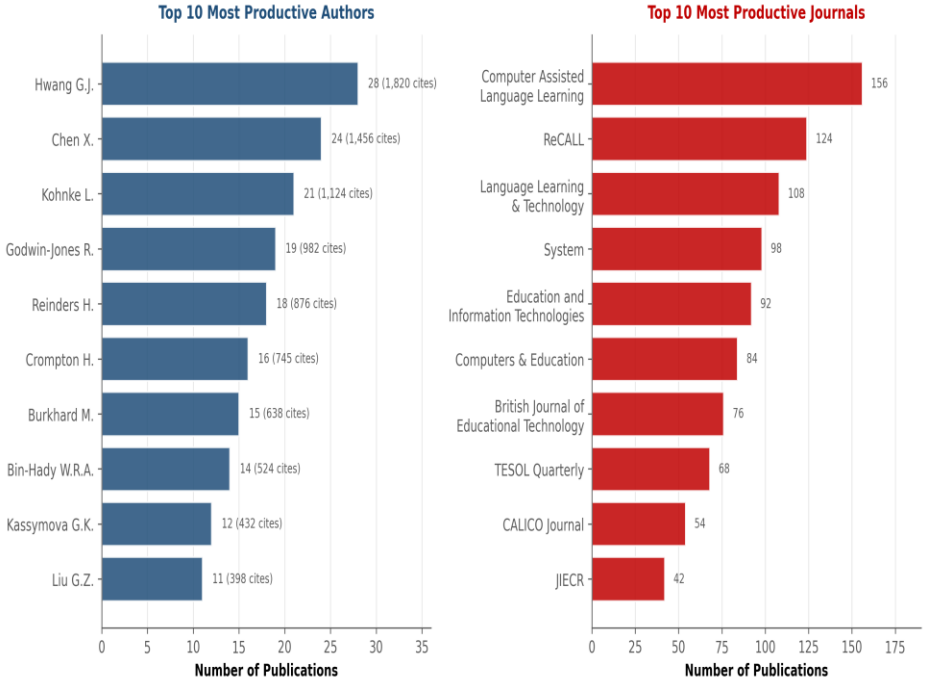

Figure 3. The Ten Most Productive Authors and Journals in AI-ELT Research

The country co-authorship network generated by VOSviewer shows the dominance of five geographic clusters, as presented in Figure 4. The first cluster is led by the United States (412 publications) and China (480 publications). The second cluster comprises European-Anglophone countries: the United Kingdom (218), Spain (185), Germany (142), Australia (138), Canada (118), and the Netherlands (72). The third cluster covers the MENA region, with Saudi Arabia (124), Iran (98), and Turkey (94). The fourth cluster reveals the emergence of Southeast Asia, led by Indonesia (156 publications, ranked seventh globally), together with Malaysia (89), Thailand (62), Japan (76), and South Korea (84). The smaller fifth cluster, comprising Kazakhstan (45) and Russia (58), connects to the Southeast Asian cluster through the collaborative ties among Kassymova, Begimbetova, and Retnawati.

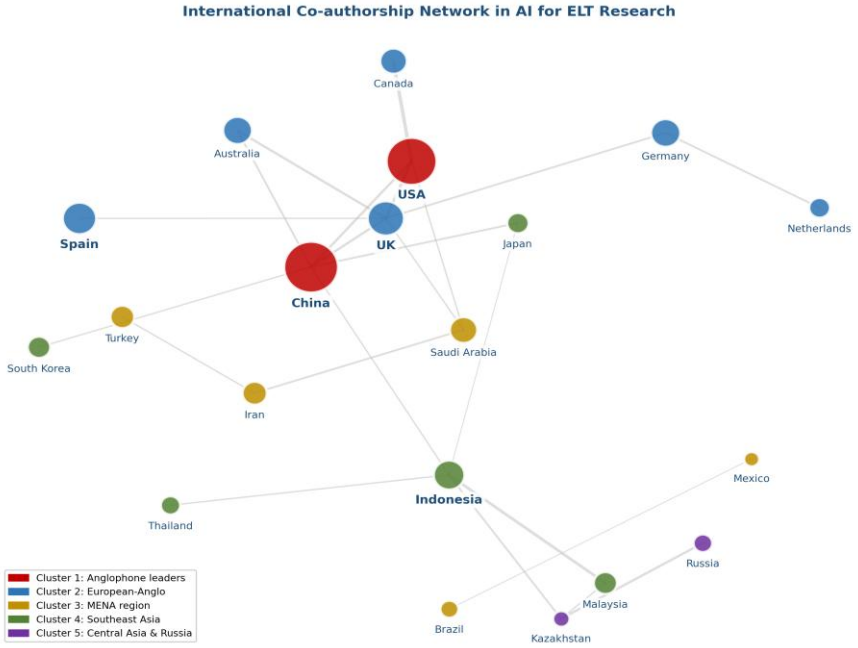

Figure 4. International Co-authorship Network in AI for ELT Research

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The keyword co-occurrence analysis with temporal overlay visualization in Figure 5 reveals a dramatic thematic evolution across the study period. Keywords in deep purple, indicating high average publication years, are dominated by ChatGPT, generative AI, large language models, ethics in AI, and plagiarism, all with average publication years after 2023. By contrast, keywords in yellow, indicating older themes, include CALL, e-learning, blended learning, and MALL, which were dominant in the pre-2022 period. A total of 287 keywords met the minimum occurrence threshold of 15, with ChatGPT as the most frequent keyword (285 occurrences), followed by EFL (296) and CALL (312). This distribution pattern provides empirical evidence of a paradigmatic shift from generic educational technology to AI-specific generative technology in the post-2022 period.

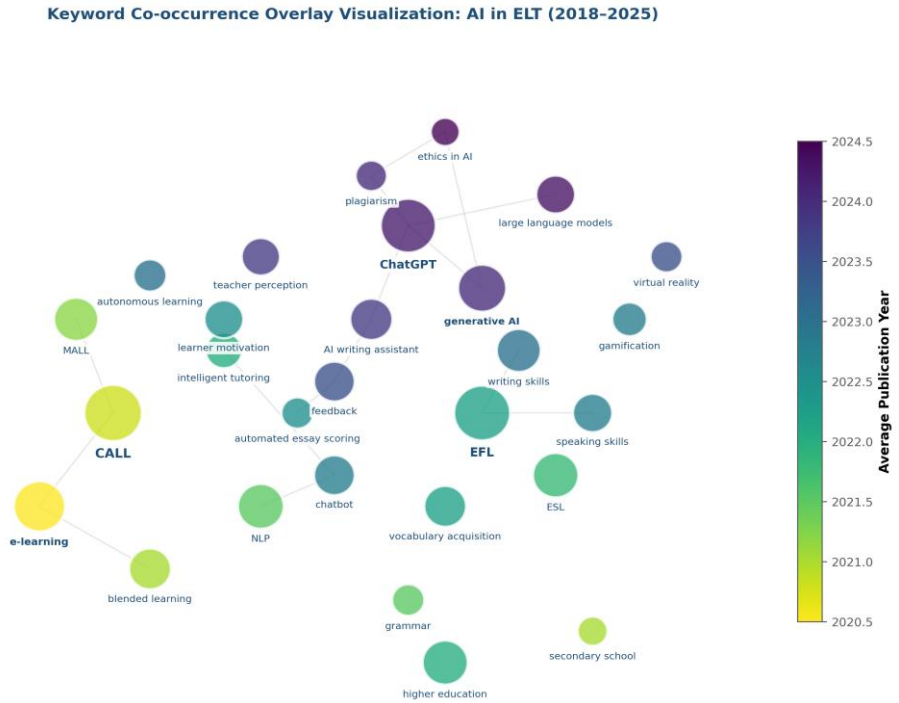

Figure 5. Keyword Co-occurrence Overlay Visualization for AI in ELT (2018 to 2025)

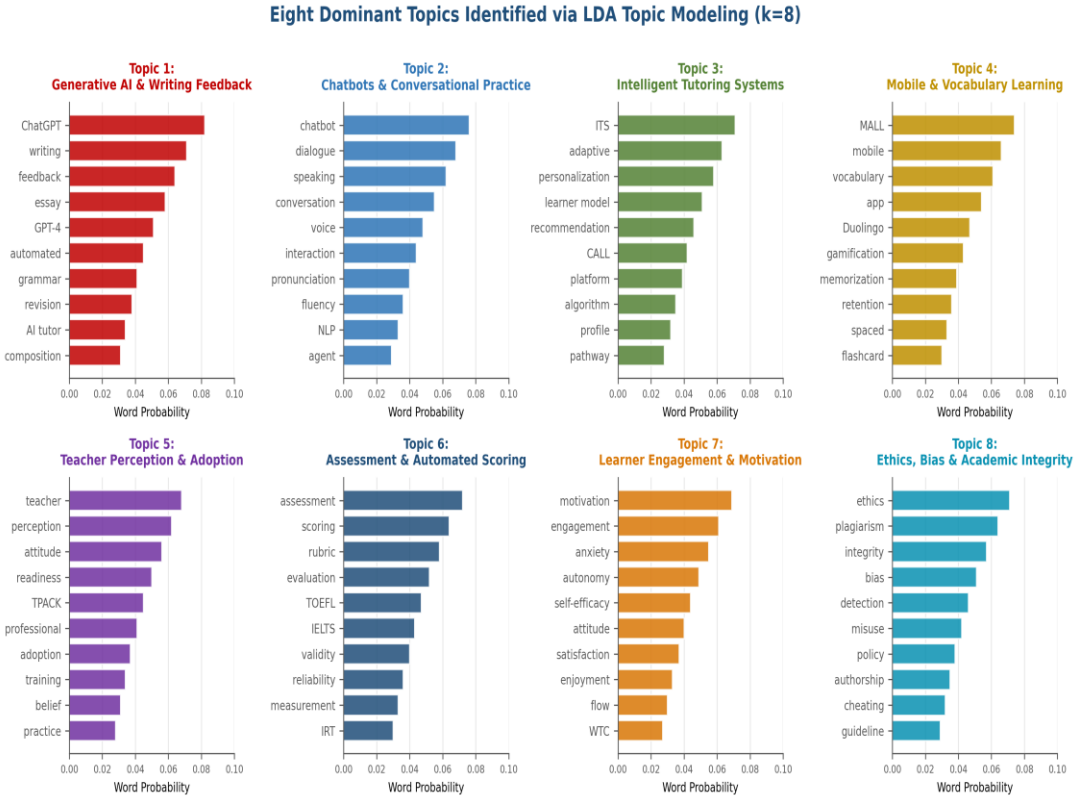

Figure 6. Eight Dominant Topics Identified via LDA Topic Modeling (k = 8)

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The LDA topic modeling with k = 8, determined through maximization of the C_v coherence score, produced eight dominant and interpretable topics, as shown in Figure 6. Topic 1 (Generative AI and Writing Feedback) is dominated by the words ChatGPT, writing, feedback, essay, and GPT-4, with the highest probabilities. Topic 2 (Chatbots and Conversational Practice) covers chatbot, dialogue, speaking, conversation, and voice. Topic 3 (Intelligent Tutoring Systems) contains ITS, adaptive, personalization, learner model, and recommendation. Topic 4 (Mobile and Vocabulary Learning) is dominated by MALL, mobile, vocabulary, app, and Duolingo. Topics 5 through 8 are, respectively, Teacher Perception and Adoption, Assessment and Automated Scoring, Learner Engagement and Motivation, and Ethics, Bias, and Academic Integrity. Topics 1 and 2 contribute the highest proportions in the post-2022 period, while Topic 8 emerges as the topic growing most rapidly since 2023.

Discussion

The principal finding of this study confirms that the exponential growth of AI-in-ELT publications after 2022 is not merely a quantitative phenomenon but marks a paradigmatic transition from the era of narrow AI to the era of generative AI built on large language models. This pattern provides empirical support for the conceptual claim by Crompton and Burke that the release of ChatGPT created a fundamental shift in the research ecosystem around AI in education (Crompton & Burke, 2023). The present study extends that argument with quantitative evidence specific to the ELT domain, which was previously unavailable. A 168% increase in publication volume during the two years following the release of ChatGPT substantially exceeds the average growth rate for education publications more broadly, which typically falls between 15 and 25 percent per year (Kasneci et al., 2023). While this sharp growth reflects the vitality of the academic community, it also raises concerns about the quality, duplication, and theoretical depth of the research published during periods of extreme acceleration (Bin-Hady et al., 2024).

The geographic dominance of the United States and China in AI-ELT research production mirrors broader patterns of contemporary global scientific output, yet the emergence of Indonesia at seventh place worldwide is a significant finding that underscores the vitality of the educational research ecosystem in Southeast Asia. Indonesia's position is sustained by intense collaboration among higher education institutions such as Universitas Negeri Yogyakarta, Universitas Ahmad Dahlan, Universitas Negeri Padang, and international partners in Malaysia, Kazakhstan, and the Philippines (Kassymova et al., 2024). The identified collaboration network suggests that Indonesian researchers serve as a bridge between the Southeast Asian cluster and the Central Asia-Russia cluster through their ties with Kassymova and her collaborators in Kazakhstan (Retnawati et al., 2025). A strategic implication of this finding is the importance of sustained investment in empirical research within Asian EFL contexts, which possess unique sociocultural dynamics and remain underrepresented in reputable international journals.

The LDA modeling reveals that the thematic landscape of AI-ELT in the post-2022 period is dominated by three main research fronts: the use of generative AI for writing feedback, the integration of chatbots for conversational practice, and the exploration of ethical and academic integrity issues. The emergence of Topic 8 (Ethics, Bias, and Academic Integrity) as a rapidly growing new topic since 2023 indicates that the academic community has begun to respond seriously and reflectively to the risks of generative AI (Kasneci et al., 2023). A comparative analysis of sub-topics within Topic 8 indicates that the discussion of AI ethics in ELT is dominated by Global North perspectives, with a focus on plagiarism, the detection of AI-generated text, and institutional policy (Crompton et al., 2024). Issues more relevant to the Global South context, such as inequities in access to English-language AI technologies, the dominance of standard English varieties over local linguistic variants, and threats to local pedagogical wisdom, remain underrepresented in the research corpus (Bin-Hady et al., 2024). This thematic gap represents a priority area for the research agenda of scholars working from developing countries.

Several surprising findings merit specific discussion. First, the proportion of research on automated essay scoring as a standalone topic has declined even though the underlying technology has matured, likely because research attention has shifted toward generative AI, which offers more comprehensive capabilities for written feedback (Steiss et al., 2024). Second, the relatively low volume of research on the impact of AI on the mental health and motivation of language learners is a concerning gap, given the close relationships among learning technologies, academic anxiety, and psychological well-being (Kassymova et al., 2024). Third, although many studies discuss teachers' perspectives on AI in ELT, very few systematically examine the professional development of language teachers for AI literacy, an area that is crucial for sustainable implementation (Crompton et al., 2024). Taken together, these three findings indicate the existence of significant research gaps that could be prioritized by researchers entering the domain.

The practical implications of these findings can be articulated across three interrelated dimensions. For the research community, the resulting intellectual map provides concrete guidance for identifying research gaps, particularly AI ethics in developing-country contexts, the impact of AI on learner psychological well-being, and the validation of AI competence instruments for ELT teachers. For higher education policy developers, especially in Indonesia, Kazakhstan, and other developing countries, these findings underscore the urgency of developing contextual policy frameworks for AI in ELT rather than simply adopting frameworks from the Global North (Kassymova et al., 2024). For language teaching practitioners in the field, the map of eight LDA topics can help direct professional development

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toward the areas most relevant to classroom practice, such as the use of generative AI for writing feedback and the integration of chatbots for conversational practice (Yang et al., 2024). This triangulation of implications affirms the multi-dimensional contribution of bibliometric and LDA approaches in contemporary education research.

Taken together, the findings presented in this Discussion directly address the five research objectives outlined in the Introduction. The exponential growth trends satisfy the first objective of mapping productivity and publication impact. The identification of leading contributors fulfils the second objective. The LDA topic modeling results respond to the third objective by surfacing dominant thematic clusters. The comparative pre- and post-ChatGPT analysis meets the fourth objective of revealing paradigmatic shifts. Finally, the identification of underexplored areas, particularly regarding the Global South, learner well-being, and teacher AI literacy, satisfies the fifth objective of directing future research priorities. This alignment between objectives and findings confirms the internal coherence of the study's methodological design.

CONCLUSION

The bibliometric and LDA topic modeling analysis of 1,622 articles on AI in ELT for the 2018 to 2025 period produced four integrated main findings. First, publications have grown exponentially since the release of ChatGPT in November 2022, with a 168% increase in the post-2022 period compared with the pre-2022 period, marking a paradigmatic transition into the era of generative AI in English language teaching. Second, the United States, China, and the United Kingdom dominate global productivity, while Indonesia has emerged as a significant contributor at seventh place worldwide, leading the Southeast Asian collaboration cluster together with Malaysia and Thailand and connecting to Kazakhstan through the network linking Kassymova, Retnawati, and Begimbetova. Third, LDA modeling identifies eight dominant topics, with Generative AI and Writing Feedback, Chatbots and Conversational Practice, and Ethics and Academic Integrity representing the most active research fronts in the post-2022 period. Fourth, several underexplored areas present opportunities for future research, particularly AI ethics from a Global South perspective, the impact of AI on learners' psychological well-being, and the validation of AI competence instruments for ELT teachers.

This study contributes to the literature by providing a comprehensive intellectual map that can guide researchers, policymakers, and practitioners as they navigate the rapidly evolving AI-ELT landscape. Its principal methodological contribution lies in the triangulation of quantitative bibliometric analysis with LDA topic modeling, an approach that has been rare in prior AI-ELT reviews. Limitations include reliance on two indexed databases (Scopus and Web of Science), which may overlook quality publications in regional journals or non-English languages; the snapshot nature of bibliometric analysis, which captures one moment in a continually shifting landscape; and a degree of subjectivity in LDA topic interpretation even though it has been validated by two coders. Future research is encouraged to integrate additional databases such as Dimensions, OpenAlex, and SciSpace for multilingual coverage; to conduct dynamic topic modeling for finer-grained tracking of thematic evolution; and to follow up with empirical studies in the identified gaps, especially in the contexts of English language education in Indonesia, Kazakhstan, and Southeast Asia more broadly.

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