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A Bibliometric and LDA Topic Modeling Analysis of Artificial Intelligence in English Language Learning

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ABSTRACT

Artificial Intelligence (AI) has become a transformative tool in education, particularly in the domain of English Language Learning (ELL), offering adaptive, personalized, and scalable instruction. However, the research landscape on AI in ELL remains fragmented, multidisciplinary, and rapidly evolving, making it difficult for scholars, educators, and policymakers to grasp its full scope. To address this issue, this study applies bibliometric and LDA modelling analysis as a systematic and data-driven method to map the development and structure of AI-related research in ELL. The contribution of this study is a comprehensive overview of publication trends, research themes, disciplinary intersections, and influential contributors in AI and ELL, offering a foundation for future investigations and policy decisions. The study utilized data from the Scopus database covering publications from 2015 to 2025, yielding 1,510 documents. Bibliometric techniques including citation analysis, keyword co-occurrence, and ISCED-based disciplinary classification were applied using RStudio and the Bibliometrix package. Topic modeling was conducted using Latent Dirichlet Allocation (LDA) to identify thematic clusters in the literature. Findings indicate an annual growth rate of 60.47% in the volume of publications, with China, India, and Malaysia leading as primary contributors. Citation analysis indicates that key papers from 2018 and 2023 continue to shape the field's development. Using LDA (Latent Dirichlet Allocation), seven thematic clusters were detected: adaptive instruction, AI-driven writing feedback, motivation within learners, and application of machine learning. Disciplinary mapping illustrates that the foundations for AI in ELL come from Education and Humanities, along with increasing input from Computer Science and Engineering, marking its interdisciplinary global integration. This study may help curriculum designers, tech developers, and education policymakers better understand where the field is heading and what areas still need attention. It also underscores the importance of addressing challenges such as ethical considerations, data privacy, and equitable access in the use of AI for language education.

1. Introduction

Artificial Intelligence (AI) impact's extends to all industries, including education. Its use encompasses intelligent tutoring systems, grading automation, adaptive learning technologies, and

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teaching assistants in virtual formats. For language teaching and AI application, technologies like chatbots, intelligent writing and virtual tutors, as well as adaptive learning systems implement training through NLP-enabled tools, machine learning algorithms, and even speech recognition technologies [1], reshaping traditional pedagogical practices. These innovations promise not only personalized learning experiences but also scalable support based on data for language acquisition.

One of the most significant contributions of AI in ELL is its ability to provide personalized learning experiences. Traditional classroom settings often struggle to cater to the diverse linguistic needs and learning speeds of individual students [2]. AI systems, however, can analyze learners' performance data in real time and adapt instructional content accordingly [3], [4]. For example, adaptive learning platforms use algorithms to enable learners to receive real-time feedback, customized lessons, and immersive experiences tailored to their proficiency levels [5], [6]. This level of customization helps learners stay engaged and supports more effective skill acquisition [7].

Despite these advancements, several problems persist. First, ELL students vary widely in their learning styles, motivation, and linguistic backgrounds, making one-size-fits-all instruction ineffective [2]. Second, educators often struggle to integrate AI tools pedagogically, either due to lack of training or theoretical guidance [8]. Third, ethical concerns about data privacy, bias, and over-reliance on automation raise questions about AI's role in communicative competence development [9]. Finally, equity and access remain major concerns, as learners in under-resourced contexts may lack the infrastructure to benefit from AI [10], [11].

To address these issues, researchers have proposed leveraging AI such as intelligence learning systems and adaptive learning platforms to enhance engagement and support diverse learning [5]. Adaptive learning systems now tailor vocabulary, grammar, and reading materials to learner profiles. Chatbots provide 24/7 conversation partners, while VR tools simulate real-world environments for immersive practice [12]. Automated correcting feedback tools offer instant feedback frequently applied to English as a second language learning context and undergraduate students, helping them develop accuracy and fluency at their own pace [13]. These solutions, when thoughtfully implemented, have demonstrated improved engagement, retention, and learner autonomy [6], [7].

However, the research landscape on AI in ELL is highly fragmented. Studies span multiple disciplines like education, applied linguistics, computer science, and information technology, each with different theoretical foundations, terminologies, and research priorities [14]. While this diversity offers rich perspectives, it also creates gaps, making it difficult to synthesize existing knowledge or identify underexplored areas. For educators, this fragmentation hinders practical adoption; for scholars, it slows theoretical progress; for policymakers, it obscures trends that should inform investment and regulation.

To unify and make sense of this evolving body of work, bibliometric analysis offers a powerful solution. As a quantitative method grounded in scientometrics, it enables systematic mapping of publication trends, co-authorship networks, keyword clusters, and citation dynamics [15], [16]. Recent bibliometric studies have mapped AI in higher education [14] and educational technology [17], but no study to date has systematically examined the intersection of AI and English Language Learning. This highlights the novelty of the present study

In summary, although this growing literature highlights the potential of AI to transform English language education, it leaves several important aspects underexamined which particularly regarding thematic structures, influential contributors, and disciplinary foundations. To address these gaps, the present study is guided by the following research questions:

RQ1: What is the publication trend of AI-related research in English Language Learning?

RQ2: Who are the most influential authors, journals, countries, and institutions in this field?

RQ3: What are the major research themes and keywords in AI-based English Language Learning?

RQ4: What are the dominant disciplines contributing to this research area?

These questions frame a comprehensive bibliometric analysis of peer-reviewed literature on Artificial Intelligence in English Language Learning, using Scopus-indexed publications. This study aims to map the research landscape, identify influential contributors and journals, highlight thematic clusters, and uncover disciplinary patterns and research gaps. Specifically, it investigates publication trends over time, the most impactful stakeholders shaping the field, the conceptual structure of current research, and the academic disciplines involved. By addressing these questions through a bibliometric lens, the study not only quantifies the structure of the field but also reveals where scholarly focus is concentrated and where critical gaps remain. For researchers, it highlights trends and emerging opportunities; for educators and tool designers, it identifies innovations supported by evidence; and for policymakers and funding bodies, it offers strategic insight to guide future investment and policy decisions. Moreover, this study aims to contribute a structured, data-informed perspective to a rapidly growing and impactful field, laying the groundwork for more coordinated and meaningful future efforts.

The remainder of this paper is structured as follows: Section 2 describes the research methodology and data collection procedures. Section 3 presents and discusses the key findings from the bibliometric and topic modeling analyses, including trends in publication, thematic clusters, and disciplinary patterns. Finally, Section 4 concludes the study by summarizing major insights, offering practical recommendations, and outlining directions for future research.

2. Method

2.1. Research Design

The aim of this study is to understand the structure and evolution of AI in ELL through bibliometric methods. The analysis concentrates on scholarly productivity patterns within a decade spanning from 2015 to 2025 which include key contributors, dominant research themes and cross-disciplinary engagement.

The Bibliometrix package in RStudio used in conducting the bibliometric analysis. The tools help to collect data on aspects such as the frequency of paper publication and citation, the collaboration between authors, and the co-occurrence of keywords. To understand the main topics in the field, this study use LDA (Latent Dirichlet Allocation) model, which aims to cluster the abstracts and author keywords to group similar themes. Research disciplines were sorted using the ISCED classification, showing how different academic fields contribute to this area. To enhance methodological of the screening process, the study applied the PRISMA 2020 guidelines [18]. The flowchart in Fig. 1 shows each step, from finding the articles to deciding which ones to include.

2.2. Data Collection

The dataset was retrieved from the Scopus database on June 10th, 2025, with a structured Boolean search applied for the Title, Abstract, and Keywords (TITLE-ABS-KEY) fields. The search string used was: ("artificial intelligence" OR "machine learning" OR "chatGPT" OR "AI") AND ("English language learning" OR "ELL" OR "language education" OR "English teaching"). To ensure relevance and data quality, filters were applied to limit results to documents published in English, classified as articles or conference papers, and indexed under relevant subject areas, including Education, Social Sciences, Computer Science, and related fields. This search yielded a total of 1,870 records for initial screening.

Scopus was selected due to its reputation for indexing publications that have undergone rigorous peer-review, often associated with greater impact in scholarly work. The privilege and prestige that comes with being indexed in Scopus provides undeniable scholarly value that strengthens the trustworthiness of the dataset. Still, it is necessary to note that there are other crucial journals that are not covered by Scopus. Some journals, especially those from underfunded institutions, struggle to comply with the stringent Scopus indexing requirements or pay the exorbitant publication fees. This can result in the exclusion of important datasets and limit the comprehensiveness of the dataset.

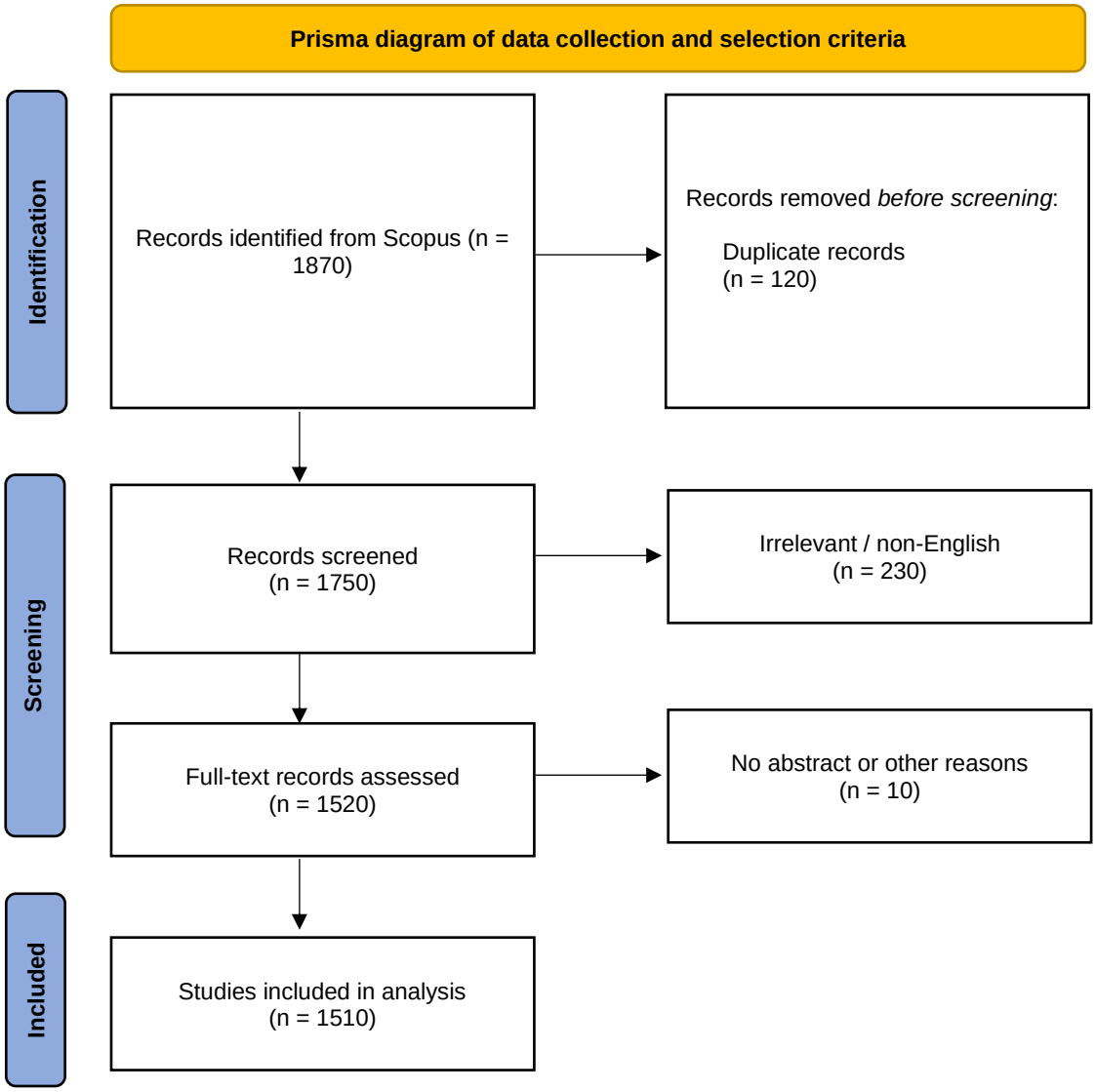

Fig. 1. Prisma diagram of data collection and selection criteria

2.3. Inclusion and Exclusion Criteria

Three-step screening process was used to refine the dataset and ensure the relevance and completeness of the included publications. Table 1 outlines the criteria applied at each stage. In the first step, duplicate records were removed, and the time frame was limited to publications between 2015 and 2025. This period was selected to capture the most recent decade of research reflecting the growing integration of artificial intelligence in English Language Learning (ELL).

Table 1. Inclusion and Exclusion Criteria

Step	Criterion	Inclusion	Exclusion
1	Time period	2015 to 2025	Before 2015 or after 2025
	Duplicates	Unique records	Duplicate entries
2	Topic relevance	AI applied in English Language Learning	Unrelated to both AI and ELL
	Educational context	Formal or non-formal language education settings	Non-educational contexts
	Academic completeness	Full metadata (title, abstract, keywords, affiliations)	Incomplete or missing components
3	Language and accessibility	English; available DOI and full abstract	Non-English or missing metadata

In the second step, inclusion was restricted to publications that met the following conditions: (1) the topic must be directly related to the use of Artificial Intelligence in the context of English language learning or teaching, (2) the publication must be situated within formal or non-formal educational contexts, and (3) the article must contain essential academic components, including at least the title, abstract, keywords, and affiliation metadata.

In the final step, accessibility and language criteria were applied. Only articles written in English and indexed with complete metadata were retained. The records of lacking abstracts, author keywords, or Digital Object Identifiers (DOIs) were excluded. After these multi-stage screenings, a total of 1,510 eligible documents were extracted for bibliometric analysis.

2.4. Content Analysis

To meet the research aims and provide appropriate responses to the guiding queries, this inquiry performed a content analysis on 1,510 publications chosen for bibliometric evaluation. A combination of descriptive and thematic techniques was used. Descriptive Analysis sought to measure publication activity over a period of time while also identifying the leading authors, key journals, contributing nations, and their respective institutions. These indicators are beneficial in understanding the development and major contributors in the field of Artificial Intelligence in English Language Learning. As noted by Lachheb et al., bibliometric methods are particularly effective in scanning the research terrain, identifying patterns in scholarly production, and critically reflecting on what is being studied—and what is being overlooked [19].

For deeper analysis, thematic exploration was conducted using co-occurrence keyword analysis from author-specified keywords and abstracts. To reveal more profound conceptual layers within texts' underlying structures, Latent Dirichlet Allocation (LDA) topic modeling was employed. This approach made it possible to identify several latent topics around themes such as adaptive learning, feedback mechanisms, learner engagement metrics, or AI facilitated writer support tools. This unsupervised machine learning approach enabled the extraction of latent topics, which allowing the identification of prevailing research focuses such as adaptive learning, feedback mechanisms, learner engagement metrics, and AI-facilitated writing support tools. As highlighted by Arthi and Gandhimathi, topic modeling enables researchers to assess the dynamic development of concepts and themes across time in a field like English Language Teaching, where cognitive dimensions such as critical thinking intertwine with linguistic instruction [20]. Furthermore, each publication was categorized into one or more academic disciplines utilizing ISCED (International Standard Classification of Education). This permitted classification into Education, Humanities, ICT and Engineering demonstrating interdisciplinary nature to research within field.

3. Results and Discussion

3.1. Publication Growth on AI in English Language Learning (Q1)

The annual scientific output in AI and English Language Learning (ELL) has grown significantly from 2015 to 2025. As seen in Fig. 2, there were only 4 publications in 2015, growing steadily to a peak of 596 in 2024, followed by 453 in 2025. By 2024, the number of publications had peaked at 596, followed by 453 publications in 2025. The overall annual growth rate of 60.47% reflects the rising interest in AI tools, especially as technologies like ChatGPT gained global attention.

Several factors may explain the trend within this topic. First, the interest in AI was cosine with the shift in availability of AI tools and especially large-scale language models like ChatGPT. It sparked interest at the academic and practical level for how these technologies can be implemented in teaching. At the same time, the Covid Pandemic pushed traditional education into the digital domain. This encouraged many educators and researchers to experiment with self-paced remote learning solutions that are often powered by AI. Another factor may be the rise in opportunities for funding, which may have put some scholarly work into this topic. Looking at the data, the apparent decline in publication numbers in 2025 should be interpreted with caution, as the data was retrieved in the middle

of the year (June 10th, 2025). It is likely that the number of publications for 2025 will continue to rise as more articles are published and indexed later in the year. Therefore, the current data may not reflect the full research output for 2025 and does not necessarily indicate a downward trend.

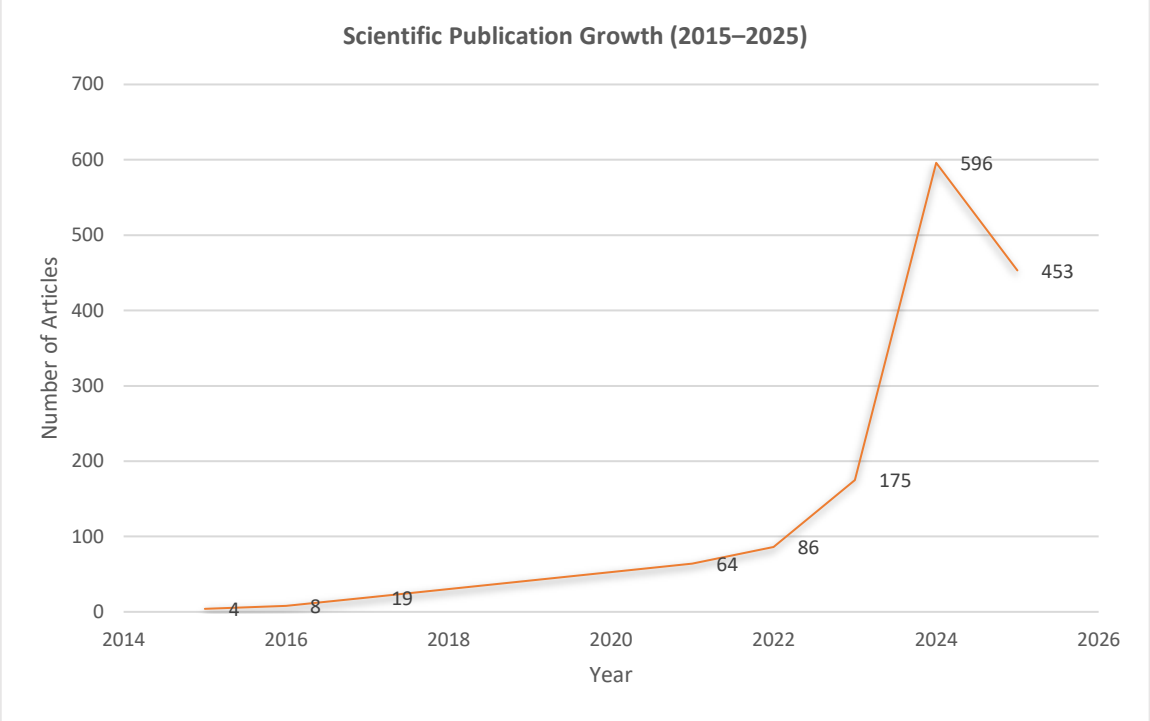

Fig. 2. Scientific Publication Growth (2015–2025)

In terms of impact, the citation data tells a complementary story. As shown in Fig. 3, the most highly cited publications per article appeared in 2018, with an average of 38.88 citations. This likely reflects the foundational nature of early studies that have had more time to accumulate citations. More recent work, especially in 2023, also performed well with an average of 22.99 citations per article, showing that newer contributions are already gaining traction. By contrast, the lower citation averages in 2024 and 2025 are expected due to the natural lag in citation cycles, not necessarily because the work is less valuable.

Moreover, these trends show that AI in ELL has moved from an emerging research interest to a mainstream topic across multiple disciplines. These findings indicate a rapid acceleration of research activity over the past five years, likely stems from increasing institutional investment, classroom experimentation, and wider public interest in AI technologies. As interest in the field continues to rise, research is expected to expand into a wider range of topics and delve more deeply into the influence of AI on language education globally. This ongoing trend provides strong support for the hypothesis that AI is becoming a central focus in language learning research worldwide.

3.2. Leading Contributors: Authors, Countries, and Institutions (Q2)

As indicated by citation analytics in Fig. 4, Perkins published the most influential work of the dataset in 2023, which was cited 395 times, followed closely by Kessler (2018) and Sun (2021). The intelligent tutoring systems, AI-assisted writing feedback, and pedagogical models for AI integration are some of the top cited works. This concentrated pattern strongly implies that AI-enabled ELL research continues to focus on adaptive learning frameworks that feature autopilot modes for teaching and evaluation. It is clear from their prevailing emphasis that these structures largely determine the frameworks discourse contemporary use is built on.

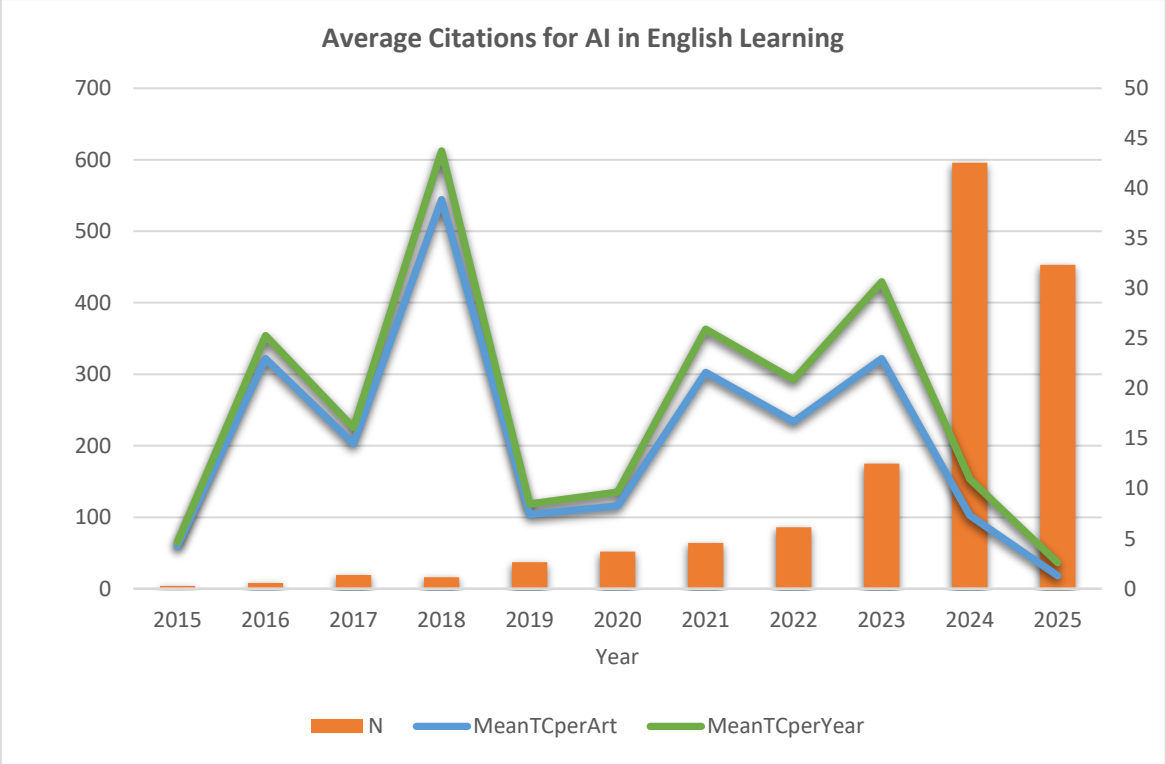

Fig. 3. Average Citations for AI in English Learning

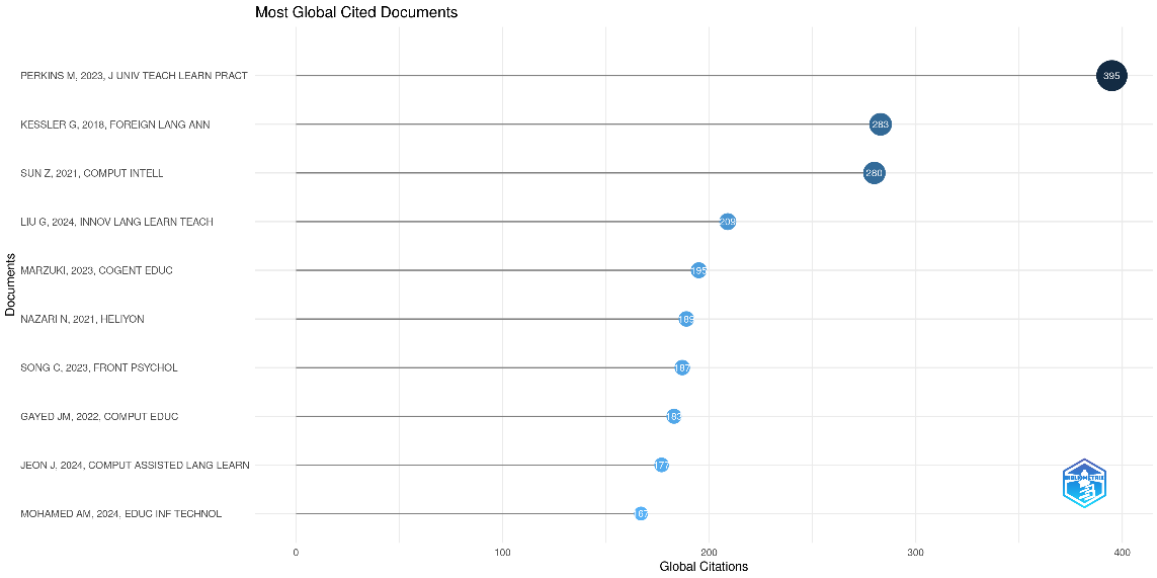

Fig. 4. Most Globally Cited Documents

Further, a geographic analysis reveals a shift in leadership within regions focused on research output. China has been the most productive country since 2020 (Fig. 5), followed closely by India, Indonesia, Saudi Arabia and the United States. This is suggestive of a regional focus or interest in education in artificial intelligence technologies driven by greater academic activity dealing with generative AI from developed infrastructures coupled with accommodating policy settings seen in Asia and the Middle East. The information not only captures increased productivity but serves as evidence towards shifting collaborative models of research departure from previous works centered around bibliometric reviews dominated by Western contributions.

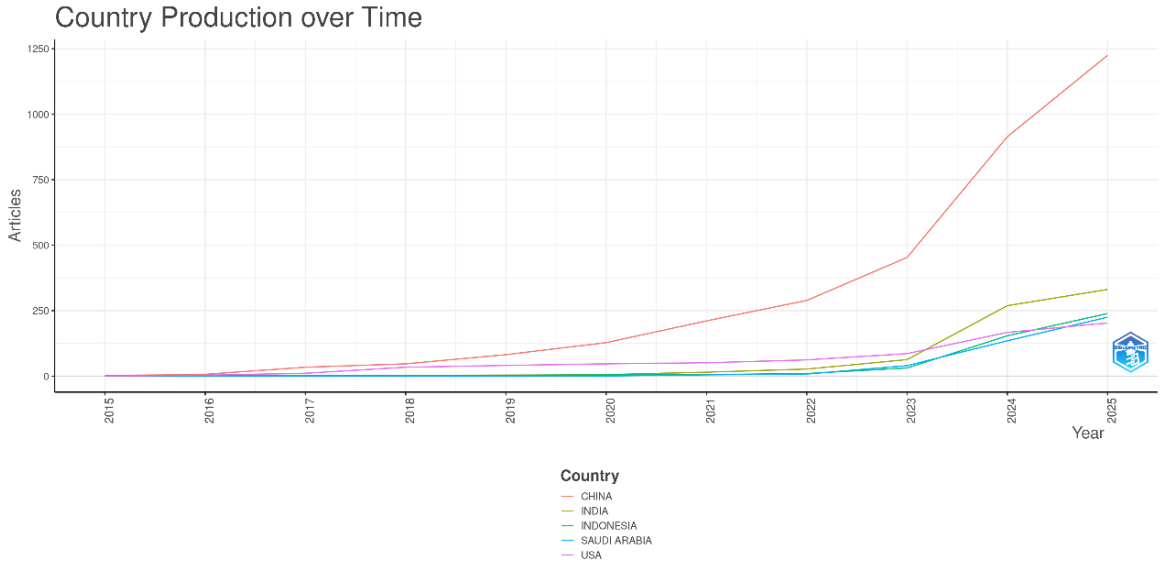

Fig. 5. Country Production Over Time

Research productivity by institutions follows a similar geographical pattern (Fig. 6). The most active ones are Universiti Teknologi Malaysia, Universitas Negeri Malang, and The University of Hong Kong. Their sustained output provides evidence for the development of new scholarly centers in artificial intelligence and language teaching research. This development is consistent with other patterns in international scholarship, as now more than before regionally located centers of research excellence are influencing both the amount and the focal areas of research. Also remarkable is that these institutions have shown strong collaboration networks which again supports the notion that co-authorship and institutional partnerships strongly determine citation impact and visibility on a global scale.

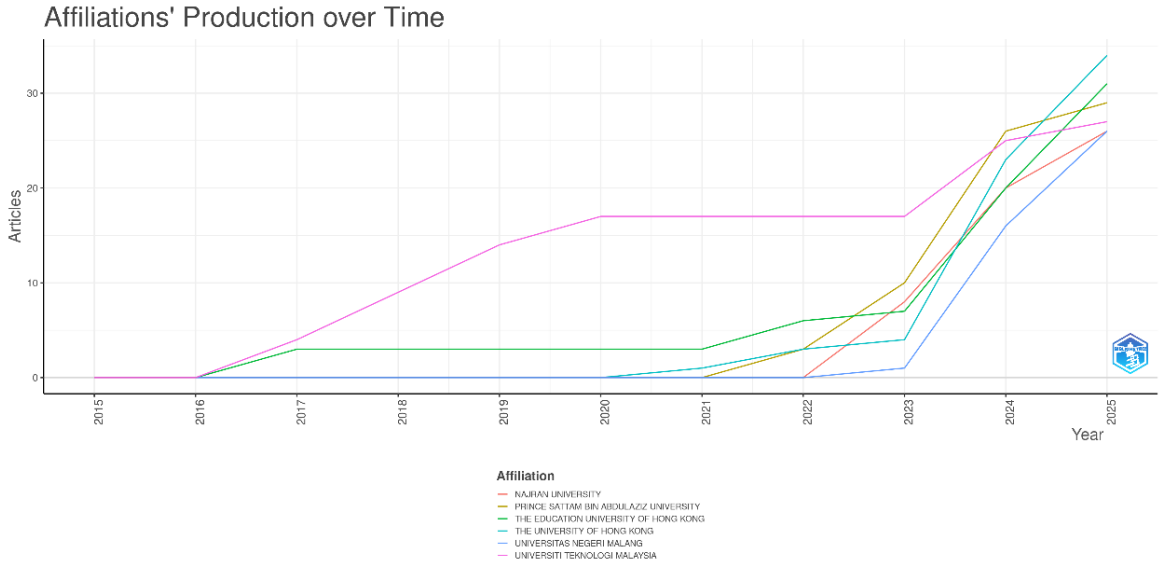

Fig. 6. Affiliations' Production Over Time

As clearly presented in the citation analysis, authors, countries, and affiliations seem to indicate more freely distributed AI-assisted language education scholarly outputs. Works that received the highest number of citations were authored/adapted instruction, intelligent tutoring systems, AI teaching or educational frameworks suggesting further optimizations academically driven today continue to focus on personalization and efficiency in learning. It is eye-catching indeed that states

such as China, India, Indonesia, as well as Saudi Arabia have recently emerged into foremost important players unlike before when research focus was Western-centric. At the same time, institutions like Universiti Teknologi Malaysia, Universitas Negeri Malang, and The University of Hong Kong are stepping up as primary contributors demonstrating how pertaining expansion in digital infrastructure is fostering academic creativity. Together, it appears that the emerging collaborations coupled with institutional networks have taken center stage when it comes to determining the influence and visibility of research on a global level.

3.3. Major Research Themes and Keywords in AI-Based ELL

LDA topic modeling identified themes like adaptive learning, feedback systems, engagement of learners, and AI-supported writing tools. Those thematic clusters suggest dual concentration within the areas: a teaching intention geared toward improving learner autonomy and engagement and the AI functionalities designed to support these goals. Nowdays, generative AI technologies like ChatGPT marks a move away from the use of passive AI technologies toward the use of more active, learner-centered approaches. This change is indicative of heightened expectations for self-directed learning that align with the international landscape of education technology. To better understand the conceptual structure of research in AI and English Language Learning (ELL), Latent Dirichlet Allocation (LDA) topic modeling was conducted using author keywords and abstracts. This analysis revealed seven prominent themes, each reflecting a distinct research focus (see Fig. 7):

Topic 1: Personalized and self-directed learning

Topic 2: AI-integrated pedagogical tools (e.g., ChatGPT)

Topic 3: AI-supported instruction in foreign language classrooms

Topic 4: Writing feedback and speaking practice systems

Topic 5: EFL/ESL learning motivation and classroom dynamics

Topic 6: Vocabulary, grammar, and linguistic patterns

Topic 7: Machine learning algorithms and model performance

These themes indicate a strong presence of both pedagogical goals and technical concerns across the literature. What stands out across these topics is how the field balances two main concerns: how to teach better using AI, and how AI actually works behind the scenes. On the teaching side, topics like personalized learning (Topic 1) and AI-supported classroom tools (Topic 2) show how educators are exploring ways to give learners more control, flexibility, and interactive experiences. For instance, recent studies have examined how students use chatbots to practice conversations or how adaptive systems adjust tasks based on learner progress [21].

Topic 4, which focuses on feedback for writing and speaking, reflects another big trend: using AI to improve language accuracy and fluency. While tools like Grammarly or speech recognition apps are helping students correct mistakes and build confidence, researchers have also pointed out limitations such as AI missing context or giving feedback that's too mechanical.

Early research on AI in ELL largely focused on improving grammatical accuracy, vocabulary retention, and pronunciation, as reflected in Topics 4 and 6. These studies often relied on rule-based or statistical AI models and emphasized complex linguistic rules [22], [23]. The use of intelligent tutoring systems and automatic writing evaluation tools dominated this stage.

As AI technologies matured, there was a shift toward adaptive learning systems that promote learner-centered experiences (Topic 1). These systems analyze input from learners and adjust content dynamically based on individual needs. For instance, Lin and Lee studied the impact of AI-driven apps that personalize grammar and vocabulary instruction. The development of large language models (LLMs) such as ChatGPT has further advanced the field, emphasizing real-time dynamic interaction and natural language generation (Topic 2) [24], [25], [10]. Studies have explored how these generative

tools support role-playing, peer feedback, and autonomous conversation tasks, illustrating a shift from static AI systems to more dynamic, learner-AI collaboration [26-28].

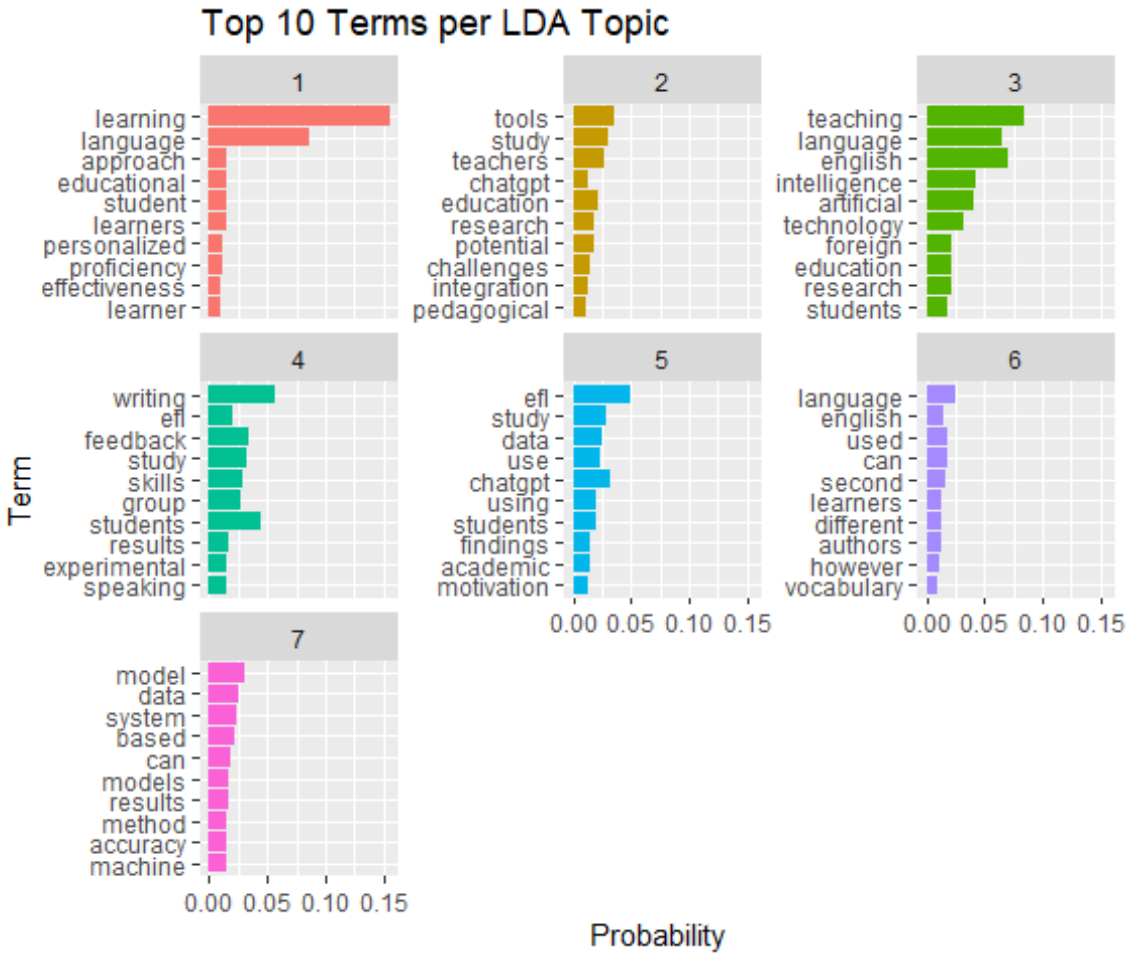

Fig. 7. Top 10 terms per LDA topic

As for the more technical aspects, Topic 7 collates investigations into the design and functionality of the AI tools. Such papers are usually from computer science or linguistics fields dealing with the training of natural language models or their performance in language learning contexts. All these themes point to a trend where AI use in ELL is becoming increasingly interactive, more attuned to students' needs, and multidisciplinary. Overall, the overarching LDA-based themes also reinforce that the area of AI in ELL is not fragmented. It integrates inquiry into learner actions within the instructional setting, teaching methods, and technology innovation. Interdisciplinary collaboration will enhance development of AI applications aimed at more customized and profound language learning. Other scholars may research these gaps, especially concerning ethics issues related to data privacy and multimodal pedagogical environments.

3.4. Disciplinary Contributions to the Field of AI in English Language Learning (Q4)

As the integration of Artificial Intelligence into English Language Learning (ELL) accelerates, understanding its disciplinary roots becomes critical for evaluating the field's direction, balance, and knowledge gaps. Using the International Standard Classification of Education (ISCED), this study categorized contributions into four dominant academic domains: Education (01), Humanities (02), Information and Communication Technologies (ICT, 06), and Engineering (07). An additional segment of publications remained Unclassified (~200), due to ambiguous metadata or multidisciplinary overlap (see Fig. 8). The presence of unclassified portion may have from emerging

interdisciplinary research areas that do not align with traditional classifications, or from inconsistencies in authors' keyword tagging. This represents a notable limitation that future bibliometric tools and taxonomies should seek to address.

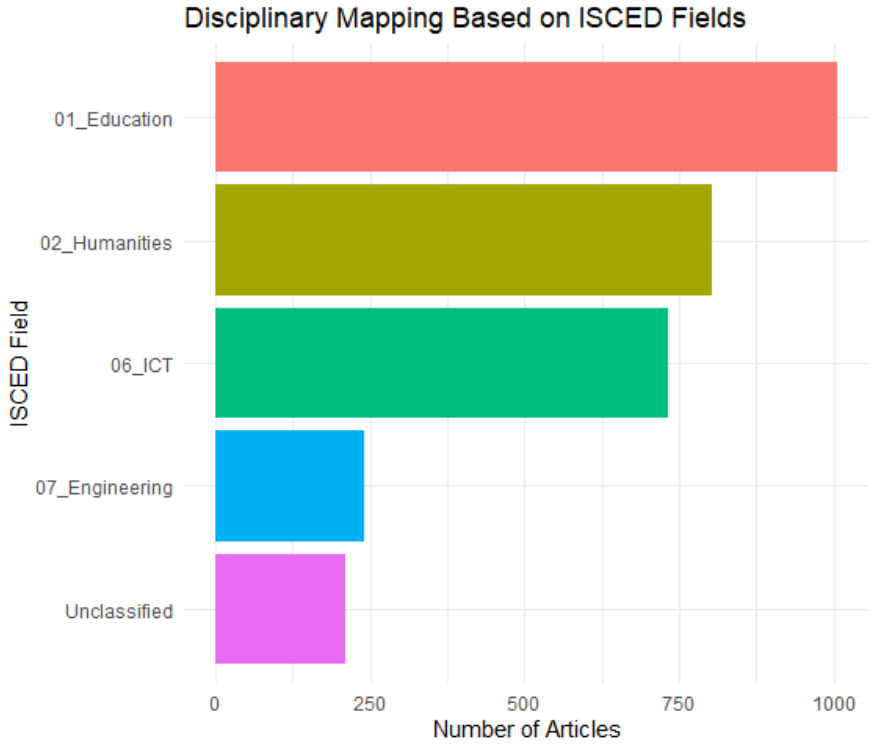

Fig. 8. ISCED-based disciplinary classification of AI in ELL publications

Historically, the earliest contributions to this field were predominantly grounded in education and applied linguistics, where researchers explored how AI platforms provide useful data-driven insights for educators which could support vocabulary retention, grammar instruction, pronunciation practice and skill development in traditional classroom contexts [24]. These studies often emphasized the teacher's role in integrating AI tools and focused on student learning outcomes in structured, curriculum-aligned environments.

Applied linguists are exploring how AI can address real-world language-related issues, integrating technology into language assessment and teaching [28]. Tools like chatbots and virtual tutors provide continuous practice opportunities, promoting independence in EFL Learning [27]. These intersections ensure basic screening of AI applications based on its functionality to include SLA (Second Language Acquisition) theory and linguistic frameworks. Such pedagogical anchoring ensures that technology use aligns with meaningful learning outcomes and student needs.

The ICT and Engineering involvement mark a significant evolution in the field. As recognized scholars from these disciplines have made notable strides in developing and ensuring the ELL-embedded systems' speech recognition, neural translation engines, and intelligent tutoring systems' performance from an AI design perspective [30]. Their work is characterized by computational modeling, system evaluation, or algorithm optimization which all critical for the scalability and robustness of educational AI systems.

However, with so many technologically oriented studies come a heightened concern regarding imbalance within academic disciplines. Although access and functionality are bolstered through innovation technology, if educator's perspectives are not ranged equally to guide on pedagogical considerations, there is potential risk of losing nuance [31]. This underlines the need for disciplinary

mapping as a strategic tools to allows researchers assess whether the field remains pedagogically anchored or is drifting toward tool-centric development without sufficient classroom validation.

The Unclassified publications (~13%) points to the complexity and evolving nature of the field. Some of the studies lie at the intersection of areas such human computer interaction, cognitive science, or even digital ethics which making it more complex to classify under ISCED definitions. These emerging intersections highlight the complexity of AI integration in language learning. They also represents daps and opportunities where ethical, cognitive and sociocultural dimensions of AI use in education are still being explored but still remain underrepresented in most journals. This mirrors trends observed in other domains of educational technology where hybrid disciplines are increasingly defining research frontiers [17]. This ambiguity in classification reflects a broader challenge in bibliometric studies, which is disciplinary boundaries are increasingly fluid, yet indexing systems remain rigid. Future analyses should consider how such hybrid research can be better captured and evaluated to support a more nuanced understanding of AI in education.

Overall, the disciplinary analysis reveals that while the field remains strongly rooted in education and language studies, the increasing contributions from engineering and computing underscore a shift toward deeper interdisciplinarity. Monitoring this evolution is essential for ensuring that educational impact remains at the core of AI development for language learning which balancing innovation with instructional integrity.

4. Conclusion

This study systematically mapped the research landscape of Artificial Intelligence (AI) in English Language Learning (ELL) using bibliometric analysis and Latent Dirichlet Allocation (LDA) topic modeling on Scopus-indexed data. The findings confirmed a sharp rise in scholarly interest post-2020, driven in part by the development of AI technologies such as ChatGPT and AI-assisted writing tools. Influential contributions originated from a diverse range of countries, institutions, and authors, indicating a global and interdisciplinary engagement in the field. Thematic analysis revealed seven major research clusters, highlighting a shift from tool-focused evaluations to learner-centered, adaptive, and interactive applications. Furthermore, the integration of educational, linguistic, and technical disciplines suggests that AI in ELL is becoming increasingly collaborative and complex.

These findings offer several practical implications. For researchers, this study identifies emerging areas such as generative AI, dialogue-based systems, and interdisciplinary collaboration that warrant deeper exploration. For educators and tool developers, the study highlights the need to align AI applications with pedagogical goals and learner needs. Policymakers should consider supporting ethical frameworks that address data privacy, algorithmic bias, and equitable access—especially in under-resourced contexts. Nonetheless, the study is limited by its reliance on a single database (Scopus), which may underrepresent non-English, regional, or unindexed publications. Future work should broaden the scope to include other databases, longitudinal tracking of AI's impact on learning outcomes, and qualitative assessments of AI use in authentic classroom environments.

In addition, this study provides a structured, data-driven overview of how AI is shaping English language education. By mapping thematic trends, disciplinary foundations, and influential contributors, it lays the groundwork for more coordinated, ethical, and impactful future research in the rapidly evolving AI–ELL domain.

Declaration

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