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Artificial Intelligence in Applied Linguistics Research: A Bibliometric Study Tracing Between the Years of 2017 and 2024

Zafer SUSOY[1]

Elham ZARFSAZ[1]

[1]Tokat Gaziosmanpasa University, Faculty of Education, English Language Teaching Department, Tokat, Türkiye

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Corresponding author:
Zafer Susoy
E-mail: zafersusoy@gmail.com

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ABSTRACT

Drawn upon data from 117 full-length research articles from 19 Social Science Citation Index (SSCI)-indexed journals of applied linguistics, the current study presents a bibliometric analysis of the use of artificial intelligence (AI) in the field from 2017 to 2024. It examines various aspects, including the most frequently discussed topics, the most highly cited publications, the countries and institutions' contributions, and the shifts in citation trends locally and globally. The study employed bibliometric techniques to analyze publication trends, citation patterns, and thematic focuses across SSCI-indexed applied linguistics journals, covering the period between 2017 and 2024. The results show that there has been a substantial increase in the number of applied linguistics studies discussing AI and their citations since 2021. As for the country-based analysis, China is the leading country in single-country publications; however, in the multi-country publications, the USA is taking the lead, followed by the UK. Frequently discussed topics such as ChatGPT, language learning, student performance, and automated assessment and feedback indicate intense research on applying AI to enhance language learning and assessment. Furthermore, keywords such as "machine learning," "chatbots," "NLP," and "large language model" form another cluster, showcasing the various AI technologies employed in applied linguistics. Overall, these trends underscore a robust and evolving intersection of technology and education, suggesting that future research may further illuminate the transformative potential of AI in language acquisition and pedagogy.

Keywords: Applied linguistics, artificial intelligence, language learning, bibliometrics

Introduction

Artificial intelligence (AI) has a significant impact on language instruction in applied linguistics, especially when it comes to second language (L2) acquisition. Language education is changing as a result of developments in machine learning (ML) and natural language processing (NLP), which are replacing earlier approaches with more individualized learning opportunities (Pokrivcakova, 2019). This change is primarily due to AI-driven chatbots offering comprehensive language practice (Dokukina & Gumanova, 2020; Huang et al., 2023). Studies by de la Vall and Araya (2023) and Alm and Nkomo (2020) demonstrate that these chatbots significantly improve language proficiency through simulated discussions. The learning process is further enhanced by the tailored input and feedback provided by these interactions (Tsivitanidou & Ioannou, 2021).

The rising demand for the possibilities of AI in language training is reflected in the increasing quantity of review papers on the subject (Zhu et al., 2023). Comprehensive studies by Xu et al. (2019) and Oliva et al. (2021) show the significant impact of technology on language learning. Research employing bibliometrics by Liang et al. (2023) and Huang et al. (2022) reveals trends in the application of AI to language acquisition. However, Yang and Kyun (2022) and Ali (2020) point out the need for more thorough syntheses to fully understand the field's evolution and future directions.

Originally named "bibliométrie" by Otlet (1934) and renamed "bibliometrics" by Rousseau (2014), bibliometrics is the quantitative analysis of readership and publication statistics. This definition was further clarified by Pritchard (1969), who defined it as studying publications and other kinds of communication by applying statistical and mathematical techniques. Bibliometric analysis is broadly

synonymous with scientometrics and involves multiple approaches. For example, Author Co-citation Analysis (ACA) examines the relationships between co-cited authors to map knowledge domains (Wang et al., 2018), while Document Co-citation Analysis (DCA) identifies important documents based on citation patterns. Citation Analysis is another popular bibliometric technique that evaluates the impact of writers, publications, organizations, and documents using a variety of citation measures.

Researchers usually use one of three databases for bibliometric investigations: Google Scholar, Scopus (Elsevier), or Web of Science (WoS). Every database has benefits and drawbacks. For instance, using Google's search engine, Google Scholar provides open access to many academic publications (Aguillo, 2012). However, this openness may also be a disadvantage since it might make it harder to identify reliable sources, leading to the creation of a "noisy database" (Aguillo, 2012). Moreover, Google Scholar's absence of co-citation data and inability to distinguish between academic and non-academic citations make it challenging for bibliometric research (Zhang, 2020). We chose Web of Science (WoS) for our study since it is relevant and thorough. Zhang (2020) and Roemer and Borchardt (2015) noted that WoS has a user base of over 7,000 subscribers. The WoS Core Collection currently includes over 21,100 peer-reviewed academic publications from various fields, including the social sciences, humanities, and arts, as well as conference proceedings and book data, according to Clarivate's official website. Bibliometric researchers often use abstracts, titles, and keywords to extract information about academic disciplines. On the other hand, co-citation analysis is a recent trend that looks at references. The method's perceptive results have made it popular in many different fields. Bibliometric analysis and co-citation techniques are increasingly popular for identifying scholarly trends and links.

Purpose of the Study

Bibliometric methods are becoming more popular for monitoring and analyzing the spread of knowledge in many forms. Lei and Liu (2019) conducted two important investigations in this area. The first examined contributions to the "System" journal during 40 years (1973–2017), emphasizing recurring themes, highly cited works, and significant authors and references. The second study used bibliometric analysis to identify changing patterns in research trends in applied linguistics (AL) from 2005 to 2016.

A bibliometric analysis of second language acquisition (SLA) from 1997 to 2018 was carried out by Zhang (2020). Zhang discovered key trends, significant papers, authors, institutions, and geographic areas influencing SLA by methodically examining the subject and utilizing the Web of Science (WoS) for data retrieval. This analysis brought to light important developments and new trends in the industry. Several bibliometric studies published in 2021 demonstrated how popular this research methodology is becoming. Bibliometric analysis was used by Hyland and Jiang (2021) to investigate the evolution of the field of English for Specific Purposes (ESP). By examining 3,500 articles released since 1990, they could pinpoint important subjects, significant writers, and noteworthy works. Their research revealed a growing interest in academic and professional discourses and a persistent emphasis on classroom activities.

In addition, Liu and Hu (2021) examined ESP through a co-citation study of papers published between 1980 and 2018. The field was tracked through four developmental stages: methodological development, maturing (1990s–2000s), conceptualizing (1970s–1990s), and flourishing (2000s–present). This approach found 52 seminal studies and 11 key research clusters; recent spikes in citations indicate ongoing research interests. These bibliometric studies offer a thorough summary of their subjects, enhancing typical narrative evaluations with insightful information.

Our work seeks to close the gap by thoroughly bibliometrically examining AI in language teaching. By concentrating on important research themes, patterns, writers, records, and sources, we hope to shed insight into the advantages and difficulties associated with teaching second languages (L2) to contribute to creating more potent language teaching techniques.

The following research questions form the basis of our investigation:

1. What are the artificial intelligence (AI) publication trends and citation metrics in applied linguistics?
2. What bibliometric trends may be found in published papers on artificial intelligence in applied linguistics journals?
3. Which institutions and countries contribute to artificial intelligence publication?
4. Which documents are the most cited within artificial intelligence studies?
5. How do the most cited sources in intelligence studies appear on a network map and density view?

Method

Research Model

We chose WoS as the central database for the current study sample of AI documents. WoS has a user base of over 7,000 subscribers. The WoS Core Collection currently includes

over 21,100 peer-reviewed academic publications from various fields, including the social sciences, humanities, and arts, as well as conference proceedings and book data (Roemer & Borchardt, 2015; Zhang, 2020).

Data Sources of the Research

For our study sample, we chose 19 highly respected journals (the complete list is in Table 1). The selection criteria were among those for journals covering a wide range of second language (L2) study topics and publishing articles with various methodological perspectives. These journals are also included in the Social Sciences Citation Index (SSCI).

After choosing the journals, we looked for AI studies published in them. Utilizing the Web of Science (WoS) search parameters (Artificial Intelligence*) OR (AI*), we analyzed complete texts, abstracts, titles, and keywords from 2017 to 2024. Following a comprehensive analysis, we pinpointed papers that declared themselves AI research and included pertinent AI literature. In the end, we found 117 studies exclusively about AI in the 19 L2 journals, the first one published in 2017. This figure is consistent with earlier surveys of AI research published in prestigious applied linguistics publications, indicating a relative dearth of conclusive AI research in the area. We only considered full-length articles in our analysis; book reviews and other shorter forms of writing were not included.

We gathered pertinent data from WoS and stored it as a text file. This data included titles, authors, affiliations, abstracts, and references. As some research used multiple names for identical authors, we also cleaned the information to address author name inconsistencies.

Data Collection Tool

Leading journals such as System, CALL, and Language Teaching Research publish many AI-related studies. This indicates their role as key platforms for disseminating AI research in applied linguistics.

The table lists journals (SO: Source Titles) ranked by the frequency (Freq) of AI-related publications in applied linguistics and education technology. The cumulative frequency (cumFreq) indicates the cumulative publications count as you move down the list. Education and Information Technologies leads with 18 publications, suggesting a strong focus on integrating AI with educational information technologies.

Table 1.

The Table Lists of Journals

SO	Rank	Freq	cumFreq
EDUCATION AND INFORMATION TECHNOLOGIES	1	18	18
INTERACTIVE LEARNING ENVIRONMENTS	2	9	27
INTERNATIONAL JOURNAL OF EDUCATIONAL TECHNOLOGY IN HIGHER EDUCATION	3	9	36
AUSTRALASIAN JOURNAL OF EDUCATIONAL TECHNOLOGY	4	8	44
LANGUAGE LEARNING & TECHNOLOGY	5	7	52
EDUCATIONAL TECHNOLOGY & SOCIETY	6	6	59
INTERNATIONAL JOURNAL OF MANAGEMENT EDUCATION	7	7	66
BRITISH JOURNAL OF EDUCATIONAL TECHNOLOGY	8	4	70
INNOVATIONS IN EDUCATION AND TEACHING INTERNATIONAL	9	3	73
ASSESSMENT & EVALUATION IN HIGHER EDUCATION	10	4	77
JOURNAL OF COMPUTER-ASSISTED LEARNING	11	3	80
STUDIES IN HIGHER EDUCATION	12	4	84
SYSTEM	13	3	87
ASSESSING WRITING	14	2	89
ETR&D-EDUCATIONAL TECHNOLOGY RESEARCH AND DEVELOPMENT	15	2	91
JOURNAL OF HOSPITALITY LEISURE SPORT & TOURISM EDUCATION	16	2	93
MEDICAL EDUCATION ONLINE	17	2	95
TESOL QUARTERLY	18	2	97
THINKING SKILLS AND CREATIVITY	19	2	97

Interactive Learning Environments ranks second with nine publications, highlighting its role in exploring AI applications in dynamic and interactive learning settings. The International Journal of Educational Technology in Higher Education has nine publications indicating significant interest in AI's impact on higher education technology.

The cumulative frequency provides a sense of the distribution of AI-related research across journals. The top five journals have 52 publications, showing a research concentration in a few key journals. Journals like Language Learning & Technology (8 publications) and Educational Technology & Society (7 publications) are mid-tier in terms of publication frequency. These journals bridge the gap between the highest and lowest frequencies, reflecting diverse research interests and methodologies in AI applications. Journals like Medical Education Online, TESOL Quarterly, and Thinking Skills and Creativity have two

publications. These journals, while having fewer AI-related articles, still contribute to the overall body of research and indicate niche application areas.

The spread of publications across various journals demonstrates the interdisciplinary nature of AI research in applied linguistics. It spans various aspects of education, from interactive learning environments to higher education and specific language learning technologies. The inclusion of journals like Medical Education Online and TESOL Quarterly suggests emerging trends in applying AI to specialized fields such as medical education and teaching English as a second language. This points to the broadening scope of AI applications beyond traditional educational technology contexts. The concentration of publications in a few key journals highlights the importance of these venues in advancing the field. Researchers may target these journals for higher visibility and impact, contributing to the critical discourse on AI in education.

We divided our bibliometric analysis into co-citation analysis and citation analysis of impact. In the first stage, we used Bibliometrix Rstudio by Aria and Cuccurullo (2017) to run the citation analysis and map the publishing trends of AI publications. In the second stage, van Eck and Waltman's VOS viewer was used for co-citation analysis (2017).

Data on the annual publication of AI research and their total global citation counts (TGCS) and total local citation counts (TLCS) were provided by Bibliometrix Rstudio for yearly publication trends and citation counts. The TGCS indicates how frequently papers on AI have been cited by other articles that are indexed in WoS on an annual basis. Every year, TLCS counts the citations made by other pure AI articles in the same index to publications only about AI. The frequency of AI studies across 19 journals and their TGCS, TGCS/t (annual total global citations), TLCS, and TLCS/t (annual total local citations) were determined by analyzing journal frequency and citation metrics. We also assessed institutional contributions by looking at the quantity of AI research institutions generated, the number of citations they received, and their global partnerships.

The ethical process in the study was as follows:

• Ethics Committee Approval: The author stated that ethical permission was not required for the study because humans and animals were not used. However, ethical guidelines were followed throughout the study.

• Informed Consent: No living beings requiring informed consent were involved in this study.

Results

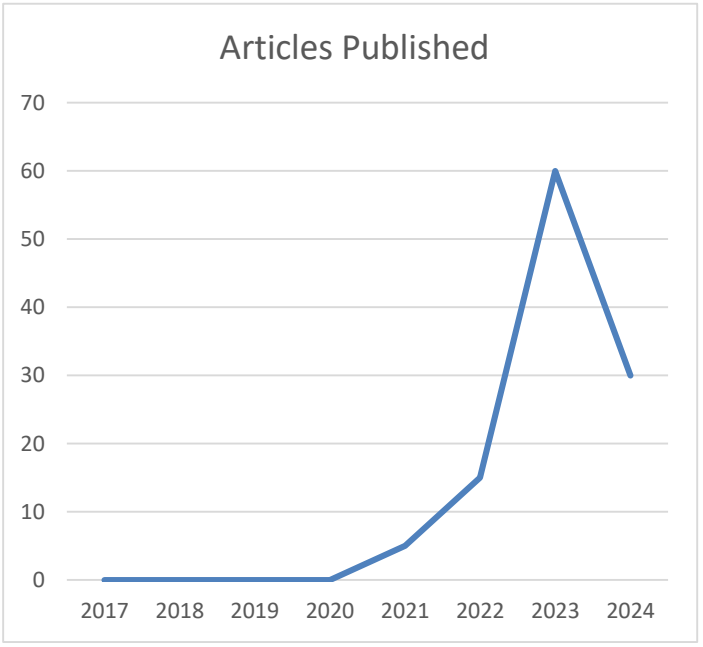
Yearly Publication Trends

The graph shows the number of articles published yearly from 2017 to 2023. The number of articles has increased noticeably, with a significant spike in 2023.

The graph in Figure 1 shows the number of articles published yearly from 2017 to 2023. There is a noticeable increase in articles over this period, with a significant spike in 2023. From 2017 to 2020, the number of articles remains relatively low and stable. 2021, there will be a slight increase, followed by a sharp rise in 2022 and a peak in 2023. A slight decline is observed in 2024, though the number of articles remains significantly higher compared to the earlier years.

Figure 1.

Graph Showing Published Article Amounts



The initial years show minimal publication activity, which could be attributed to the nascent stage of integrating AI in applied linguistics. During this period, researchers may have been exploring the feasibility of AI technologies and their initial applications in this field. The slight increase in 2021 suggests growing interest and preliminary research findings being published. This period likely saw early adopters and pioneering studies that paved the way for more extensive research. The dramatic increase in 2022 and peak in 2023 indicate a breakthrough period for AI research in applied linguistics. Several factors could contribute to this spike:

Significant improvements in AI technologies, such as natural language processing (NLP), machine learning, and

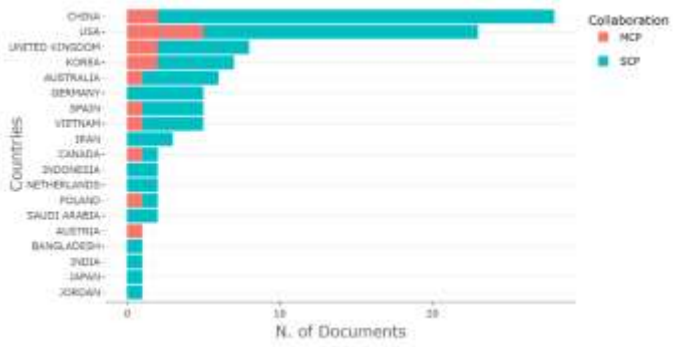
conversational agents like ChatGPT, could have driven more research and publications. More funding and grants from academic institutions, governments, and private sectors could have supported extensive research projects, leading to a higher output of publications. Greater collaboration between linguists, educators, and AI researchers might have led to more interdisciplinary studies and innovative findings. The COVID-19 pandemic might have accelerated the adoption of AI technologies in education as remote learning solutions and automated assessment tools became critical. The slight decline in 2024 could be due to several reasons. Natural fluctuations in publication cycles, where some years have more publications due to the culmination of multi-year research projects. Initial rapid growth might slow as the market saturates and the research community consolidates its findings. Researchers might focus on addressing emerging challenges or refining existing technologies rather than producing new publications.

Citation Trends

The graph in Figure 2 shows the number of citations per year from 2017 to 2023. There is a peak in citations around 2018, followed by a sharp decline and a gradual increase from 2021 onwards.

Figure 2.

Number of Documents Graph



The initial rise and peak in 2018 suggest that early publications on AI in applied linguistics gained significant attention and were widely cited. This could be due to pioneering studies or influential reviews that laid the groundwork for subsequent research in this field. The high citation count indicates that these early works were considered foundational, contributing valuable insights and methodologies that other researchers built upon.

The sharp decline in citations in 2019 could be attributed to several factors. Citations often take time to accumulate, and there may have been a lag following the initial burst of influential publications. The initial novelty might have worn off, leading to fewer new publications and, thus, fewer citations. Researchers might have shifted their focus to different aspects of AI, leading to a temporary drop in citations for earlier studies. The gradual increase in citations from 2021 onwards suggests a resurgence of interest in AI applications in applied linguistics. This period likely reflects the field's maturation, with newer studies building on the foundations laid by earlier research and addressing more complex or nuanced questions. The rise in citations could also be driven by advancements in AI technology and increasing integration into educational practices, prompting more citations of relevant work.

International Collaboration in AI and Applied Linguistics

China has the highest number of documents, predominantly single-country publications (SCP). The USA also has many documents, a significant portion of which are multi-country publications (MCP). The United Kingdom shows a balanced contribution with both SCP and MCP. Other notable contributors include Korea, Australia, Germany, and Spain, each with a mix of SCP and MCP.

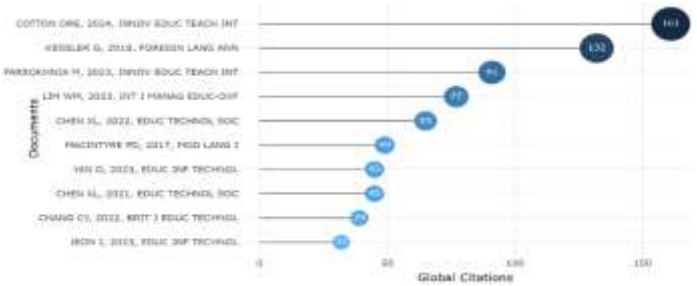
MCP indicates collaborative research efforts between authors from different countries. The USA, UK, Korea, and Germany show significant MCP activity. SCP represents research efforts within a single country. China, Iran, and Vietnam have high SCP counts, indicating strong domestic research activities.

Most Cited Documents in AI and Applied Linguistics

Cotton (2024) in Innovative Education and Teaching International leads with 161 global citations, indicating strong influence. Kessler (2018) in Foreign Language Annals follows with 132 global citations, highlighting its foundational role in foreign language learning and AI integration. Farrokhnia (2023) in Innovative Education and Teaching International stands third with 91 global citations, showing the rapid recognition of recent works addressing pressing issues or introducing groundbreaking methodologies.

Figure 3.

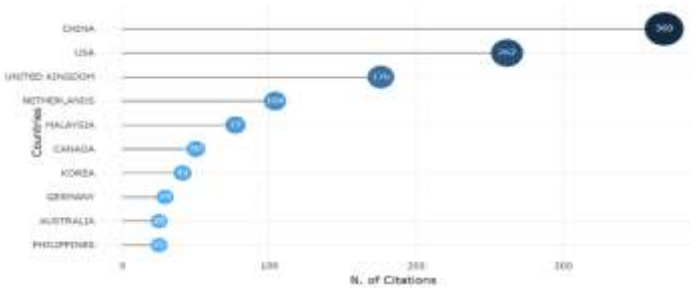
Global Citations Graph



Cotton (2024) is influential, with its high citation count reflecting significant impact and wide recognition within the academic community. The document's focus on innovative educational practices and teaching international contexts resonates strongly with current research trends and practical applications. Kessler (2018), as the second-most cited document, underscores the importance of foreign language learning and the integration of AI in this domain. Its sustained citation count since 2018 demonstrates its ongoing relevance. Farrokhnia (2023) quickly gained recognition due to its contribution to the field within a short time frame. Lim (2023) is another recent work with substantial citations, indicating its importance in management education and the application of AI in administrative and educational leadership contexts.

Figure 4

Citation Count Graph



The diversity of journals and topics among the most cited documents indicates a wide range of research interests within AI and applied linguistics. This includes educational technology, language learning, management education, and innovative teaching practices. The presence of multiple citations from journals like Educational Technology & Society and Innovative Education and Teaching International suggests that these publications are key platforms for disseminating influential research.

Citation Distribution by Country

China leads with 369 citations, indicating a strong impact of its AI and applied linguistics research. The USA follows with 262 citations, reflecting its significant contributions and influence, while the United Kingdom stands third with 176 citations, showcasing its role in advancing the field. The citation distribution highlights the leading roles of China, the USA, and the UK in AI and applied linguistics research. These countries' high citation counts reflect their capacity to produce influential studies that shape the research landscape. Their academic institutions, research funding, and collaborative networks enable them to lead global research efforts.

Countries like the Netherlands and Malaysia also show significant citation counts, indicating their rising influence. This suggests successful efforts to develop AI research capabilities and contribute to international discourse. These emerging countries bring diverse perspectives and innovative approaches, enriching the global research community. The presence of countries from various regions, including Asia, Europe, and North America, highlights the international nature of AI research in applied linguistics, fostering cross-cultural collaborations and knowledge exchange.

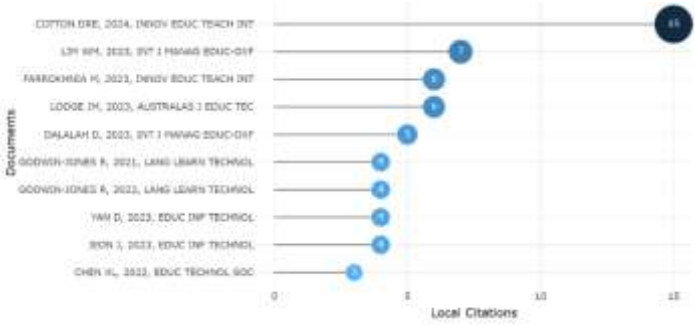
The impact of leading countries' research can be linked to national strategies and policies promoting AI and educational research. For instance, China's high citation count reflects its strategic focus on AI development and integration into education. Similarly, the USA and UK's research policies and funding mechanisms support their leading roles.

Local Citations in AI and Applied Linguistics

Figure 5 displays the total global citation counts (TGCS) and total local citation counts (TLCS) over the years.

Figure 5

Local Citation Analysis Graph



The top locally cited documents reveal significant insights into the research landscape. Cotton (2024) leads with 15 local citations, indicating strong relevance within the field. Lim (2023) follows with seven local citations, significantly impacting management education. Farrokhnia (2023) and Lodge (2023) each have six local citations, highlighting their influence. Other notable documents include Dalalah (2023), with five local citations; Godwin-Jones (2021), both with four local citations each; Yan (2023), with four local citations; Jeon (2023), with four local citations; and Chen (2022), with three local citations.

Cotton (2024), with the highest number of local citations, is highly regarded and frequently referenced, suggesting significant contributions to ongoing research. Lim (2023), with the second-highest local citations, reflects its impact on management education, providing valuable insights and

methodologies. Farrokhnia (2023) and Lodge (2023) have quickly become influential due to their high local citation counts within a short time frame, addressing pressing issues or introducing innovative approaches. With consistent local citations, Godwin-Jones (2021) reflects ongoing relevance and contributions to language learning and technology.

The local citation count provides insights into the most influential documents within the AI and applied linguistics research community. High local citations suggest that a document's findings, methodologies, or theoretical contributions are frequently referenced, indicating its importance in shaping ongoing research. Recent publications with high local citations, such as those by Cotton and Farrokhnia, demonstrate the field's responsiveness to new research addressing current challenges or leveraging recent AI advancements. The diversity of topics covered by the most locally cited documents, from educational technology to management education and language learning, highlights the interdisciplinary nature of AI applications in education. This diversity suggests that AI research in applied linguistics addresses various educational contexts and challenges. The presence of multiple highly cited documents from journals like Innovative Education and Teaching International and International Journal of Management Education indicates these journals are key venues for impactful research, enhancing a document's visibility and influence within the research community.

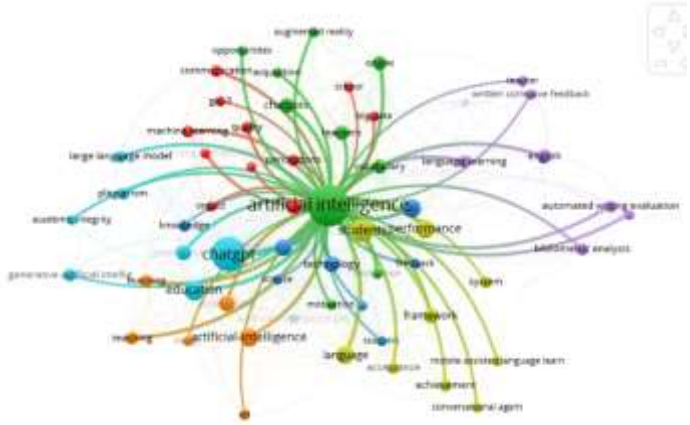
Network Visualization

The network visualization graph provides a comprehensive view of the relationships and connections between various keywords in AI and applied linguistics. Each node represents a keyword, and the edges (lines) between them indicate the co-occurrence of these keywords in the literature. The size of the nodes and the thickness of the edges reflect the frequency of the keywords and their co-occurrence, respectively.

Artificial Intelligence is the most prominent node, indicating its central role in the research. It is highly interconnected with many other keywords, reflecting its widespread application and relevance across various topics in applied linguistics. ChatGPT is another significant node that shows the relevance of AI-driven conversational agents in the research landscape. Its connections to other keywords like "education" and "language learning" highlight its importance in these contexts. Education and technology are also central nodes, showing strong connections with AI and indicating the integration of AI technologies in educational settings.

Figure 6.

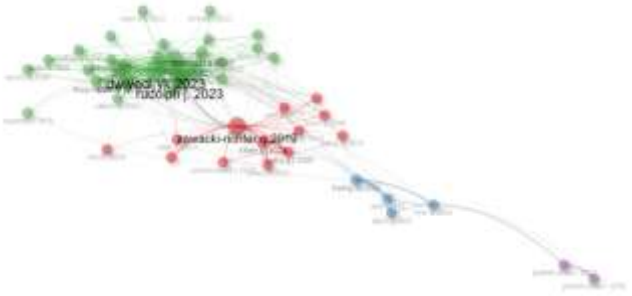
AI Brain Map



Keywords like "language learning," "student performance," "automated writing evaluation," and "feedback" form a cluster, indicating a strong research focus on applying AI to enhance language learning and assessment. Keywords such as "machine learning," "chatbots," "NLP," and "large language model" form another cluster, showcasing the various AI technologies employed in applied linguistics. Keywords like "student performance," "perceptions," and "teacher" indicate research exploring the impact of AI on educational outcomes and stakeholder perceptions.

Figure 7.

AI Research Heat Map



Keywords like "generative artificial intelligence" and "GPT-3" highlight emerging technologies, reflecting recent advancements and their applications in education and linguistics. The presence of keywords like "plagiarism" and "academic integrity" suggests ongoing discussions about the ethical implications of AI in education, particularly concerning the use of generative AI tools.

Co-citation Network Visualization

Dwivedi (2023) and Rudolph (2023) are central nodes, highly connected and frequently co-cited with other significant documents, indicating their influential status in the field. Similarly, Zawacki-Richter (2019) remains a central node, showcasing its continued relevance and impact over the years.

The green cluster is dominated by recent publications from 2023, indicating active and emerging research areas, with key figures like Dwivedi and Rudolph. The red cluster features Zawacki-Richter (2019) as a central node, suggesting its foundational role in the literature, along with notable nodes such as Chen (2020) and Atlas (2023). The blue cluster includes recent works such as Huang et al. (2022) and Fryer (2020), highlighting their relevance in specific subfields. The purple cluster contains documents by Godwin-Jones from 2016 and 2023, focusing on a specialized area of research within the broader field.

Figure 8.

AI Research Citation Heatmap



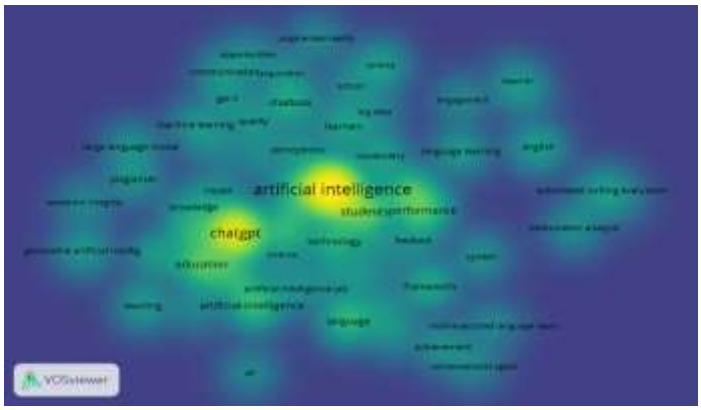
Documents by Godwin-Jones (2016) in the purple cluster are more peripheral, suggesting a focused but less central area of research. Historical references like Vygotsky (1978) in the green cluster indicate that foundational theories are still referenced in contemporary research.

Density Visualization Graph

The Central High-Density Cluster comprises pivotal documents such as Dwivedi (2023), Rudolph (2023), and Zawacki-Richter (2019), marking them as highly influential in the field. Surrounding these are high-density nodes like Lo (2023), Strzelecki (2023), and Chan (2023), indicating significant influence within the central cluster. In moderate-density areas, works by Huang et al. (2022), Chen (2020), and Hwang (2020) show considerable influence, albeit not as central. Low-density areas feature specialized documents like Godwin-Jones (2021) and historical references such as Vygotsky (1978) and Floridi (2020), reflecting foundational influence.

Figure 9.

AI Research Keywords Heat Map



Dwivedi (2023) and Rudolph (2023) occupy central, high-density positions, highlighting their crucial role in ongoing research. These works are frequently cited and serve as key sources of knowledge and methodology. Similarly, Zawacki-Richter (2019) maintains a central position, providing essential frameworks and insights. Emerging influential works, including Lo (2023) and Strzelecki (2023), address contemporary issues or introduce new methodologies, demonstrating strong resonance within the research community. Historical and theoretical contributions like Vygotsky (1978) continue to underpin current research, while specialized works such as those by Godwin-Jones (2023) offer niche insights into AI and applied linguistics.

Density Visualization Discussion

The density visualization map reveals essential topics and their interconnections in AI and applied linguistics research. Central terms like "artificial intelligence," "chatgpt," "machine learning," and "education" indicate their pivotal roles and frequent co-occurrence in scholarly work. The centrality of "artificial intelligence" and "chatgpt" highlights their significance in the current research landscape. The prominence of "machine learning" and "education" underscores the application of AI technologies in educational settings.

Emerging trends such as "augmented reality," "big data," and "automated writing evaluation" signify innovative applications in the field. These technologies pave new paths for enhancing language learning and assessment. Connections among terms like "students' performance," "language learning," "technology," and "feedback" illustrate the integrated approach researchers use to improve educational outcomes through AI.

Discussion

The density visualization offers a thorough overview of key themes and trends in AI research within applied linguistics.

The central role of AI and technologies like ChatGPT highlights their foundational impact on current research. Focusing on educational applications and language learning underscores the practical benefits of AI technologies. The examination of advanced technologies and ethical considerations reflects the dynamic and evolving nature of the field. By understanding these themes and trends, researchers and policymakers can better guide future efforts to maximize AI's potential in education, ensuring it is used effectively, ethically, and equitably to enhance learning outcomes and support language acquisition.

There has been a significant rise in AI-related publications in applied linguistics, particularly since 2021, indicating growing interest and advancements in this interdisciplinary field. The sharp increase in publication and citation counts highlights the rapid development and widespread recognition of AI applications in education. Central figures such as Dwivedi (2023), Rudolph (2023), and Zawacki-Richter (2019) are pivotal in shaping research discourse. These frequently co-cited, and highly referenced studies provide foundational insights and innovative methodologies guiding ongoing research. Journals like Innovative Education and Teaching International, Educational Technology & Society, and Language Learning & Technology are critical platforms for disseminating high-impact research.

Leading institutions from China, the USA, and the UK dominate research output, reflecting their robust academic infrastructure and significant investments in AI research. The density and co-citation visualizations highlight key themes such as the integration of AI in educational technology, language learning, and automated assessment. Prominent keywords like "artificial intelligence," "ChatGPT," "education," and "language learning" indicate primary focus areas within the research community. The interdisciplinary nature of AI research in applied linguistics is evident from integrating historical and foundational theories, such as those by Vygotsky (1978), alongside contemporary advancements. Ethical considerations, including academic integrity and the responsible use of AI, are also prominent, emphasizing the need for a balanced and thoughtful application of technology in education.

The analysis of international collaboration patterns shows significant contributions from countries across Asia, Europe, and North America, with notable leaders being China, the USA, and the UK. Emerging contributors like the Netherlands and Malaysia are also making substantial impacts, demonstrating AI research's global and collaborative nature. The bibliometric analysis of AI in applied linguistics offers a detailed overview of the field's growth, influential research, key contributors, and thematic trends. It reveals a significant and steady increase in AI-related research within applied linguistics, especially from the early 2000s onwards. This upward trend highlights the growing recognition of AI's potential to revolutionize language education through innovative tools and methodologies.

Citation analysis underscores the impact of AI research, marked by notable peaks in total global citation counts (TGCS) and total local citation counts (TLCS). These peaks align with the publication of influential studies that have significantly shaped the field. High citation counts reflect the widespread acknowledgment of AI's relevance and interdisciplinary influence, reaching beyond applied linguistics into education, cognitive science, and computational linguistics. The co-citation analysis provides insights into the intellectual structure of AI research in applied linguistics. The distinct clusters of frequently co-cited references highlight major themes such as NLP, machine learning applications, and AI-driven language assessment. These clusters point to foundational texts and emerging trends, guiding researchers toward essential literature and new research directions.

Leading journals like 'System,' 'CALL,' and 'Language Teaching Research' are pivotal platforms for disseminating AI research. The concentration of AI-related publications in these journals emphasizes their role in advancing technological integration in language education. Researchers aiming for high visibility and impact should consider these journals for their submissions. Key institutions such as Lancaster University, Macquarie University, and Iowa State University are major contributors to AI in applied linguistics. These institutions are likely centers of innovation and collaboration, offering valuable resources and expertise. Their prominence reflects robust academic programs and research capabilities, setting benchmarks for quality and innovation. Geographically, the USA, UK, and China lead contributions, reflecting their strong research infrastructure and investment in AI technologies. This global distribution underscores the universal relevance of AI in enhancing language education and fostering international collaborations and knowledge exchange.

Conclusion and Recommendations

The analysis of the most cited articles reveals pivotal studies that have introduced new concepts, methodologies, or technologies. These highly cited works

are key references, guiding subsequent research and indicating successful strategies and emerging trends. The author's co-citation network further illustrates the collaborative nature of the field, identifying influential researchers and their collaborative relationships. The heatmap of references provides a visual representation of the most influential works, serving as cornerstones for developing new research. These references offer comprehensive reviews, methodological innovations, or significant findings that drive the field forward. The word cloud visualization also captures the key topics and concepts, offering a snapshot of the main areas of interest and potential directions for future research.

Overall, the bibliometric analysis highlights AI research's dynamic and interdisciplinary nature in applied linguistics. The field is characterized by rapid growth, significant contributions from leading institutions, and influential studies that shape ongoing research. Understanding these patterns provides valuable insights for researchers, educators, and policymakers aiming to leverage AI technologies to enhance language learning and teaching. Integrating AI in applied linguistics holds promise for developing innovative educational tools, personalized learning experiences, and more efficient language assessment methods, ultimately advancing the field and improving educational outcomes.

The bibliometric analysis and visualizations of AI research in applied linguistics offer a comprehensive view of the current research landscape, highlighting key trends, influential studies, and emerging themes. This discussion will delve into the implications of these findings, exploring the transformative potential of AI in education, the challenges and opportunities ahead, and the strategic directions for future research The transformative potential of AI in education is underscored by a significant increase in related publications and citations in applied linguistics. Natural language processing (NLP), machine learning, and ChatGPT are revolutionizing language education through personalized learning, automated assessments, and real-time feedback, enhancing student engagement and performance.

AI tools create adaptive environments tailored to individual needs, improving language acquisition and retention. Automated writing evaluation reduces educators' workload and provides consistent, objective feedback, enhancing learning. AI is widely applied in education, from intelligent tutoring systems to virtual classrooms, supporting teaching and learning. Ethical concerns include academic integrity, data privacy, and algorithmic biases. Addressing these requires robust guidelines and policies. Implementation challenges involve funding, infrastructure, and training, particularly in under-resourced areas. Continuous research is needed to refine AI tools and adapt them to various educational contexts. Interdisciplinary collaboration and international partnerships are vital for advancing AI research. Emerging technologies like augmented reality and big data offer new possibilities for immersive learning. Sustainable and ethical AI use in education requires ongoing stakeholder dialogue to create and enforce best practices.

The findings from this bibliometric analysis highlight the dynamic and evolving nature of AI research in applied linguistics. The increasing trends in publications and citations, alongside identifying key influential studies and central themes, underscore the transformative potential of AI technologies in education. The interdisciplinary approach and focus on ethical considerations are crucial for ensuring that AI applications remain innovative and responsible. Future research should build on these foundational works, explore emerging technologies, and address new challenges. Interdisciplinary collaboration and international partnerships will be essential in advancing the field, fostering innovation, and developing effective and ethical AI applications that enhance language education and learning outcomes globally. By understanding these patterns and leveraging insights from influential studies and emerging trends, researchers, educators, and policymakers can guide the development of AI in applied linguistics, ensuring its positive impact on education and society.

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