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ARTIFICIAL INTELLIGENCE AS A LEARNING MEDIA IN ENGLISH EDUCATION: BIBLIOMETRIC USING BIBLIOSHINY ANALYSIS (2009-2023)

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Abstract
This research examines the publication trends and emerging keywords within the domain of artificial intelligence applied to English education. Analyzing 74 documents sourced from Scopus using RStudio and Vosviewer revealed distinct patterns. Notably, the year 2021 marked a significant milestone with 26 articles, constituting 35.14% of total publications, while the preceding decade (2009-2020) contributed only 13 articles, representing less than 18%. However, the period from 2021 to 2023 experienced a noteworthy surge, introducing over 80% of the total publications, incorporating 60 new articles. Esteemed institutions like Hebei University of Engineering in China and three other affiliates each contributed 4 publications. The prominence of the ACM International Conference Proceedings Series underscores the influential role of technology conferences in shaping discussions around artificial intelligence in English education. An influential article, cited 20 times, focused on the integration of 5G and AI technologies to reform English education at universities, considering the necessity of cutting-edge technological infrastructure. Visual analysis highlights specific keywords such as speech recognition, quality control, teaching systems, and learning algorithms within yellow circles, suggesting potential areas for further research in the intersection of artificial intelligence and English education.

Keywords: artificial intelligence, bibliometric, English education

Introduction
After the period of independence, the world has witnessed a rapid surge in development in various fields. The war's end has spurred countries to improve and improve their quality significantly (Fitriani, 2023; Hakim & Angga, 2023). This is reflected in the development of more modern infrastructure, including integrated transportation networks and advanced technology penetrating various life sectors. However, one of the most vital aspects of this evolution is the developments in the education system (Zafrullah et al., 2023; Zafrullah & Zetriuslita, 2021). Countries have focused on improving the quality and accessibility of education for all levels

of society, creating more relevant curricula, and expanding access to technology to support learning. Education has become the main pillar in preparing future generations to face increasingly complex global challenges.

Education is an irreplaceable foundation that is the key to progress, understanding change, and human competitiveness in the global world, essential in forming minds, broadening horizons, and preparing individuals to face exploration, resilience, and adaptation amidst the complexity of life throughout their journey (Zafrullah et al., 2023). Education is an effort to develop individual skills to shape better character and create a superior generation that can respond and adapt to the dynamics of ever-changing times (Kurniaaji et al., 2018; Rezeki et al., 2020). Education is a vital foundation for humans in acquiring knowledge and making it easier to fulfill their daily needs. It is also a domain that is increasingly adopting digital systems as an integral part of development, enriching learning methods and access to information (Ma'rufah, 2022; Tanjung et al., 2022). So, it can be concluded that education aims to form superior characters who can adapt to changing times and adopt digital systems to enrich access to information. One thing that is developing in the world of education is learning media.

Learning media are devices or tools in the educational process that act as various means of communication in print and visual form to convey information and messages to facilitate an effective and comprehensive learning process (Ekayani, 2017; Nurrita, 2018). Learning media can also be interpreted as a tool that helps teachers in conveying learning material and as a forum for conveying information and messages in the learning process (Wulandari et al., 2023; Zahwa & Syafi'i, 2022). So that learning media can provide a variety of learning methods and approaches that are more interesting and effective for students. One form of learning media that is currently on the rise is learning media assisted by artificial intelligence.

Artificial intelligence can be defined as an innovative branch of computer science that focuses on the development of systems and technology capable of enabling machines or computer programs to learn, think, and act autonomously by adapting to the data received, becoming an integral part of advances in information technology and communication, especially in the industrial era 4.0 (Maulana et al., 2023; Ririh et al., 2020). Artificial intelligence is the result of a combination of electronics, mathematics, and technology that gives machines the ability to carry out cognitive functions and enable learning (Prasetyo & Rosyid, 2022; Rochmah, 2023; Sidabutar & Munthe, 2022). So, it can be concluded that artificial intelligence creates the ability of machines to learn, think autonomously, and carry out cognitive functions, which integrally develops information and communication technology, especially in the industrial era 4.0, which has significant implications in the world of education.

The use of artificial intelligence has spread to various sectors, including English education, which has driven significant growth in artificial intelligence-based research in this field. Thus, researchers are interested in conducting bibliometric analysis to explore existing publication trends as well as newly emerging keywords. This analysis aims to provide recommendations for further research in the development of artificial intelligence in the context of English language teaching.

Method

This bibliometric research is intended to evaluate previous scientific frameworks that have been carried out in the context of using artificial intelligence in the English language in education. Bibliometric analysis is a method that examines the evolution of a research domain, highlighting topics, authors, and the conceptual structure of scientific disciplines based on quantitative studies of journal papers and other scientific communication sources (Supinah & Soebagyo, 2022). In the context of the development of artificial intelligence in the English language in education, bibliometric analysis involves comprehensive mapping of articles using platforms such as R-Studio and Vosviewer to map innovative keywords (Aria & Cuccurullo, 2017; Cuccurullo et al., 2016; Sidiq, 2019).

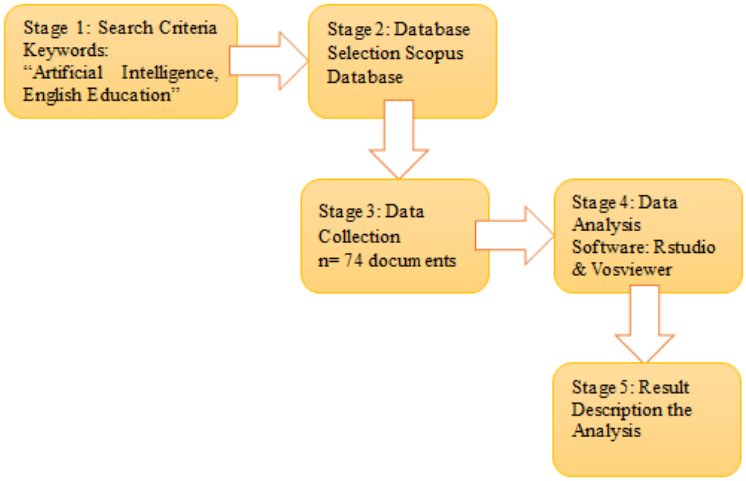

Figure 1. Bibliometric research about artificial intelligence in English education

Research on artificial intelligence in English education begins with a search for scientific sources related to the use of Artificial Intelligence in the context of English education. This process involves the use of keywords to ensure relevance and focus of the research. Through the Scopus database, 74 related documents were found for further analysis. These documents were then evaluated and analyzed using bibliometric software such as R Bibliometrix and Vosviewer to map the novelty of the research and analyze the relevance of key concepts in the context of artificial intelligence in English education. The final stage includes the results, conclusions, and quantitative evaluation of this research, with in-depth explanations and visual representations of the findings obtained after data processing and analysis.

Findings and Discussion

Main information

Once the metadata has been exported to the Biblioshiny application, the initial display of the software is basic information about all the articles that have been imported and are ready for analysis. The main information about the documents to be analyzed using bibliometric methods can be found in Figure 2.

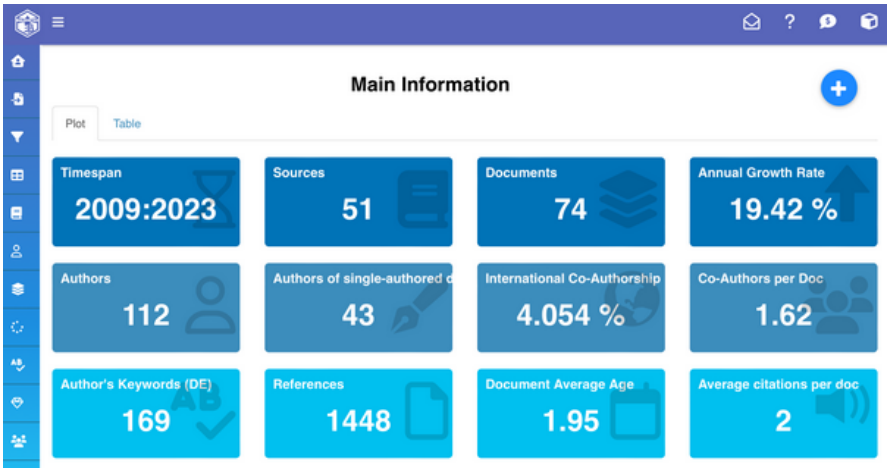

Figure 1. Main information

This data covers the period from 2009 to 2023, with 51 sources and 74 documents involved. There are 112 authors, of which 43 have written themselves. There were indications of international collaboration on 4,054% of documents, and an average of 1.62 authors per document. The author's keywords are 169 and there are 1448 references. The average age of documents is 1.95 years with an average of 2 citations per document. The annual growth rate is 19.42%. In the context of artificial intelligence in English education, these data could indicate increasing interest and research in this area over the specified period, indicating significant international progress and collaboration, as well as growing acceptance in academic circles as indicated by citation rates.

Publication trends

This research describes the distribution of publications each year in Scopus. Data distribution starts from the year the article was first published to the year the article was ready to be published.

Table 1. Publication trends

Year	Total Publications	Percentage
2009	1	1.35%
2010-2016	-	-
2017	3	4.05%
2018	3	4.05%
2019	2	2.70%
2020	5	6.76%
2021	26	35.14%
2022	22	29.73%
2023	12	16.22%
Total	74	100%

Source: RStudio

The peak of publications was in 2021, with 26 articles accounting for 35.14% of total publications. From 2009 to 2020, only 13 articles were published,

which is less than 18% of the total. However, from 2021 to 2023, the number of articles increased significantly, adding 60 articles or more than 80% of the total in a short time. This indicates a substantial increase in research related to artificial intelligence in English education, driven by advances in artificial intelligence technology, changing educational needs, and greater recognition of the potential of artificial intelligence in supporting and enhancing English language teaching and learning processes.

Affiliate and productive source

Below is presented data regarding the most productive affiliates in the Artificial Intelligence theme in the field of English education.

Table 2. Most productive affiliates

Affiliation	Country	Total Publications
Hebei University of Engineering	China	4
Institut Teknologi Sepuluh November (ITS) Surabaya	Indonesia	4
Jiaying University	China	3
National Taiwan Normal University	Taiwan	4
Shaanxi University of Chinese Medicine	China	4
Universiti Teknologi Malaysia	Malaysia	4

Source: RStudio

The image you provided displays a table that lists affiliations and the number of publications related to artificial intelligence. Hebei University of Engineering in China, Sepuluh November Institute of Technology in Indonesia, National Taiwan Normal University in Taiwan, Shaanxi University of Chinese Medicine in China, and Universiti Teknologi Malaysia have each contributed 4 publications. Meanwhile, Jiaying University in China has contributed 3 publications. This shows that educational institutions in Asia are very active in artificial intelligence research, especially related to its application in English education. The fact that universities from various Asian countries are involved indicates broad international collaboration and widespread interest in the region to develop and integrate artificial intelligence in English education.

Table 3. Top productive source

Sources	Articles
ACM International Conference Proceeding Series	9
Journal of Intelligent and Fuzzy Systems	3
Journal of Physics: Conference Series	3
Mathematical Problems in Engineering	3
Wireless Communications and Mobile Computing	3

Source: RStudio

From the data shown in the table, it can be seen that artificial intelligence in the context of English education has received significant attention in various research forums. The ACM International Conference Proceedings Series, as the

source with the largest number of articles, indicates the importance of technology conferences in advancing the discussion of artificial intelligence in English education. A similar number of articles from other journals focusing on intelligent systems, physics, engineering, and wireless communications confirms that the integration of artificial intelligence in English education is an interdisciplinary topic. This reflects the use of artificial intelligence-based tools, such as adaptive systems and machine learning, in enriching the way English is taught, providing deeper insights, and adapting teaching methods to the specific needs of each learner.

Highest citation document

Below is presented data regarding the most productive documents on the theme of Artificial Intelligence in English education.

Table 4. Documents with high citations

Source	Title	Total Citations
(Sun, 2021)	5G joint artificial intelligence technology in the innovation and reform of university English education	20
(Yuan, 2021)	RETRACTED: Design of College English Teaching Information Platform Based on Artificial Intelligence Technology	15
(Yunanto et al., 2019)	English education game using non-player characters based on natural language processing	13
(Shin, 2018)	How to use artificial intelligence in the English language learning classroom	9
(Cheng et al., 2017)	InterviewME: A comparative pilot study on M-learning and MAR-learning prototypes in Malaysian English language teaching	9

Source: RStudio

The most cited article, with a total of 20 citations, discusses 5G combined artificial intelligence technology in innovation and reform of English education at universities, emphasizing the importance of the latest technological infrastructure. Another article with 15 citations discusses the design of an artificial intelligence-based learning platform for English education in higher education, while an article with 13 citations examines the use of educational games that utilize natural language processing. Another study collecting 9 citations revealed how artificial intelligence can be integrated into English classes, and a pilot study, also with 9 citations, compared m-learning and MAR-learning in English language teaching in Malaysia. All of this reflects a growing trend in applying innovative artificial intelligence technologies to support and enrich the English language learning and teaching process.

Research focus and novelty

Researchers conduct research focus analysis and search for new keywords using Vosviewer. The discussion regarding the research focus can be seen in Figure 2 and Table 5.

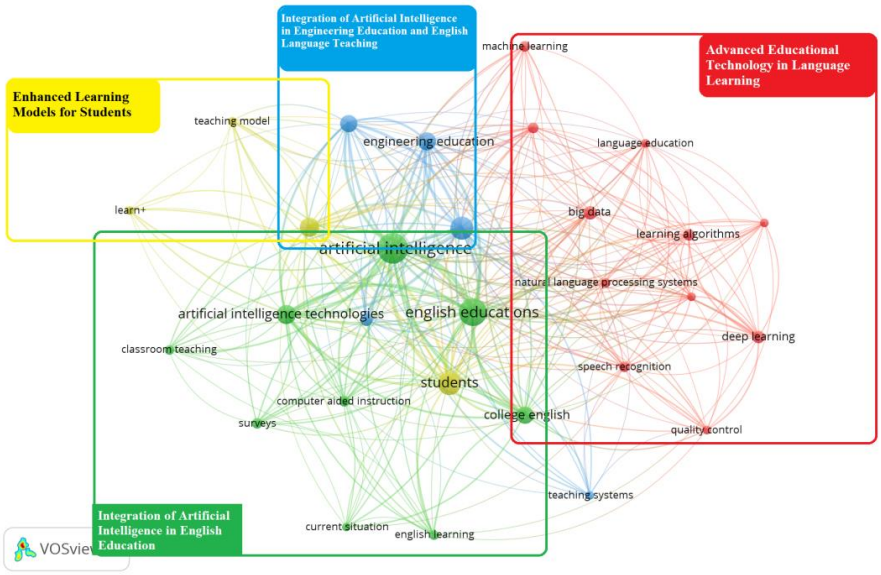

Figure 3. Network visualization and grouping

Table 5. Grouping based on color

Color Group	Group Name	Keywords in Group
Green	Integration of Artificial Intelligence in English Education	Artificial Intelligence, Artificial Intelligence Technologies, Classroom Teaching, Computer Aided Instruction, Surveys, Current Situation, English Learning, College English, English Education
Blue	Integration of Artificial Intelligence in Engineering Education and English Language Teaching	Engineering Education, Teaching Systems
Red	Advanced Educational Technology in Language Learning	Machine Learning, Language Education, Big Data, Learning Algorithms, Natural Language Processing Systems, Deep Learning, Speech Recognition, Quality Control
Yellow	Enhanced Learning Models for Students	Learn+, Teaching Models, Students

Source: RStudio

The focus of the topic entitled "Integration of Artificial Intelligence in English Education" is the application of artificial intelligence in the educational environment, especially in the context of learning English in a tertiary environment. The discussion includes the use of artificial intelligence, AI technology in classroom teaching, computer-assisted teaching methods, as well as survey analysis related to the current educational situation. Issues related to the development of English education, including the use of AI technology, teaching methods, as well as trends in educational surveys are at the center of attention in this topic.

The focus of the topic entitled "Integration of Artificial Intelligence in Engineering Education and English Language Teaching" includes the integration of artificial intelligence in the context of engineering education curriculum development, as well as the implementation of teaching systems related to English. This may address the application of artificial intelligence technologies to improve teaching approaches in engineering subjects while strengthening teaching methods in English language contexts. In the context of artificial intelligence, the focus may include the development of learning platforms, automated evaluations, and learning support systems that are optimized to improve the quality and effectiveness of engineering education and English language teaching.

The topic focus with the title "Advanced Educational Technology in Language Learning" covers various topics related to advanced technology in education, especially language learning. This includes the implementation of machine learning to develop predictive models and personalized learning, the use of technology in language education, the processing of big data to gain educational insights, the use of learning algorithms to improve the learning process, natural language processing systems for language learning and assessment, deep learning methods for analysis complex data, speech recognition for language learning, and a focus on quality control in educational technology. Overall, these topics reflect the application of current technologies, especially artificial intelligence and language processing, in creating innovative solutions for education and language learning.

The topic "Enhanced Learning Models for Students" discusses the development of enhanced learning models for student education. The focus is on innovation in teaching methods, adapting learning models more effectively to individual student needs, as well as applying technology such as artificial intelligence to improve the student learning experience. The discussion also includes the impact of technology or new learning models on student performance, optimizing the teaching and learning process, and aligning the curriculum with student needs and interests more effectively.

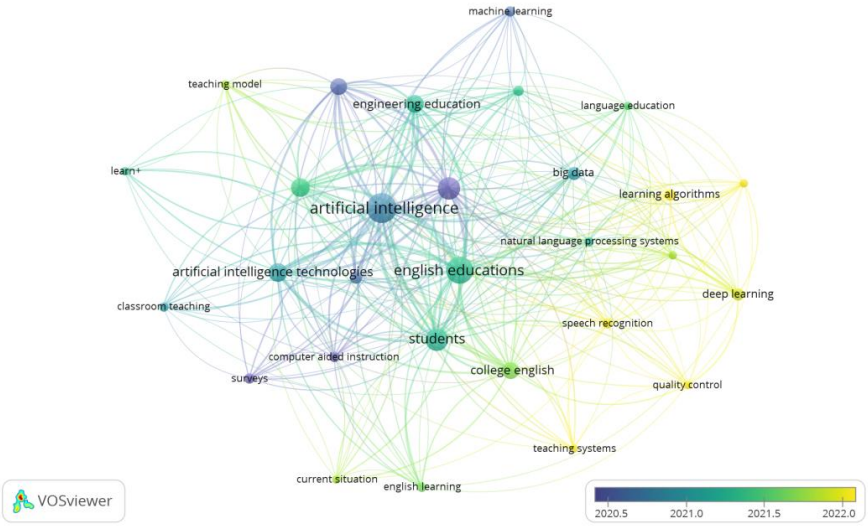

Figure 4. Overlay visualization

The visualization displayed uses a color scheme to differentiate between research topics that have been researched for a long time, which are indicated by darker colors, and topics that are newer to research, which are indicated by lighter colors. From Figure 4, it can be seen that the yellow circles are for the words speech recognition, quality control, teaching systems, and learning algorithms. This indicates that this word can be used as a novelty and recommendation for conducting further research on the topic of artificial intelligence in English education.

Conclusion

From the analysis results, it can be concluded that The peak of publications was in 2021, with 26 articles accounting for 35.14% of total publications. From 2009 to 2020, only 13 articles were published, which is less than 18% of the total. However, from 2021 to 2023, the number of articles increased significantly, adding 60 articles or more than 80% of the total in a short time. Hebei University of Engineering in China, Sepuluh November Institute of Technology in Indonesia, National Taiwan Normal University in Taiwan, Shaanxi University of Chinese Medicine in China, and Universiti Teknologi Malaysia have each contributed 4 publications. The ACM International Conference Proceedings Series, as the source with the largest number of articles, indicates the importance of technology conferences in advancing the discussion of artificial intelligence in English education. The most cited article, with a total of 20 citations, discusses 5G combined artificial intelligence technology in innovation and reform of English education at universities, focusing on the importance of the latest technological infrastructure. From overlay visualization, it can be seen that the yellow circles are for the words speech recognition, quality control, teaching systems, and learning algorithms. This indicates that this word can be used as a novelty and recommendation for conducting further research on the topic of artificial intelligence in English education.

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