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A Comparative Analysis of Characteristics and Trends of Artificial Intelligence and Foreign Language Education at Home and Abroad

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Abstract: This paper takes the research on artificial intelligence and foreign language education in domestic CSSCI and international SSCI journals since 2004 as the analysis object, and makes a comprehensive review, tracking and identification based on the bibliometric and bibliographical analysis supported by CiteSpace. It is pointed out that while domestic research mainly focuses on human-computer cooperation and digital transformation of foreign language education, international research attaches more importance to the role of artificial intelligence-assisted foreign language teaching tools, the study on participants is more comprehensive. Regarding the future directions of Chinese artificial intelligence and foreign language education, it is suggested that attention could be drawn to the integration of technology and foreign language education, balance the research between teachers and learners, further deepen and expand the research topics, and promote the in-depth development of artificial intelligence and foreign language education research.

Keywords: artificial intelligence, foreign language education, comparison and contrast, home and abroad, bibliometric research

Introduction

The concept of artificial intelligence was first put forward by McCarthy, the father of artificial intelligence, at Dartmouth College Conference in 1956, which marked the birth of artificial intelligence. Over the past 60 years, artificial intelligence has gone through several periods of high tide and low tide, and finally entered the current period of vigorous development. In the last 20 years of the 20th century, the Internet sprang up suddenly, which profoundly affected the progress of human civilization. Therefore, artificial intelligence is closely combined with big data, which has made theoretical and technical breakthroughs, and thus brought about a directional change and ushered in a new upsurge of explosive growth. For example, artificial intelligence technologies such as image classification, knowledge quiz, man-machine game, unmanned driving and so on have achieved technological breakthroughs from "unusable, not easy to use" to "usable". Traditional artificial intelligence, which is based on computer intelligence and relies on computational algorithms and data, emphasizes universal learning and machine learning of large-scale training sets, and is gradually moving towards a new generation of artificial intelligence based on open intelligence, relying on interactive learning and memory, reasoning and knowledge-driven, and centered on mixed cognitive models[13].

Driven by big data and deep learning, the wide application of artificial intelligence has triggered important changes in the field of language education[5]. With the rise of intelligent teaching, artificial intelligence and teaching are gradually integrated, which effectively improves the practicality and pertinence of foreign language teaching. The application of

artificial intelligence in foreign language teaching makes foreign language education "turn knowledge into wisdom" and form the key to foreign language wisdom teaching form[3].

In order to fully understand the characteristics and trends of artificial intelligence and foreign language education since the 21st century, and the comparison at home and abroad, this paper reviews and summarizes the latest progress of artificial intelligence and foreign language education since 2004 with the help of CiteSpace, a scientific metrology visualization software, and mainly discusses the following aspects: 1) The general situation and research trends of artificial intelligence and foreign language education in China; 2) The general situation and research trends of artificial intelligence and foreign language education abroad; 3) Comparison of domestic and international research on artificial intelligence and foreign language education; 4) The future development direction of artificial intelligence and foreign language education research in China.

1. Data sources and analysis tools

1.1 Data sources

In order to collect more complete and comprehensive data as much as possible, this study adopts the method of combining computer retrieval with manual screening. The domestic literatures are searched in https://www.cnki.net/, China, with "artificial intelligence and foreign language teaching", "foreign language teaching and artificial intelligence" and "foreign language education", "foreign language education and artificial intelligence" as the themes, with the year range from 2004 to 2023 and the periodical category selected by CSSCI. Foreign literature is selected from the core collection of Web of Science (https://webofscience.clarivate.cn/), Based on the retrieval condition that the subject contains "artificial intelligence", "foreign language teaching" and "foreign language education", in order to correspond to domestic journals, the year range is also selected from 2004 to 2023. After manually screening out irrelevant documents, 36 domestic related documents and 74 international related documents are obtained as statistical analysis data.

1.2 Analysis tools

In this study, CiteSpace 6.2.6 was used to draw the knowledge map, and the visual co-occurrence knowledge map of the sample papers was analyzed. The word frequency analysis method is used to extract the high and low frequency distribution of keywords or subject words to determine the research hotspots and development trends.

2. The latest research progress of artificial intelligence and foreign language education at home

Subject words and keywords are the condensation and refinement of the core content of research papers. When two or more keywords appear in the same article, they are called keyword co-occurrence. Through the co-occurrence analysis of keywords and keywords in the literature related to artificial intelligence and foreign language education research, the research keyword knowledge map shown in Figure 2 is obtained, which contains 54 nodes and 83 connections. Each circular node represents a key, and the larger the circle, the higher the frequency of the keyword. The connection between nodes indicates that there is a co-occurrence relationship between keywords in the same document, and the thickness of the connection indicates the co-occurrence frequency of keywords. High-frequency keywords reflect the hot research topic in this field, and centrality is used to measure the importance of this topic. It is generally believed that nodes with centrality not less than 0.1 are key nodes, which are highlighted with purple circles.

Among the keywords of research papers published in core journals of domestic research on artificial intelligence and foreign language education, the most frequently appearing keywords include artificial intelligence, foreign language education, foreign language teaching, wisdom education, educational technology, man-machine dialogue, autonomous learning and foreign language learning. Related research mainly investigates the construction of ecological teaching mode of college English in the era of artificial intelligence[8], pays attention to the scene of human-computer symbiosis in foreign language learning, summarizes the methods of human-computer cooperative learning, discusses the existing problems[11],

and discusses the application of "AI+ education" practice mode[12].

Research frontiers refer to emerging theoretical trends or emerging new themes[9]. CiteSpace conducted keyword clustering analysis on 36 domestic documents, and finally formed 8 clusters, 2 of which are statistically significant. Each cluster represents a research frontier topic.

Content analysis of documents based on keyword clustering in Figure 3 shows that identity remodeling is the first category of all frontier topics. With the development of artificial intelligence technology and its deep integration in foreign language education, identity remolding has become the research focus in the field of artificial intelligence and foreign language education, including role crisis , man-machine dialogue, distance education and so on. Function is the second largest cluster of frontier topics, and the integration of educational technology and foreign language education is gradually affecting the ecology of foreign language education.

3. The latest research progress of artificial intelligence and foreign language education at abroad

There are 134 nodes and 343 connections. The node of artificial intelligence is the largest, followed by system, education and design. From the perspective of centrality, there are 13 keywords whose centrality exceeds 0.1, which are from high to low, namely, influence, design, acceptance, students, feedback, Pedagogical Content Knowledge, language learning, system, foreign language education, artificial intelligence, EFL and applied language. Related research combines machine translation tools with language teaching, analyzes machine translation-assisted language learning[6], puts forward robot-assisted language learning (RALL), which provides students with another learning opportunity[2], and combines the sharing method of English digital teaching resources to effectively enhance and improve the teaching effect[3][4].

The knowledge map of keyword clustering in international artificial intelligence and foreign language education research has 10 statistically significant clusters. We further combined the results of the 10 clusters to form two kinds of frontier topics in international artificial intelligence and foreign language education research: 1) the integration of technology and education, and 2) participants and attitudes. Below we introduce the contents and evolution trends of these topics one by one according to the documents gathered in the cluster.

The first category is the integration of technology and education. The topics of this kind of research include key words such as EFL teaching and learning, English teaching, adaptive learning, computer-assisted language learning, mobile-assisted language learning, and writing evaluation. Yang(2022) studied the effective use of artificial intelligence applications to teach and learn English from the perspective of college students, and measured the level and effectiveness of artificial intelligence applications in English teaching based on deep learning technology[14]. Finally, it discusses the integration of artificial intelligence tools into foreign language teachers' teaching to make it easier, more time-saving and more effective.

The second category, participants and attitudes. As the core participants in education, teachers and students have always been one of the focuses of foreign language education research. In order to help English teachers use and develop tools correctly in the application selection based on artificial intelligence, Du & Gao(2022) identified and evaluated the factors affecting teachers' adoption based on technology acceptance theory, and found that effectiveness, efficiency and complexity are the most influential factors to encourage teachers to use applications based on artificial intelligence in English teaching.[7] An (2023) investigated English teachers' cognition, knowledge and behavior intention of using artificial intelligence to support English teaching in middle schools, and provided a theoretical scheme for educators and decision makers to cultivate teachers' behavior intention of using artificial intelligence in teaching[1]. Mohamed(2023) investigated ten EFL teachers' views on the effectiveness of ChatGPT in supporting students' English learning, and the study emphasized the potential of ChatGPT as a tool to improve EFL students' English language proficiency[10]. The integration of artificial intelligence and foreign language education makes the new research pay more attention to teachers and students, which is manifested in paying attention to the needs and strategies of teachers' professional development and artificial intelligence training, and improving teachers' ability and confidence in the application of artificial intelligence;

Further explore students' feedback, attitudes and learning achievements to meet students' different learning needs and interests.

4. Comparative analysis of artificial intelligence and foreign language education research at home and abroad

From the general situation of research, the number of articles published at home and abroad has shown an upward trend in recent five years, but the overall number of articles published abroad is higher than that published at home. From the research topic, artificial intelligence and foreign language education are the topics of common concern at home and abroad in recent five years, and at the same time, domestic and foreign research has its own emphasis. Domestic research mainly focuses on topics such as man-machine cooperation and the digital transformation of foreign language education, focusing on the digital transformation in the era of artificial intelligence, as well as the role crisis and identity reconstruction of foreign language teachers. However, foreign research focuses more on the research of artificial intelligence-assisted foreign language teaching tools, the development and application of research systems and the study and analysis based on platform data. On the research of participants, although domestic research pays attention to the reshaping of teachers' identity, it focuses on the crisis of teachers' role, and less on learners, while foreign research pays more attention to teachers' better choice and development of tools under the background of artificial intelligence, teachers' cognitive, knowledge and behavioral intentions in using artificial intelligence to support teaching, and also pays attention to learners' cognitive process and the application of metacognitive strategies in foreign language learning.

5. The prospect of artificial intelligence and foreign language education research in China.

Based on the comparison of the development status and trends of artificial intelligence and foreign language education research at home and abroad in the past 20 years, we put forward some prospects and suggestions for the future direction of artificial intelligence and foreign language education research in China.

First, carry out research on the integration of technology and foreign language education. Technology-supported foreign language education provides us with a new teaching environment, which constantly presents a new look. In this context, Chinese research can strengthen the integration of educational technology and educational theory, and promote the effective application of artificial intelligence in foreign language education by integrating technology and educational theory.

Second, in the choice of research participants, Chinese research can balance the research of teachers and learners, and attach importance to learners' learning needs, cognitive processes and meta-cognitive strategies. So as to form a more comprehensive research perspective and promote the coordinated development between teachers and learners.

Third, the research theme should be further deepened and expanded. In addition to man-machine cooperation and digital transformation, follow-up research can further pay attention to the application of natural language processing in foreign language learning and the potential of virtual reality technology in language teaching.

6.Conclusion

In this study, the visual analysis method of CiteSpace is used to sort out the related literatures on artificial intelligence and foreign language education at home and abroad in the past 20 years, and analyze the research survey, hot topics, keyword co-occurrence and word frequency in this field, and describe the frontier hotspots and development trends of artificial intelligence and foreign language education at home and abroad in an all-round way. It is pointed out that domestic research focuses on human-computer cooperation and digital transformation of foreign language education, with a single focus, while foreign research focuses more on artificial intelligence-assisted foreign language teaching tools, and the participants' research is more comprehensive.

On this basis, this study puts forward suggestions and prospects for the future direction of artificial intelligence and foreign language education in China. In the future, the research on artificial intelligence and foreign language education in China needs to carry out the research on the integration of technology and foreign language education, balance the research

between teachers and learners, further deepen and expand the research topics, and promote the research on artificial intelligence and foreign language education to develop in depth. At the same time, foreign language education must plan ahead and take cultivating higher-quality “cross-cultural, multilingual” compound talents as the inevitable choice of foreign language education in the new era. Through the implementation of national strategies such as “the belt and road initiative” initiative and China’s cultural going abroad, we will strengthen the discipline consciousness of foreign language teaching as cultural teaching and cross-cultural teaching, realize the effective combination of artificial intelligence and humanistic education, meet the needs of students’ individualized growth and development, and cultivate compound talents with “professional knowledge+foreign language skills+cultural literacy”.

Conflicts of interest

The author declares no conflicts of interest regarding the publication of this paper.

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