



(RESEARCH ARTICLE)



## Data analysis of Chinese-foreign cooperative higher education based on CiteSpace

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### Abstract

Chinese-Foreign Cooperative Education is a mode of education in China that can benefit from learning from foreign excellent educational experience and finding a teaching mode suitable for China's education in the new area. To analyze more objectively the development history and problems encountered in the field of Chinese-Foreign Cooperative Education in higher education, this paper compares the Chinese literature on this topic based on CiteSpace software and conducts data visualization and analysis in four aspects: distribution of the number of articles issued of each year, authors' distribution, research institution distribution and research trends. Based on the research results, it proposes some suggestions for improvement.

**Keywords:** Higher Education; Chinese-Foreign Cooperative Education; CiteSpace; Education Data Analysis.

### 1. Introduction

Nowadays, the public is highly concerned about the quality and accessibility of higher education, which plays an important role in the education system of many countries, improves the quality and competence of learners, trains and supplies excellent personnel to various industries. Because of Chinese reform and opening-up policy, Chinese-Foreign Cooperative Education programmes and institutions have developed rapidly with the increasing and more frequent international exchanges [1]. However, due to the impact of the global COVID-19 pandemic from 2020 to 2022, many problems have arisen in Chinese-Foreign Cooperative Education and study abroad [2]. To enhance the internationalization of education, more and more studies and research have been conducted on Chinese-Foreign Cooperative Education, especially higher education in recent years. CiteSpace is a literature analysis software and tool that has a function of data visualization by generating a co-citation network map, in which gives an objective and systematic presentation of the structural relationships, distribution and development patterns to the people [3]. This software is used to visualize and analyze the literature data related to this research to reveal the development, challenges and trends of Chinese-Foreign Cooperative Higher Education, and to offer suggestions for our future research works.

### 2. Material and method

This research uses Chinese-language literature data downloaded from China National Knowledge Infrastructure (CNKI). By using the advanced search function of CNKI, the topic field was set to 'Chinese-Foreign Cooperative Higher Education', and in order to make the literature data more reliable, the source categories are selected as Science Citation Index (SCI) source journals, Engineering Index (EI) source journals, Peking University core journals and Chinese Social Sciences Citation Index (CSSCI) source journals. After selection of the database, 372 articles in total published in the period from November 1998 to October 2022 are used for data analysis. In this research, all the selected literature is

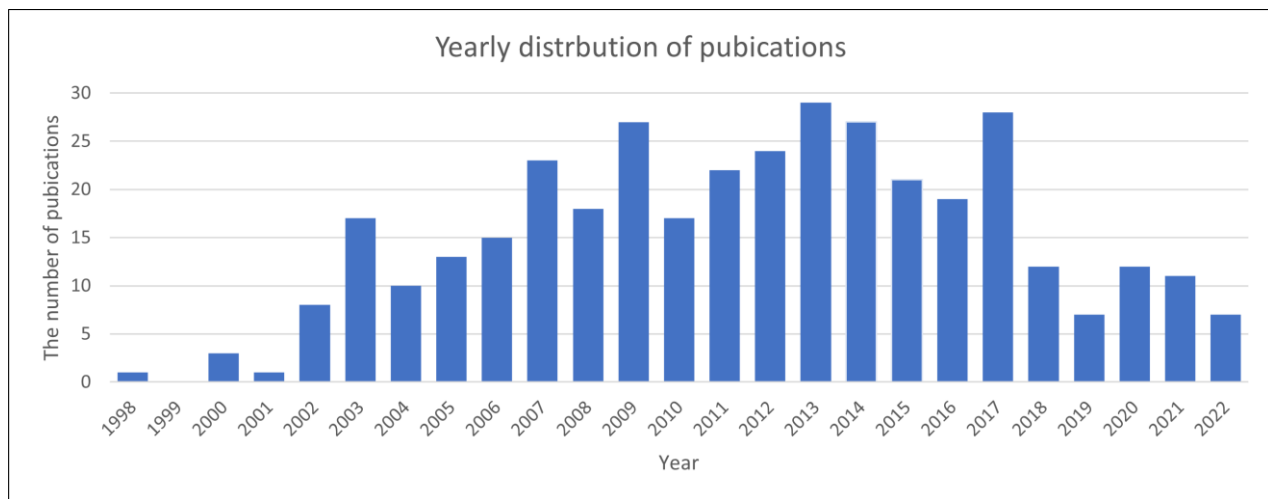
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exported as a dataset containing information such as authors, research institutions, titles, journals, keywords and abstracts for visual data analysis.

### 3. Results and Analysis

#### 3.1. Yearly Distribution of Publications

In the whole dataset of Chinese higher education, the number of articles about Chinese-Foreign Cooperative Higher Education has been calculated and a bar chart is drawn and shown in Figure 1.



**Figure 1** Yearly Distribution of Publications on Chinese-Foreign Cooperative Higher Education

According to the information from Figure 1, we can divide the research on Chinese-Foreign Cooperative Higher Education into three phases. The first phase is from 1998 to 2002, when the research on Chinese-Foreign Cooperative Education emerged, and there were only 13 publications in total. In the second phase (2003-2014), the research on Chinese-Foreign Cooperative Higher Education developed, and the publication number increased generally, reaching a peak of 29 in 2013. In the third phase (2015-present), the research on Chinese-Foreign Cooperative Education stabilized, with the publication number decreasing significantly from the previous phase and stabilizing at around 10 in recent years.

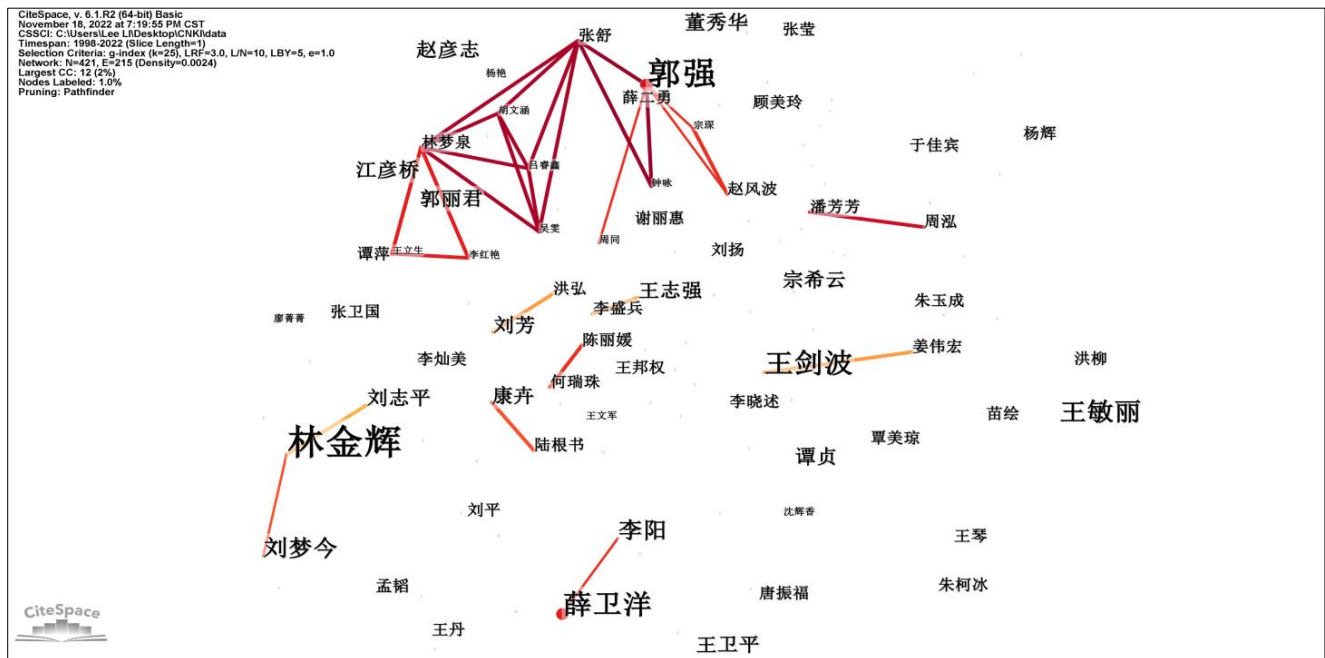
#### 3.2. Distribution of Authors and Research Institutions

The number of articles published by authors or research institutions has a strong correlation with their research ability, and the collaboration between authors or research institutions reflects the formation of a research system [3]. In this research, we use CiteSpace software package and set the time span from 1998 to 2022 and the time slice as 1. By using the authors of investigating Chinese-Foreign Cooperative Higher Education as the analysis nodes, we give a frequency analysis and construct a co-authorship network map of the main research papers' authors, and the obtained map is shown in Figure 2 below. From the dataset, we search for the research institutions of the authors, and rank them by their publication number in descending order. After selection, the top 10 core authors are shown in Table 1 below.

**Table 1** Distribution of Core Authors on Chinese-Foreign Cooperative Higher Education

Chinese name	English name	Total number of publications	Institutions
林金辉	Jinhui Lin	12	Xiamen University
郭强	Qiang Guo	11	Nanjing University of Posts and Telecommunications
薛卫洋	Weiyang Xue	6	Xiamen University
王剑波	Jianbo Wang	5	Shandong University of Finance and Economics

赵彦志	Yanzhi Zhao	4	Dongbei University of Finance and Economics
王敏丽	Minli Wang	4	Qingdao University
刘梦今	Mengjin Liu	4	Xiamen University
陈丽媛	Liyuan Chen	4	Shanghai Jiao Tong University
郭丽君	Lijun Guo	3	Hunan Agricultural University
林梦泉	Mengquan Lin	3	China Academic Degrees and Graduate Education Development



**Figure 2** Co-authorship Network Map on Chinese-Foreign Cooperative Higher Education

In the co-authorship network map, the size of each node reflects the number of published papers of the author, while the link line between the nodes indicates the collaboration between the two authors. The color and thickness of each link line reflect the collaboration intensity [4]. There are 421 nodes and 215 link lines in the map from Figure 2. Some nodes are linked by obvious lines, which indicated that these authors have collaboration on Chinese-Foreign Cooperative Higher Education. However, most nodes are isolated, indicating weak or no collaboration. In Figure 2, Jinhui Lin, Qiang Guo, Weiyang Xue and Jianbo Wang are the main nodes since they all have more than four and are ranked in the top 4 in Table 1. Also, the table shows that Jinhui Lin, Weiyang Xue and Mengjin Liu are all from the same research institutions Xiamen University, and there is a deep partnership between Jinhui Lin and Mengjin Liu in Figure 2, indicating the possibility of collaboration between authors from the same research institution. In general, however, there is less intra-institutional collaboration among these authors, suggesting that most research institutions fail to establish a well-developed research centre or department on this research topic. As shown in Figure 2, there are several link lines around Qiang Guo with darker color, indicating frequent collaboration on Chinese-Foreign Cooperative Higher Education. At the same time, the authors linked to Qiang Guo include Lijun Guo and Mengquan Lin. However, these authors belong to different research institution from Table 1. This suggests that there is inter-institutional collaboration in the study of Chinese-Foreign Cooperative Higher Education.

Using CiteSpace software, the top 10 institutions were selected in descending order of frequency, which is shown in Table 2 below.

**Table 2** Distribution of Institutions on Chinese-Foreign Cooperative Higher Education

Top 10 Institutions	Total number of publications	Starting year
Xiamen University	31	2003
Nanjing University of Posts and Telecommunications	13	2013
Beijing Normal University	8	2005
Jiangxi Normal University	7	2004
East China Normal University	7	2006
Dongbei University of Finance and Economics	6	2010
Wuhan University	6	2002
Shanghai Education Evaluation Institute	5	2006
Tianjin University of Technology	5	2009
Shandong University of Finance and Economics	5	2004

Table 2 shows that the most prolific research institutions are well-known higher education institutions in China, indicating that they lead the research on Chinese-Foreign Cooperative Education. Xiamen University ranks first in Table 2 with the number of 31 publications, which is significantly more than other institutions. Xiamen University published its first paper in 2003, which is much earlier than other institutions. With such kinds of research in the early stage, Xiamen University had a rich theoretical and practical experience in its cooperative programme with Dublin Business School in Ireland, which was approved in 2010. Nanjing University of Posts and Telecommunications (NJUPT) follows Xiamen University with 13 publications, despite publishing its first article in 2013, which is the slowest among the institutions in Table 2. NJUPT has established exchange and study programmes to cultivate many international talents with leading schools in America, Singapore, France, and the United Kingdom. For the rest of the institutions in Table 2, most of them started publishing around 2005, more than 15 years ago, but they only have less than 10 publications each, indicating that they have less research on Chinese-Foreign Cooperative Education and lack of interaction and learning among them. Moreover, none of the top 10 institutions in Table 2 are among Chinese nine approved Chinese-Foreign Cooperative Universities, such as the University of Nottingham Ningbo China (UNNC), established in 2004, Beijing Normal University - Hong Kong Baptist University United International College (UIC), established in 2005 and Xi'an Jiaotong-Liverpool University (XJTLU), established in 2006. This suggests that Chinese-Foreign Cooperative Universities fail to conduct much research on their own project activities, and even never have internal research centers for comprehensive analysis of the university's development, and long-term collaborative relationships with other institutions or agencies in research.

#### 4. Analysis of research trends

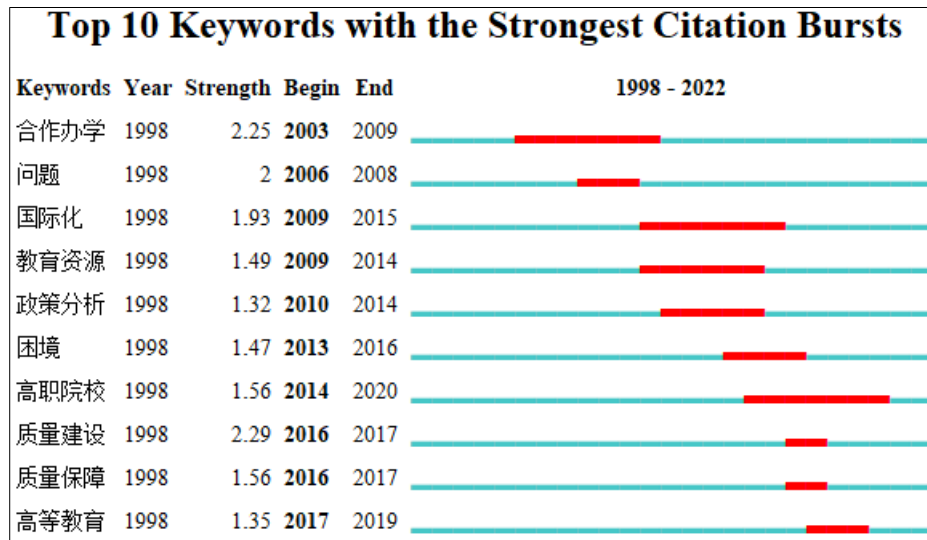
Because the keywords appear a lot of times in a certain period, it can be analyzed to get the hotspots and trends of related research in different time periods [4]. After running CiteSpace software to set the node as keywords, clustering the keywords and then performing the burst detection, setting the minimum duration as 2, and adjusting the parameters to obtain 10 keywords with the strongest citation bursts of higher education research on Chinese-Foreign Cooperative Education from 1998 to 2022. The results are shown in Figure 3.

In the chronological order of their first appearance, the keywords are 'cooperative education', 'problem', 'internationalization', 'educational resources', 'policy analysis', 'dilemma', 'higher vocational colleges', 'quality construction', 'quality assurance' and 'higher education'.

As the period from 1998 to 2002 was the early stage of China's higher education research on Chinese-Foreign Cooperation Education, the number of Chinese publications on this topic was relatively small, and no high-frequency keywords were found in this period due to the minimum emergence duration set at 2 years.

Between 2003 and 2009, the main research keywords were 'cooperative education', and 'problem', with the strength of 2.25 and the duration of 6 years for 'cooperative education'. It indicates that cooperative education was the primary goal of Chinese higher education in the early stage of development. In 2003, the State Council of the People's Republic

of China adopted and implemented the Regulations of the People's Republic of China on Chinese-Foreign Cooperation in Running Schools, which encouraged education or institutions to carry out the activities of Chinese-Foreign Cooperative Education and regulated its system, which greatly promoted the internationalization of education in China [5]. In this process, many scholars, institutions and agencies found many problems and deficiencies in Chinese-Foreign Cooperative Education programmes, so they conducted research and discussion on many aspects of education sovereignty, quality and supervision, and proposed corresponding rationalization initiatives for improvement Construction.



**Figure 3** Distribution of Burst Terms on Chinese-Foreign Cooperative Higher Education

From 2009 to 2015, the trend of related research has changed to 'internationalization', 'educational resources', 'policy analysis', and 'dilemma'. The period of the burst detection of these keywords roughly coincided, and it was also in the late stage of the development of higher education research on Chinese-Foreign Cooperative Education. In this period, the keyword 'dilemma' is a continuation of the burst term 'problem' in the previous period. With the promotion of internationalization of higher education, higher education institutions and educational institutions need to be familiar with the relevant policies and institutional requirements of cooperative education, analyze their own situation, and understand and optimize the setting of various majors and courses to better join the team of Chinese-Foreign Cooperative Education.

Since 2015, the research on Chinese-Foreign Cooperative Education entered a stable period, and the focus of higher education research in this field has slowly shifted to 'higher vocational colleges', 'quality construction', and 'quality assurance' to expand the scale of operation and sustain the development of cooperative programmes and activities. The burst range length of 'higher vocational colleges' is 6, and the emergent strength of 'quality construction' is the strongest among all the keywords (2.29). This shows that in recent years, higher vocational education institutions have been receiving a lot of attention from many scholars in the study of Chinese-Foreign Cooperative Education, while the main content of research has changed from policy situation analysis and educational resources to how to improve and ensure the quality of teaching and learning.

The epidemic broke out globally during the Chinese New Year in 2020 and continues to this day, and various institutions, agencies, and corporate organizations in China have taken initiatives to address the various problems faced by cooperative education institutions as a result, while also providing cross-border learning environments for scholars who are unable to leave the country [6]. However, related burst terms such as epidemic or online courses did not appear during the period, indicating that higher education has not followed up on a great deal of studies or summaries of Chinese-Foreign Cooperative Education under the epidemic.

## 5. Conclusion

This research analyses the development of Chinese literature on Chinese-Foreign Cooperative Higher Education and divides it into three stages: the initial stage, the development stage and the relatively stable stage. It also uses CiteSpace

software to extract the cooperation patterns among authors or research institutions and to explore the hot topics in different time periods.

After mapping the relationships, we find that the authors from the same research institution failed to form a stable research cluster on Chinese-Foreign Cooperation Education, the number of publications was generally low, and the authors did not collaborate or even connect with each other in their research. In terms of external cooperation and joint research, only a few institutions or educational institutions had some associations with each other, but their cooperation was neither consistent nor sustainable, and few Chinese-Foreign Cooperative Universities participated in joint research. In terms of development trends, as Chinese higher education cooperation between China and foreign countries has progressed from initiation to development, the research hot topics have shifted from policies and dilemmas to keywords such as educational resources and quality.

To improve the current state of research, it is necessary to increase the research efforts of institutions, educational institutions and corporate organizations, to enhance the research capacity and quality of scholars themselves so that they can become the core force of internal research to identify and solve the problems of Chinese-Foreign Cooperative Education in order to further promote the internationalization of higher education. It is also necessary to strengthen the cooperation awareness so that the authors can realize the importance of teamwork, and to increase the learning exchanges between different institutions to understand their perspectives and to learn from their problem-solving measures to improve their own schooling systems.

At present, the main issues facing Chinese-Foreign Cooperative Education are the rational allocation of teaching resources and the improvement and assurance of teaching quality. It is necessary to strengthen the supervision of Chinese-Foreign Cooperative Education and to raise its standards by analyzing the characteristics of the institution itself and its teaching staff before deciding whether to open or cancel majors and courses, to make full use of the teachers' resources. There is also a need to strengthen the evaluation of the curriculum, learn from excellent and advanced teaching models and concepts, absorb their essence and use them to improve the settings, and substantially enhance the quality of Chinese-Foreign Cooperative Higher Education. Moreover, there is a need to increase research on Chinese-Foreign Cooperative Education under the pandemic, to keep track of its development, to learn and improve the methods of dealing with the challenges posed by the pandemic, to reduce its impact on Chinese-Foreign Cooperative Education, and to enable its stable development in international higher education.

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## Compliance with ethical standards

### *Disclosure of Conflict of interest*

The authors declare there is no personal or organizational conflict of interest with this work.

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## References

- [1] Jing T, Chen P. The Structure Reform of Chinese-Foreign Cooperation in Running Schools of Higher Education in New Era: Achievement, Problems and Prospects, *Heilongjiang Researches on Higher Education*, 40(7), 38-45.
- [2] Zhang Y, Jiang Y. The Direction of China's Higher Education Internationalization in the Post-epidemic Era, *Journal of Higher Education*, 41(12), 1-9.
- [3] Chen Y, Chen C, Liu Z, Hu Z, Wang X. The methodology function of Cite Space mapping knowledge domains, *Studies in Science of Science*, 33(2), 242-253.
- [4] Lin B. The current situation and frontier evolution of higher education evaluation research in China in the last decade-visual analysis of mapping knowledge domain based on CiteSpace, *Journal of Southwest University for Nationalities*, 43(5), 233-240.
- [5] The State Council of the People's Republic of China [Internet], © 2023 [cited 2023 May 31]. Available from: <https://www.gov.cn>
- [6] Ma W, Zhang Q. The impact of COVID-19 on international student mobility and China's coping strategies: from the perspective of the theory of risk society, *Journal of Higher Education Management*, 15(1), 1-9.