



Visualization Analysis of the Hotspots and Trends of China's Vocational Education Informatization in the New Era

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Abstract. Significant progress has been made in research on vocational education informatization in China, making it a hot topic in the field. This study analyzed 958 academic papers from 2018 to 2022 using bibliometric analysis and CiteSpace technology to identify hotspots and trends in China's vocational education informatization research during Education Informatization 2.0. The study provides insights into future development directions and hot topics, serving as a valuable reference for the construction and high-quality development of vocational education.

Keywords: vocational education informatization · education informatization 2.0 · visualization analysis · citeSpace

1 Introduction

Education informatization is a crucial aspect of education modernization and a key driver of high-quality education development in China's new era (Zhang, 2022). The Ministry of Education's "Education Informatization 2.0 Action Plan" in April 2018 marked a new phase of development for China's education informatization. In particular, education informatization has played a significant role in advancing the modernization of vocational education (Chen et al., 2018). This paper uses bibliometric analysis software to examine the development of China's vocational education informatization from 2018 to 2022, identifying research hotspots and evolution paths to inform future research.

2 Data Sources and Research Methods

2.1 Data Sources

To ensure data reliability, this paper uses CNKI as the literature source retrieval database to study China's vocational education informatization progress during the era of education informatization 2.0. The literature source time range is set from 2018–2022, and the search conditions are set to theme "vocational education informatization," literature type "academic journal," and subject type "vocational education." After screening 1002 eligible pieces of literature, 958 valid data were obtained for bibliometric analysis to ensure research accuracy and credibility.

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2.2 Research Methods

CiteSpace software is a powerful tool for scientific text mining and visual analysis, widely used in various disciplines (Li and Chen, 2022). It can draw knowledge maps of specific research fields through co-word and cluster analysis, presenting the knowledge context, research hotspots, and evolution trends. This paper employs descriptive statistical and bibliometric analysis methods, using CiteSpace software to transform and visualize data from 2018–2022. The focus is on China’s vocational education informatization research in the era of education informatization 2.0, analyzing publication volume, time, journals, and subject categories. The paper provides a visual analysis of the characteristics, hotspots, and trends in this field.

3 Analysis of the Research Hotspots of China’s Vocational Education Informatization in the Era of Education Informatization 2.0

3.1 Keyword Co-occurrence Analysis

By analyzing the co-occurrence of keywords, we can identify research hotspots and trends. Additionally, betweenness centrality is a useful metric for determining the significance of nodes within a network. Literature with high betweenness centrality may serve as a crucial link between disparate fields. The formula for calculating betweenness centrality is as follows:

$$BC_i = \sum_{s \neq i \neq t} \frac{n_{st}^i}{g_{st}} \quad (1)$$

In formula (1), g_{st} is the number of shortest paths from node s to node t , and n_{st}^i is the number of shortest paths passing through node i in g_{st} shortest paths from node s to node t .

We extracted keywords with a frequency of ≥ 3 from China’s vocational education informatization research literature between 2018 and 2022 using CiteSpaceV5.7.R2 software. A keyword co-occurrence network map was created to depict the relationship between keywords in the era of education informatization 2.0. The map consisted of 223 nodes and 225 connections, with a network density of 0.0091. The size of the nodes indicated the frequency of keywords, while the connections between nodes represented their correlation, and the thickness of lines indicated the correlation intensity. Refer to Fig. 1 for the keyword co-occurrence network relationship.

Based on the keyword co-occurrence network map, we extracted high-frequency keywords with a frequency of ≥ 10 times. The top ten keywords in the field of vocational education informatization research in China during the era of education informatization 2.0 are “vocational education, informatization, higher vocational college, higher vocational education, information technology, vocational college, education informatization, information-based teaching, educational informatization, and vocational education informatization”. Additionally, research hotspots with high betweenness centrality, such

Table 1. Keyword clustering results of Chinese vocational education informatization research literature in the era of education informatization 2.0 (self-drawn)

ID	Cluster Name	Size	Silhouette	Mean (Year)
#0	vocational education	24	1	2019
#1	vocational college	22	0.982	2019
#2	education informatization	20	0.968	2019
#3	information technology	15	0.958	2019
#4	practical path	14	0.951	2019
#5	information-based teaching	14	1	2019

CiteSpaceV5.7. R2 software identifies six clustering themes, with vocational education, information-based teaching, and vocational college being the most important research directions (Table 1). The analysis reveals a significant community structure and strong clustering effect, as indicated by Modularity $Q = 0.848$ and Silhouette $S = 0.9566$. These clusters are central to the field of vocational education informatization in China during the era of educational informatization 2.0.

4 Analysis of the Research Trend of China's Vocational Education Informatization in the Era of Education Informatization 2.0

To reveal the evolution path and change trend of China's vocational education informatization research in the era of education informatization 2.0, this paper uses CiteSpaceV5.7. R2 software to generate keyword time zone map and analyzes the hot topics and evolution of China's vocational education informatization research from 2018 to 2022. In the keyword time zone map, the more the corresponding time zone nodes are, the richer the research content is. The node size represents the frequency of keywords, and the connection is the connection between nodes.

The keyword time zone map illustrates the two stages of China's vocational education informatization research during the era of education informatization 2.0. The first stage (2018–2019) saw a significant increase in research strength and results, with a broadened research perspective covering topics such as information-based teaching, vocational college, information literacy, artificial intelligence, and digital campus. The second stage (2020–2022) has seen a reduction in research results, but a continued focus on hot topics such as high-quality development, digital transformation, smart campus, blended teaching, and competition in blended teaching ability.

5 Conclusion

China's research on vocational education informatization has yielded significant results during the Education Informatization 2.0 era. This study uses CiteSpace software to analyze the characteristics, hotspots, and trends of this research. The study identifies two

stages, with the second stage spanning from 2020 to 2022, and highlights topics such as vocational education, informatization, higher vocational education, and information technology. Emerging trends include information-based teaching, cloud computing, big data technology, and the double high-quality plan. These findings provide a foundation for future research and China's education modernization construction.

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