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An Analysis of Integration of General and Vocational Education Based on CiteSpace Knowledge Map

Yincheng Long[1], Wei Xing[1], Shaoyi Liu[2], Mei Liu[3]

[1]*Nanjing Vocational College of Information Technology, Nanjing, 210023, China*
[2]*SEGi University, Kuala Lumpur, 47810, Malaysia*
[3]*Jiangsu Vocational College of Agriculture and Forestry, Jurong, 212400, China*

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Abstract: To better leverage the educative value of vocational education, it is necessary to clarify the development context of 'integration of general and vocational education', using CiteSpace, a software of knowledge map visualization, to analyze the literature related to 'integration of general and vocational education' on China Knowledge Infrastructure (CNKI) from 2001-2023, with keyword co-occurrence and emergence analysis. The results show that the top five keywords in terms of frequency and centrality: integration of general and vocational education (frequency 69, centrality 0.27), vocational education (frequency 58, centrality 0.22), industry-education integration (frequency 30, centrality 0.09), secondary vocational schools (frequency 20, centrality 0.47), and general high schools (frequency 20, centrality 0.86). The clustering analysis shows Q=0.8114 and S=0.9805, indicating that the cluster structure is good and credibility is high. In addition, 'integration of general and vocational education' and 'enrollment' have continuously attracted attention over the past decade. However, the keyword 'comprehensive high school' has stopped appearing, while the keywords 'labor education' and 'secondary vocational schools' continue to appear. Further analysis of the Timeline view shows that, on the basis of the themes of labor education, vocational education, targeted poverty alleviation through education, high school stage, and horizontal integration, the operating modes of schools are increasingly becoming a hot topic of research in this field.

1. Research Background

The direction of Chinese vocational education reform and development is to coordinate the innovative collaboration of vocational education, higher education, and continuing education. This involves advancing the integration of general and vocational education, industry-education integration, and science-education fusion, optimizing the positioning of vocational education types, and highlighting the strategic positioning and practical requirements of modern vocational education's high-quality development. Currently, to achieve high-quality development of the national economy, it is crucial to identify the key focus points of vocational education to support Chinese-style modernization, the great rejuvenation of the Chinese nation, and the comprehensive development of human beings. Through the integration of general and vocational education, the goal is to promote the high-quality development of modern vocational education and provide more high-quality

technical and skilled talents.

Bibliometrics, which studies the literature system and its metrological characteristics[1], uses mathematical and statistical methods to research the distribution structure, quantitative relationships, and change patterns in literature information, as well as quantitative management. It further explores the structure, characteristics, and rules of science and technology[2-3]. This discipline has significant practical significance for analyzing the developmental characteristics of a discipline or research field, predicting the development trend, and explore the hot spots and frontiers in the field. CiteSpace is an information visualization software, which is mainly based on the theory of co-citation analysis and path-finding network algorithm[4-5]. It quantitatively analyzes literature in specific fields to discover the key path and knowledge inflection points in the evolution of subject areas[6-9]. This paper uses the CiteSpace method to analyze the hot spots, developmental trends, and frontiers of different phases of the research on 'integration of general and vocational education' over the past two decades. It aims to provide a review and reflection on the research on 'integration of general and vocational education', hoping to provide scholars with references and insights for the continuation of the relevant studies.

2. Research Approach

In this paper, the China National Knowledge Infrastructure database(CNKI) was used as the data retrieval source, and the data were collected through the 'Advanced Search' module of in the 'Journal Search'. The search was conducted with 'integration of general and vocational education ' as the title of related journals, with the time span from 2001 to 2023, and the search time was on November 13, 2023. To ensure research quality, book reviews, academic conference summaries, literature reviews, conference proceedings, and notices of journals, calling for papers, were identified and excluded. In the end, 787 effective documents were obtained, which were exported in the format of refworks, and after data conversion with CiteSpace, V.6.2.R5(64-bit) Basic, the analysis of keyword co-occurrence, emergence, etc. Finally, conclusions and reflections are drawn and the research approach is shown in Figure 1.

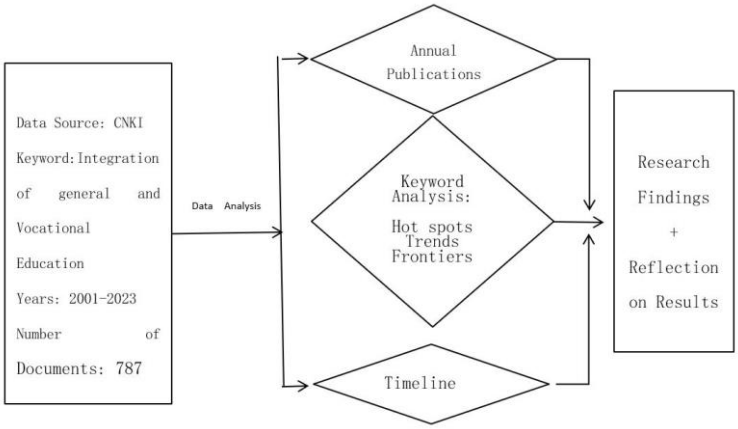

Figure 1: Research Approach Diagram

3. Research Methodology

This paper employs CiteSpace, an information visualization software, developed by Professor Chaomei Chen in 2004, to conduct an econometric analysis of the literature related to "Integration of General and Vocational Education". This software effectively reveals the key paths and turning points in the evolution of a certain research field and explores the underlying dynamic mechanisms and developmental frontiers of research evolution through a series of visualization maps. This paper

utilizes various features of the CiteSpace method, such as time distribution, keyword clustering analysis, highlighted hotspot word analysis, and timeline analysis, in an effort to explore the hot issues and evolutionary trends in "Integration of General and Vocational Education" in the past 20 or more years.

4. Analysis of Research Results

The temporal distribution reflects the change in the number of publications within a related research field over a period. In this paper, we used the retrieval analysis function of the CNKI database to count the annual number of publications in the research field of "Integration of General and Vocational Education" from 2001 to 2023, covering nearly 20 years. It was found that the earliest related research publications appeared in 2003. However, since 2018, the annual publication volume has been steadily increasing and has continued to this day, indicating that "Integration of General and Vocational Education" has recently become a research hotspot in this field.

4.1. Keyword Frequency Analysis

With the aid of CiteSpace software, an analysis of keywords in the field of "Integration of General and Vocational Education" was conducted, resulting in 787 nodes and 1524 links. In the visualization of literature, the nodes represent documents, and the size of the nodes indicates the importance or influence of a document. The degree centrality (degree centrality) or other centrality indices of the nodes signify its importance. The frequency of keywords reflects the degree of attention scholars pay to these terms; the higher the frequency, the greater the attention paid to that keyword. A higher centrality indicates a higher importance of the keyword in the field. In this paper, the study conducted a statistical analysis of the frequency and centrality of keywords, and arranged them in descending order of frequency. The top 10 keywords are shown in Table 1 as presented in the study.

Table 1: Keyword Frequency Analysis Table

Serial Number	Keyword	Frequency	Centrality
1	Vocational and General Integration	69	0.27
2	Vocational Education	58	0.22
3	Industry-Education Integration	30	0.09
4	Secondary Vocational School	20	0.47
5	General High School	20	0.86
6	General Education	17	0.18
7	Comprehensive High School	17	0.06
8	Vocational Institution	12	0.03
9	High School Stage	10	0.14
10	Labor Education	9	0.06

As can be seen From Table 1, the top five keywords in terms of frequency are Integration of General and Vocational Education, Vocational Education, Industry-Education Integration, Secondary Vocational School, and General High School. The top five keywords in centrality are General High School, Secondary Vocational School, Integration of General and Vocational Education, Vocational Education, and General Education. The top five keywords exhibit a crossover in terms of attention, influence, and importance in the field of study, reflecting the research focus of different periods. On the whole, studies on vocational education in the category of ‘Integration of General and Vocational

Education' has been and will continue to be a hot topic in the field, and the focus of future research may change in the future.

4.2. Keyword Clustering Analysis

To further grasp the hotspots and frontier knowledge in the field of "Integration of General and Vocational Education", the LLR (log-likelihood ratio) algorithm was used for keyword clustering analysis, and the keywords (K) were used to name each cluster. In the clustering analysis, two indicators need to be evaluated: the Q value (Modularity, the value of clustering modules) and the S value (Silhouette, the average silhouette value of clusters). Generally, a Q value greater than 0.3 signifies a significant clustering structure, and an S value greater than 0.7 indicates that the clustering is convincing. In this clustering result, Q=0.8114, S=0.9805, and M(Q,S)=0.888, indicating that the clustering structure is well-formed and highly credible. This clustering primarily yielded 10 clusters, and the results are presented in Table 2.

Table 2: Keyword Clustering Analysis Table

Serial Number	Frequency	Silhouette Value	Cluster Label	Core Keywords
0	80	1.000	General and Vocational Integration	General and Vocational Integration; Vocational and Universal Integration; Vocational Education; Industry-Education Integration; Secondary Vocational School
1	21	0.969	Vocational and General Integration	Vocational and Universal Integration; Type Education; Lifelong Learning; Vocational Education Entrance Examination; General and Vocational Integration
2	20	0.986	Labor Education	Labor Education; Industry-Education Integration; Vocational Institution; Development Strategy; Type Positioning
3	19	0.985	Secondary Vocational School	Secondary Vocational School; General High School; Primary and Secondary Schools; Secondary Vocational School; Vocational School
4	18	1.000	Vocational Education	Vocational Education; Coordinated Development; General and Vocational Streaming; Huang Yanpei; Higher Education
5	17	0.980	Filing and Identification	Filing and Identification; Experimental Class; Education Administrative Department; General Education; Education Bureau
6	16	0.888	High School Stage	High School Stage; Implementation Path; Dilemma; Independent Recruitment by Higher Vocational Colleges; Horizontal Integration between Vocational and General Education
7	15	0.986	Horizontal Integration	Horizontal Integration; Secondary Vocational Education; Vertical Throughput; Curriculum System; Vertical Articulation
8	13	0.928	School Running Model	School Running Model; Vocational Experience; Systematic Design; Subject Teacher; Career Development Education
9	6	0.996	Enrollment	Enrollment Rate; Quality of Student Source; Physical Labor; Value Orientation; Compulsory Education

From Table 2, it can be observed that the main 10 clusters obtained in this analysis are General and Vocational Integration, Vocational and General Integration, Labor Education, Secondary Vocational School, Vocational Education, Filing and Identification, High School Stage, Horizontal Integration, School Running Model, and Enrollment. The core keywords of each cluster group are detailed in Table 2. The Core keywords closely related to "Vocational and General Integration" research primarily include Type Education, Lifelong Learning, Vocational Education Entrance Examination, and General and Vocational Integration. Overall, although the research entry points vary across different periods, the main threads of research remain focused on Vocational and General Integration and Industry-Education Integration.

4.3. Keyword Emergence Analysis

To understand the development and changes in the research frontiers and hotspots of "Integration of General and Vocational Education" in 2013 to 2023, a burst analysis of keywords was conducted using CiteSpace. The results are shown in Table 3.

Table 3: Keyword Emergence Analysis

Top 10 Keywords with the Strongest Citation Bursts					
Keywords	Year	Strength	Begin	End	2013-2023
Comprehensive High School	2019	4.71	2019	2021	
Labor Education	2019	2.77	2019	2023	
Secondary Vocational School	2016	2.57	2017	2018	

From Table 3, it is evident that the emergence analysis yielded three burst keywords. The keyword with the strongest emergence, "Comprehensive High School," had a burst strength of 4.71 and lasted for three years (2019-2021). The keyword with the weakest burst was "Secondary School," with a burst strength of 2.57, lasting for one year (2017-2018). The burst of the keyword "Comprehensive High School" has already ceased, while the keywords "Labor Education" and "Secondary School" continue to appear.

4.4. Keyword Timeline Analysis

To understand the time span and research progress of each cluster (i.e., subfield) and its development and evolution, a Timeline view (timeline visualization) was used to analyze the evolutionary paths of each subfield. The results show that the clusters representing General and Vocational Integration, Vocational and Universal Integration, and Enrollment have the longest time spans, starting from 2013 and continuing to the present. The cluster representing Secondary Vocational School spans from 2016 to 2020. The clusters representing Labor Education, Vocational Education, Filing and Identification, High School Stage, and Horizontal Integration, which cover the period from 2015 to 2022, have significant milestone achievements and are still relevant in current research, indicating that the achievements of this period laid the foundation for subsequent research. The cluster representing School Running Model spans from 2022 to the present, during which a series of important achievements have been continuously produced and are closely linked, indicating that the field has been a research hotspot.

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References

[1] Hu Wenrui(2023). Research Hotspot and Evolution Trend of Vocational and General Education Integration in China (2013--2023)—Knowledge Map Analysis Based on CiteSpace[J]. Jiangsu Higher Vocational Education, 2023,(02):54-64

[2] Du Chaodong, Song Hong, et al.(2023).Analysis of the Current Situation of Vocational Education Research in China from the Perspective of Bibliometrics[J]. Journal of Zunyi Normal University, 2023(06): 166-170.

[3] He Zhoujian, Ye Meng, Huan Jie, et al.(2023). Research Hotspots and Trends Analysis of Phellodendron Based on CiteSpace Software[J]. Journal of Sichuan Forestry Science and Technology, 2023(06): 1-6.

[4] Li Qiaoxing, Huang Zixuan. A Review on Industrialization Development in China: A Visual Analysis Based on CiteSpace[J]. Journal of Guizhou University(Natural Sciences), 2023(04): 13-19.

[5] Qin Bing-wang. A Literature Review on Cultivation of Application - oriented Talents in Industrial Colleges Under the OBE Concept——A Knowledge Graph Analysis Based on CiteSpace[J]. Journal of Nanjing Open University, 2023(02): 46-52.

[6] Chen Qiumei. Research Review of Industry-Education Integration in China's Vocational Education in Past Decade——Based on Citespace Bibliometric Analysis[J]. Journal of Chengdu Aeronautic Polytechnic, 2023(06): 5-9,16.

[7] Chen Yue, Chen Chao-mei, Liu Ze-yuan, et al.(2023). The methodology function of CiteSpace mapping knowledge domains[J]. Studies in Science of Science, 2015(02): 242-253.

[8] Hu Zhigang, Chen Chaomei, Liu zeyuan, et al.(2023). From Counting References to Counting Citations: A New Way to Calculate the Total Cited Times of References[J]. Library and Information Service, 2013(21): 5-10.

[9] Hu Zhigang, Chen Chaomei, Liu Zeyuan, et al.(2023) Design and Implementation of the Citation Analysis System Based on XML Full - text Articles[J]. Data Analysis and Knowledge Discovery, 2012(11): 72-77.