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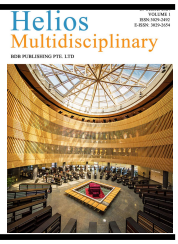

Research Status and Hotspot Analysis of Curriculum Evaluation in Chinese Higher Vocational Education

Wen Xiaohao*, Zhang Xiaolin, Chen Xiaoying

Guangxi Normal University, 15 Yucai Road, Guilin, Guangxi, China

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ABSTRACT

This study employs CiteSpace, an information visualization software, to analyze the research status and trends in curriculum evaluation within Chinese higher vocational education. By collecting data from the China National Knowledge Infrastructure (CNKI) database over the past two decades, the study generates knowledge maps and tables to reveal the spatiotemporal characteristics, core authors, research institutions, and hotspots in this field. The analysis shows distinct stages of development, with an initial development stage (2004-2007), an explosive growth stage (2008-2015), and a fluctuating development stage (2016-2023). The study identifies 14 core authors and the main research institutions, highlighting the need for stronger collaborative relationships. Through keyword co-occurrence and clustering analysis, the research hotspots are found to focus on the connotation evolution, realistic dilemmas, and functions of curriculum evaluation in Chinese higher vocational education. The study concludes by discussing the theoretical extension, categorical characteristics, dynamic improvement of indicators, and functional effects of teaching evaluation in Chinese higher vocational education. Future prospects emphasize the importance of expanding the evaluation system, adapting to industry needs, and developing intelligent teaching models to enhance the quality and relevance of higher vocational education in China.

1. Introduction

The rapid expansion and transformation of higher vocational education on a global scale have brought the issue of curriculum evaluation in vocational colleges to the forefront of academic and practical discourse. Curriculum evaluation not only serves as a pivotal element in the teaching reform of higher vocational education but also plays a critical role in shaping the overall development and evolution of these institutions. As higher vocational education continues to adapt to the changing demands of the workforce and society, it is crucial to refine the connotation and attributes of curriculum evaluation, emphasize its typological characteristics, and maximize its intended functions to ensure the relevance and effectiveness of vocational education programs.

Wen Xiaohao
E-mail address: wenxiaohao@mailbox.gxnu.edu.cn
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In the context of China, higher vocational education has experienced remarkable growth and transformation over the past two decades, progressing from the initial evaluation and demonstration schools to the establishment of high-quality institutions and the implementation of the "Double High Plan." This development has led to a shift in the focus of curriculum evaluation in Chinese vocational colleges, moving from meeting the requirements of standardized assessments to the selection of excellent courses, the construction of curriculum standards, and the development of high-level course clusters. These changes underscore the importance of conducting in-depth research and engaging in critical discussions on curriculum evaluation in higher vocational education.

To provide a comprehensive understanding of the current research landscape and emerging trends in curriculum evaluation within higher vocational education, this study and case studies from Chinese vocational colleges. By conducting a systematic review of the existing literature, both in China and internationally, this paper aims to identify the main research trends, methodologies, and findings in the field of curriculum evaluation. Furthermore, it seeks to highlight the commonalities and disparities between the Chinese and international contexts, as well as the potential implications for the future development of curriculum evaluation in higher vocational education.

The significance of this study lies in its potential to contribute to the ongoing scholarly discourse on curriculum evaluation in higher vocational education, provide valuable insights for policymakers and practitioners, and offer recommendations for future research directions. By synthesizing the current state of knowledge and identifying the key issues and challenges, this paper aims to facilitate the continuous improvement and innovation of curriculum evaluation practices in higher vocational education, ultimately enhancing the quality, relevance, and responsiveness of vocational education programs to the ever-changing needs of the labor market and society.

The following sections of this paper will delve into the data sources and research methodology employed in the study, followed by an in-depth analysis of the basic characteristics and research hotspots in the literature on curriculum evaluation in higher vocational education. The spatiotemporal characteristics analysis will reveal the distinct stages of development in this field, while the author mapping and research institution analyses will shed light on the core contributors and collaborative relationships. The keyword co-occurrence and clustering analyses will uncover the main research directions and trends, focusing on the connotation evolution, realistic dilemmas, and functions of curriculum evaluation in higher vocational education.

The paper will conclude with a discussion of the key findings, implications for future research and practice, and recommendations for enhancing the quality and relevance of curriculum evaluation in higher vocational education. By addressing the theoretical extension, categorical characteristics, dynamic improvement of indicators, and functional effects of teaching evaluation, this study aims to provide a road-map for the future development of curriculum evaluation in higher vocational education, both in China and beyond.

2. Data Sources and Research Methodology

A. Data Collection

To gain a comprehensive understanding of the research status and trends in curriculum evaluation within higher vocational education, this study employs a systematic approach to data collection. The primary data source is the China National Knowledge Infrastructure (CNKI), a leading database for academic publications in China. The search was conducted within the "Academic Journals" category, focusing on "Peking University Core" and "CSSCI" sources to ensure the quality and relevance of the selected articles. The search query "[Title/Abstract/Keyword="higher vocational + higher vocational colleges" AND "curriculum evaluation"]" was used, with a publication date range of [2004-2023]. This query yielded 218 valid articles, which were then formatted using the Refworks software to serve as the dataset for this research. By demonstrating the use of a comprehensive database, a well-defined search strategy, and a systematic approach to data collection, this study provides a valuable framework for researchers investigating curriculum evaluation in higher vocational education across different settings.

B. Research Methodology

To analyze the collected data and identify the research status, trends, and hotspots in curriculum evaluation within higher vocational education, this study employs the CiteSpace visualization analysis system. CiteSpace is a powerful tool for discovering cutting-edge research trends by analyzing and visualizing information such as keywords, authors, and institutions, thus generating knowledge maps. For the purpose of this study, CiteSpace 6.1R6 software was selected to generate three modes: theme co-occurrence, clustering, and burst detection.

Theme co-occurrence analysis allows for the identification of the most frequently occurring themes and their relationships within the selected dataset. By visualizing the co-occurrence network of themes, researchers can gain insights into the core issues and topics addressed in the literature on curriculum evaluation in higher vocational education. Clustering analysis, on the other hand, helps to group similar research topics together, revealing the main research areas and their interconnections. This analysis provides a clearer picture of the research landscape and enables the identification of potential gaps and opportunities for future research. Finally, burst detection analysis identifies the themes and keywords that have experienced a sudden increase in frequency over a specific period, indicating emerging trends and hot topics in the field.

In addition, this study also examines data on the number of published papers, authors, and research institutions to provide a comprehensive overview of the development and growth of curriculum evaluation research in Chinese higher vocational education. By combining these various data analysis techniques, this study aims to offer a multifaceted understanding of the research status and trends in this field, which can inform future research and practice not only in China but also in other countries with similar higher vocational education systems.

The use of CiteSpace and the systematic analysis of publication data demonstrate the value of employing advanced research tools and methodologies in the study of curriculum evaluation in higher vocational education. By adopting a similar approach, researchers in other contexts can uncover valuable insights and contribute to the global discourse on this important topic.

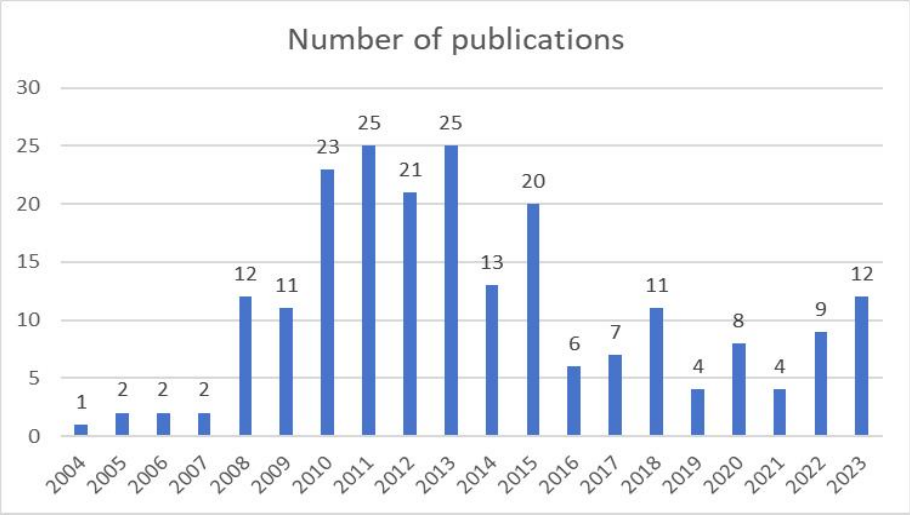
3. Analysis of Basic Characteristics in the Literature

A. Spatiotemporal Characteristics Analysis

The total number of publications and the dynamic changes in the annual publication volume provide valuable insights into the development and popularity of research in a given field. In the case of curriculum evaluation research in higher vocational education, the analysis of spatiotemporal characteristics reveals three distinct stages of development from 2004 to 2023 (Figure 1).

1. The Initial Development Stage (2004-2007) saw a limited number of publications, with an average of approximately 2 articles per year, indicating a nascent research interest in this field. This stage was characterized by a small number of researchers and a lack of widespread attention to curriculum evaluation in higher vocational education.
2. The Explosive Growth Stage (2008-2015) witnessed a significant increase in research output, with an average of approximately 20 articles per year. This surge in publications can be attributed to policy changes and reforms in higher vocational education, such as the inclusion of "curriculum construction" as a first-level evaluation indicator in the "Evaluation Plan for Talent Cultivation in Higher Vocational Colleges" issued by the Ministry of Education in 2008, and the development of demonstration schools and related policies in 2011. These policy initiatives shifted the research focus towards the evaluation of curriculum objectives that emphasized the integration of industry and education in higher vocational education.
3. The Fluctuating Development Stage (2016-2023) saw a sharp decline in the number of publications, with an average of approximately 7 articles per year. This decrease in research output can be attributed to the revision of educational policies and changes in curriculum evaluation indicators. The draft of the "National Vocational Education Reform Implementation Plan" released by the State Council in 2018 emphasized the need for "incorporating learner-centered curriculum evaluation standards and system research," while the actual document issued by the State Council in 2019 focused on "establishing and improving the quality evaluation of vocational education training." These policy changes led to a decrease in researchers' enthusiasm for studying curriculum evaluation in higher vocational education. (Figure 1)

Figure 1. Annual number of publications on curriculum evaluation in Chinese higher vocational education from 2004 to 2023



The influence of policy changes and reforms on research output and focus is a common phenomenon across different contexts, and understanding these dynamics can help researchers,

policymakers, and practitioners better navigate the evolving landscape of curriculum evaluation research in higher vocational education.

B. Author Mapping Analysis

The author mapping analysis provides valuable insights into the core authors and their collaborative relationships in the field of curriculum evaluation research in higher vocational education. According to Price's Law [2], authors with 2 or more publications are considered core authors in this field. In the context of Chinese higher vocational education, 14 authors meet this criterion, collectively publishing 31 articles, which account for 14% of the total analyzed literature. Among these core authors, Wu Yaping has published 4 articles, Wang Ting has published 3 articles, and the remaining core authors have each published 2 articles.

However, the author mapping analysis reveals that scholars specializing in curriculum evaluation research in Chinese higher vocational education have not yet formed close collaborative relationships, and the number of core scholars and research outputs is relatively limited. This finding highlights the need for strengthening team collaboration and development to foster a more vibrant and productive research community in this field.

While the author mapping analysis in this study focuses on Chinese higher vocational education, the importance of collaboration and the formation of core research groups is a universal theme in academic research. By identifying the core authors and their collaborative relationships, researchers in other contexts can gain valuable insights into the structure and dynamics of the research community in their respective fields, and work towards building stronger and more productive collaborative networks.

C. Research Institution Analysis

The research institution analysis provides a comprehensive overview of the organizations involved in curriculum evaluation research in higher vocational education. In the context of Chinese higher vocational education, the mapping analysis (Figure 2) and the publication data (Table 1) reveal that vocational and technical research institutes and higher vocational colleges are the main forces driving research in this field. (Figure 2)

Figure 2. Visualization map of research institutions studying curriculum evaluation in Chinese higher vocational education

Issuing Authority	Number of publications
Changzhou Light Industry Vocational and Technical College Higher Education Institute	4
Guangzhou Panyu Vocational and Technical College	3
Changzhou Light Industry Vocational and Technical College	3
Changchun Vocational and Technical College	3
Jinhua Vocational and Technical College	3
Zhejiang Vocational College of Finance	3
Hunan Automotive Engineering Vocational College	3
Chongqing Vocational College of Electronic Engineering	2
Zibo Vocational College	2
Xuzhou Preschool Normal College	2

Table 1. Top 10 research institutions by publication volume

Among the identified research institutions, the Higher Education Research Institute of Changzhou Light Industry Vocational and Technical College has the highest number of publications, with 4 articles. This is followed by Changzhou Light Industry Vocational and Technical College, Guangzhou Panyu Polytechnic, Changchun Vocational and Technical College, Jinhua Polytechnic, Zhejiang Financial Vocational College, and Hunan Automotive Engineering Vocational College, each publishing 3 articles.

However, the research institution analysis also reveals that there are few connections between the organizations currently studying curriculum evaluation in Chinese higher vocational education. This finding suggests that the academic links among these institutions are relatively scattered, and a closely collaborating core group of institutions has not yet been formed. Strengthening institutional collaboration and fostering the development of research networks can help to enhance the quality, impact, and sustainability of curriculum evaluation research in higher vocational education.

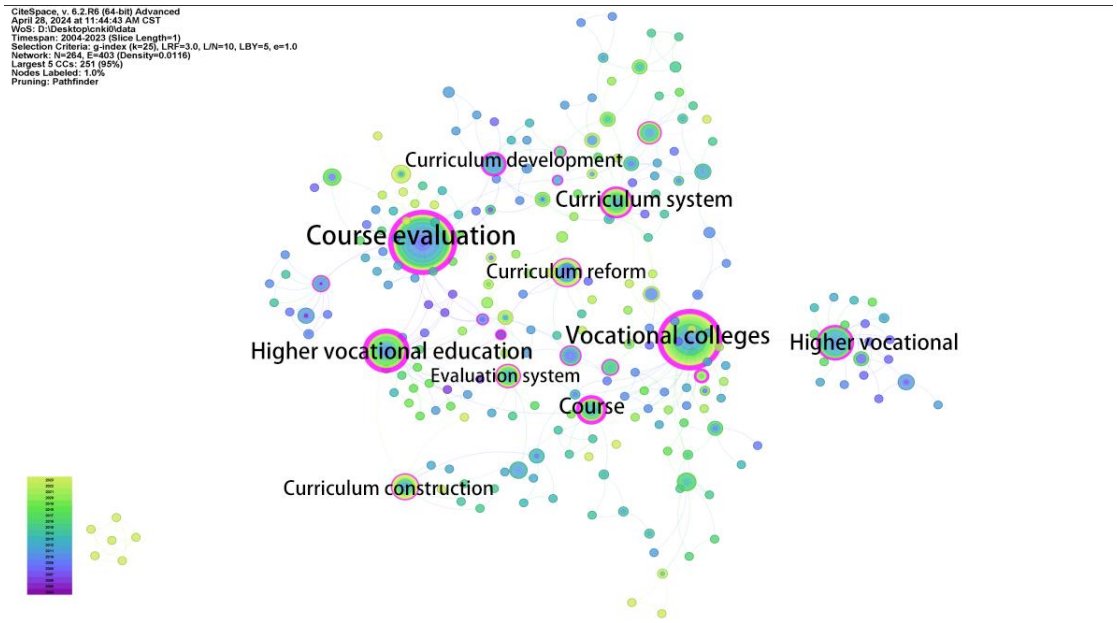
The importance of institutional collaboration and the formation of research networks is a universal theme in academic research. By identifying the key research institutions and their collaborative relationships, researchers in other contexts can gain valuable insights into the organizational landscape of their respective fields, and work towards building stronger and more productive research partnerships.

4. Research Hotspot Analysis

A. Keyword Co-occurrence Knowledge Mapping Analysis

Applying the keyword co-occurrence method to study the field of curriculum evaluation in Chinese higher vocational education can help identify scholars' research trends and hotspot issues in a timely manner. Figure 3 shows the keyword co-occurrence knowledge map of curriculum evaluation research in Chinese higher vocational education, containing a total of 264 nodes and 403 links, with an overall network density of 0.0116. Degree centrality is the most direct method for measuring the centrality of nodes in a co-occurrence network. The larger the degree centrality, the higher the importance of the node. In the map, "curriculum evaluation" and "higher vocational colleges" are the two keywords with larger nodes, with frequencies of 45 and 42, respectively, and corresponding centralities as high as 0.67 and 0.72, indicating a certain level of representativeness. Next are "higher vocational education," "higher vocational," and "curriculum reform," with frequencies of 24, 18, and 11, respectively, which are consistent with the current hotspots in curriculum evaluation research in Chinese higher vocational education. These keywords have links with other keywords, showing a high degree of aggregation. Overall, the network structure of curriculum evaluation research in Chinese higher vocational education is relatively loose, with a low network density. In the future, it is necessary to continue strengthening research efforts in the field of curriculum evaluation in Chinese higher vocational education. (Figure 3)

Figure 3. Keyword knowledge map of curriculum evaluation research in Chinese higher vocational education



B. Keyword Clustering Mapping Analysis

To further analyze the research hotspots of "curriculum evaluation in Chinese higher vocational education," this study conducted a clustering analysis on the keyword knowledge map, aggregating scattered keywords into clear clusters to obtain a visualized keyword clustering network map of the research field. Based on the clustering structure and clarity, CiteSpace provides two indicators, modularity (Q) and mean silhouette (S), to evaluate the mapping effect. Generally, Q values range from [0,1], with values greater than 0.3 indicating a significant cluster structure. When S>0.7, it suggests a good clustering effect with strong persuasiveness. In this study, the Q value is 0.8309>0.3, demonstrating the significance of the cluster structure. At the same time, the regression coefficient is 0.9704>0.7, indicating that the clustering validity is satisfactory. Considering the large number of clusters, to obtain clearer clustering results, we selected "Show the Largest K Clusters" as 7, resulting in 7 cluster groups (see Figure 4).

Based on the keyword clustering map, research on curriculum evaluation in Chinese higher vocational education since 2004 has mainly focused on 7 clusters: #0 higher vocational colleges, #1 curriculum evaluation, #2 higher vocational education, #3 curriculum construction, #4 curriculum system, #5 evaluation system, and #6 curriculum development (see Table 2). Combining the keyword co-occurrence network clustering table in Table 2, the research hotspots of curriculum evaluation in Chinese higher vocational education since 2004 have mainly concentrated on the following aspects: (Figure 4)

Figure 4. Keyword clustering knowledge map of curriculum evaluation research in Chinese higher vocational education

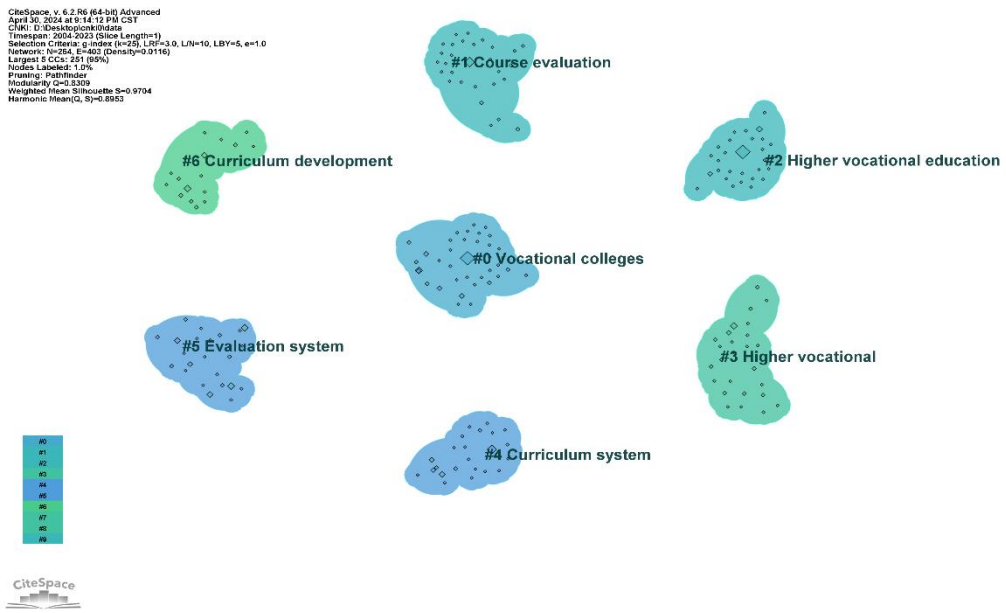


Table 2. Keyword co-occurrence network clustering table of curriculum evaluation research in Chinese higher vocational education

Cluster labels	Cluster size	Label words (top 5 degree centrality)
#0Vocational colleges	24	Higher Vocational Colleges, Teaching Reform, Flipped Classroom, Higher Vocational Education, Curriculum Evaluation
#1Course evaluation	21	Course Evaluation, Implementation, Curriculum Design, Higher Vocational Colleges, Industrial Analysis
#2Higher vocational education	15	Higher Vocational Education Connotation Higher Vocational Colleges Repertoire Oriented Flexible Teaching
#3Higher vocational	13	Higher Vocational Curriculum Construction, Higher Vocational Colleges, Industry-University Cooperation, School-Enterprise Collaboration
#4Curriculum	12	Curriculum system, vocational ability, competency-based, characteristic analysis, professional and

system		creative integration
#5Evaluation system	11	Evaluation system, combination of engineering and learning, innovation, reform, higher vocational courses
#6Curriculum development	10	Curriculum Development Features Interactive Mode Curriculum Management School-Enterprise Cooperation

1. Evolution of the connotation of curriculum evaluation in Chinese higher vocational education Currently, domestic scholars' reflections on the connotation of curriculum evaluation in Chinese higher vocational education mainly focus on its functional positioning. Su Wenxiu proposed the connotation of "curriculum evaluation in higher vocational education under the concept of quality education," which adheres to a people-oriented approach and takes students' all-round development as the core based on the concept of quality education. Wang Ting proposed that curriculum evaluation in Chinese higher vocational education should include the developmental, process-oriented, long-term, and vocational nature of evaluation from the perspective of "work-study integration," and discussed the important links of curriculum evaluation in Chinese higher vocational education from the aspects of evaluation subjects, evaluation content, evaluation standards, and means. Tang Chenghua believed that curriculum evaluation is the examination of the objectives, formulation, and implementation of the curriculum to determine its effectiveness and make corresponding decisions for improvement. At present, Chinese scholars have defined curriculum evaluation in higher vocational education from multiple perspectives, mainly sharing commonalities in evaluation objects, evaluation dimensions, and value choices. Specifically, it is manifested in the professionalization of evaluation objects, the evaluation scales of multiple subjects, and the overall values.

2. Realistic dilemmas faced by curriculum evaluation in Chinese higher vocational education Scholars such as Zhang Chi and Wang Junhong pointed out that the realistic dilemmas faced by curriculum evaluation in Chinese higher vocational education are mainly reflected in several aspects: first, the management of curriculum evaluation in higher vocational education tends to be administrative and lacks flexibility; second, the evaluation objectives are overly quantified, limiting the effectiveness of evaluation; third, the evaluation subjects are singular, the evaluation objects are one-sided, and the evaluation standards are rigid, thus hindering the scientific process of curriculum evaluation. Chu Jinxing pointed out that the current curriculum evaluation in Chinese higher vocational education has problems such as lagging evaluation concepts, ambiguous evaluation standards, rich evaluation content, limited evaluation subjects, large differences in class learning styles, and utilitarian application of evaluation results. Chen Lei et al. believed that the main problems in curriculum evaluation in Chinese higher vocational education are the disconnection between evaluation standards and the characteristics of practical courses, the lack of professionalism of evaluation subjects in practical courses, and the use of common evaluation standards for various practical links. Although most scholars have different criticisms of the realistic dilemmas faced by curriculum evaluation in Chinese higher vocational education, most of them describe the actual problems from the perspectives of evaluation subjects, evaluation standards, and evaluation results.

3. Functions of curriculum evaluation in Chinese higher vocational education Most domestic scholars have their own views on the functional positioning of curriculum evaluation in Chinese higher vocational education. Wang Ling pointed out that curriculum evaluation in Chinese higher vocational education plays a guiding and encouraging role, determining whether teaching in higher vocational education can truly promote high-quality employment of students. Liu Xingshu integrated curriculum objectives, curriculum content, curriculum implementation, and curriculum evaluation into a coherent system, combining it with the needs of job groups, and established a complete curriculum system for vocational colleges in China, mainly taking the curriculum evaluation of the intelligent automotive technology professional group in vocational schools as an example. At present, Chinese scholars' functional positioning of curriculum evaluation in higher vocational education mainly focuses on student-centeredness and talent cultivation models.

The evolution of the connotation of curriculum evaluation, the realistic dilemmas faced by institutions, and the functions of curriculum evaluation in promoting student success and aligning with industry needs are universal themes that resonate across different countries and regions. By understanding these research hotspots and their implications, researchers, policymakers, and practitioners can work towards developing more effective and relevant curriculum evaluation practices in higher vocational education, ultimately enhancing the quality and impact of vocational education programs.

C. Keyword Burst Detection Analysis

Keyword burst detection analysis is a powerful tool for revealing the development trends and changing patterns of research on curriculum evaluation in higher vocational education within specific time periods. By identifying the keywords that have experienced a sudden increase in frequency, or "burst," this analysis helps scholars understand the explosive growth of literature and the focus of academic attention in the field.

Based on the keyword knowledge map, we selected a keyword mutation threshold of 0.5 and obtained 10 keywords in the field of curriculum evaluation research in higher vocational education (Figure 5). To further visualize the evolution of these keywords over time, we conducted a Timeline analysis (Figure 6). In this view, the size of the rings represents the frequency of keyword occurrences, and the lines indicate the time span of the keywords, with the starting point being the year of initial appearance. The density of the keywords reflects the degree of research output in that time period. (Figure 5, 6)

Figure 5. Keyword burst detection map of curriculum evaluation research in Chinese higher vocational education

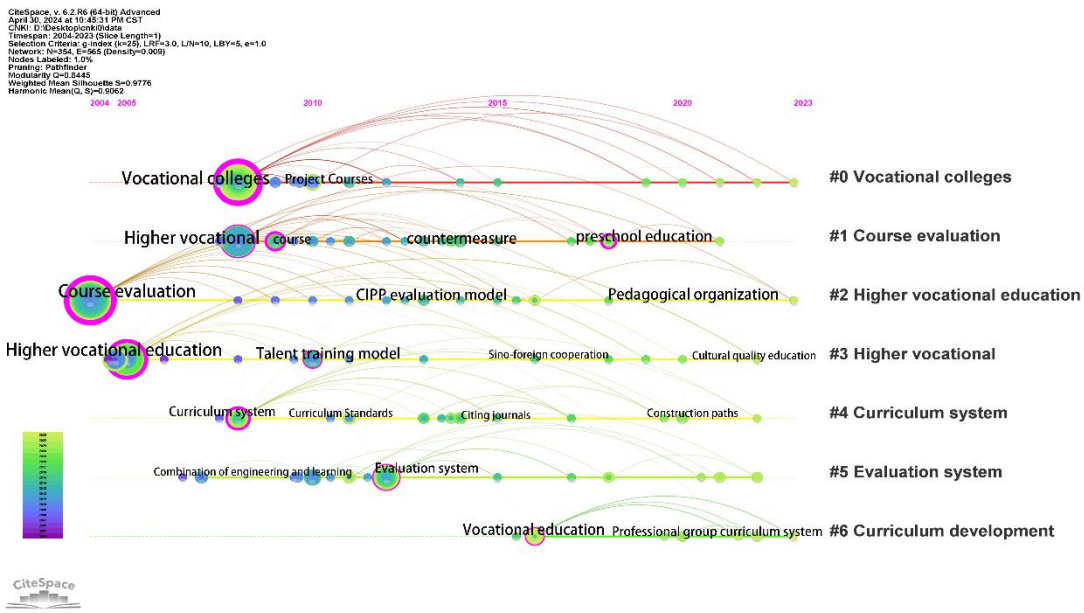


Figure 6. Timeline analysis of keywords in curriculum evaluation research in Chinese higher vocational education

Top 10 Keywords with the Strongest Citation Bursts					
Keywords	**Year**	**Strength**	**Begin**	**End**	**2004 - 2023**
Course evaluation	2004	1.86	**2004**	2009	
Higher vocational education	2008	3.21	**2008**	2011	
Higher vocational	2008	3.32	**2010**	2013	
Combination of engineering	2010	1.8	**2010**	2012	
Curriculum reform	2005	1.73	**2010**	2011	
Curriculum development	2006	1.64	**2011**	2013	
Evaluation system	2012	1.59	**2012**	2015	
Pedagogical reform	2011	1.88	**2014**	2018	
countermeasure	2014	1.6	**2014**	2016	
Higher vocational education	2005	2.36	**2018**	2019	

we can divide the research on curriculum evaluation in higher vocational education into two distinct stages:

1. Stage 1 (2008-2013): During this period, research revolved around the evaluation methods, evaluation strategies, teaching development paths, and construction of evaluation standards for different professional courses, particularly in the context of work-study integration and school-enterprise cooperation. This focus can be attributed to the release of the "Evaluation Plan for Talent Cultivation in Higher Vocational Colleges" by the Ministry of Education in April 2008, which promoted the process of connotative teaching reform in higher vocational colleges and emphasized the importance of employment-oriented education and deep collaboration between schools and enterprises.

Recognizing the unique characteristics of higher vocational courses, many scholars conducted stage-based research on constructing evaluation index systems. For example, Tao Honglin and Xiao Renzheng proposed that the evaluation system for higher vocational education courses should be constructed from aspects such as curriculum plan evaluation, curriculum effect evaluation, and evaluation several years after curriculum construction. Similarly, Li Yuanyuan and Sha Jidong focused on common computer courses in higher vocational education and developed an evaluation system that combined process evaluation and final evaluation based on an in-depth analysis of course characteristics. The intensity of mutant words during this stage suggests that most studies focused on researching curriculum evaluation plans from the perspective of work process-oriented curriculum development in higher vocational education.

2. Stage 2 (2014-2023): The release of the "National Vocational Education Reform Implementation Plan" by the State Council in 2019 marked a shift in the research perspective of domestic scholars. Taking market demand as the entry point, researchers began to focus on curriculum evaluation reform, curriculum design, and teaching reform paths and countermeasures in higher vocational education, starting from specific higher vocational courses and the connection between secondary and higher vocational education.

For instance, Dong Yongzhe used ideological and political courses as the entry point and elaborated on new curriculum evaluation concepts from the perspectives of unifying final evaluation and formative evaluation, shifting from single evaluation to diversified evaluation, and combining quantitative and qualitative evaluation. Lyu Yulong deeply analyzed the connotation and development status of the curriculum evaluation system in higher vocational colleges and proposed strategies and principles for constructing a work-study integrated curriculum evaluation system, as well as ideas and methods for designing the curriculum evaluation system.

During this stage, many scholars also conducted research on the basic ideas, objectives, and content design of curriculum evaluation in higher vocational education from aspects such as professional categories, practical courses, the CIPP evaluation model, and competency-based education. The time series of mutant words during this period reveals that "curriculum system" and "practical courses" remain popular to this day, closely related to the current era background and objective conditions faced by curriculum evaluation in higher vocational education. These keywords are expected to continue to be research hotspots in the future.

The keyword burst detection and Timeline analyses provide valuable insights into the evolution of research on curriculum evaluation in higher vocational education, highlighting the impact of policy changes and the shifting focus of academic attention over time. By understanding the development of curriculum evaluation research and its relationship to the broader context of higher vocational education reform, researchers, policymakers, and practitioners can work towards developing more effective and responsive evaluation practices that support the continuous improvement and innovation of vocational education programs.

5. Conclusions and Future Prospects

A. Conclusions

This study employed the CiteSpace information visualization software to analyze the literature related to "curriculum evaluation in higher vocational education" collected from the

Peking University Chinese Core and CSSCI databases over the past two decades. By generating relevant knowledge maps and tables, the following conclusions were drawn:

1. Spatiotemporal Characteristics Analysis: The development of research on curriculum evaluation in higher vocational education exhibits distinct stage characteristics from 2004 to 2023. The initial development stage (2004-2007) was characterized by a small number of researchers and insufficient attention to the field. The explosive growth stage (2008-2015) showed an increase in research efforts, driven by policy orientation and the construction of demonstration schools. The fluctuating development stage (2016-2023) was influenced by changes in policies and curriculum evaluation indicators, leading to a decline in research enthusiasm.
2. Author Mapping Analysis: Using CiteSpace software, a visualization map of authors in the research on curriculum evaluation in higher vocational education was generated. The analysis revealed 14 core authors with 2 or more publications, but their collaborative relationships are relatively scattered, and close collaborations have not yet been formed.
3. Research Institution Analysis: A visualization map of research institutions publishing on curriculum evaluation in higher vocational education was created using CiteSpace software. The analysis showed that vocational and technical research institutes and higher vocational colleges are the main research institutions, but there are few collaborative relationships, and a close core group of collaborating institutions has not been formed.
4. Research Hotspot Analysis: Through keyword co-occurrence and clustering, the main directions and changing trends of research on curriculum evaluation in higher vocational education were revealed. The research mainly focuses on aspects such as the connotation evolution, realistic dilemmas, and functions of curriculum evaluation in higher vocational education, involving the construction of evaluation systems, exploration of evaluation methods, and formulation of evaluation standards.

B. Future Prospects

Curriculum evaluation in higher vocational schools plays a crucial role in national teaching evaluation and is of great significance to the professional development of schools and the cultivation of students. With the goal of improving the quality of teaching in higher vocational education, it is essential to explore the connotation of evaluation, highlight its typological characteristics, and give full play to its due role. The following aspects should be considered for future research and practice:

1. Theoretical Extension of Teaching Evaluation in Higher Vocational Education: Over the past two decades, teaching evaluation in higher vocational schools has gone through four periods: qualified evaluation, demonstration schools, high-quality schools, and the creation of "double high schools." In the future, curriculum evaluation in higher vocational colleges should expand from "curriculum" to "quality," emphasizing the important position of "curriculum" and "classroom" in "school-enterprise cooperation." It should also focus on student-centered approaches and continuously adapt to the needs of industries and enterprises, expanding the evaluation system.
2. Categorical Characteristics of Curriculum Evaluation in Higher Vocational Colleges: In the past 20 years, there have been deficiencies in resource acquisition, enterprise role positioning, and evaluation indicator setting in higher vocational majors in China. To overcome these problems, it is necessary to establish evaluation objectives, involve multiple parties, deepen

process evaluation, and clarify grading standards to better adapt to the needs of industries and enterprises.

3. Dynamic Improvement of Curriculum Evaluation Indicators in Higher Vocational Education: Curriculum reform evaluation should focus on the foresight and dynamism of industry and enterprise needs, designing forward-looking indicators and establishing a dynamic evaluation mechanism. In response to the problems existing in the current evaluation system, such as the lack of foresight and weak dynamism of evaluation indicators, it is necessary to construct an algorithm model with both foresight and dynamism to improve the effectiveness of curriculum evaluation in higher vocational education.
4. Functional Effects of the Teaching Evaluation System in Higher Vocational Majors: Currently, the phenomenon of "utility deficiency" in China's teaching evaluation system for higher vocational education is manifested in the lack of professionalization of evaluation teams and the need to improve the effectiveness of evaluation results. To adapt to the needs of modern higher vocational teaching, it is necessary to form dedicated structural evaluation teams and conduct evaluations through technical models. It is important to achieve quantitative evaluation of "knowledge and ability" while also focusing on "non-quantitative" evaluation research. On this basis, a new intelligent teaching model is proposed: improving the informatization level of evaluation and enhancing the intelligence level of intelligent teaching.

By addressing these key aspects, researchers, policymakers, and practitioners can work towards developing a more effective, responsive, and forward-looking curriculum evaluation system in higher vocational education. While this study primarily draws upon data and case studies from Chinese vocational colleges, the conclusions and future prospects discussed are relevant to higher vocational education systems in other countries facing similar challenges and opportunities. By understanding the current state of research and the potential directions for future development, stakeholders can collaborate to create a curriculum evaluation framework that supports the continuous improvement and innovation of vocational education programs, ultimately enhancing the quality and relevance of higher vocational education in meeting the evolving needs of students, industries, and society.

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