The Credit Bank for Lifelong Education in China: Research Status, Hotspot Analysis, and Future Outlook - A Visual Analysis Based on CiteSpace

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Abstract: Taking "lifelong education" and "credit bank" as the key words, and the relevant literatures from CNKI (China National Knowledge Infrastructure) from 2006 to 2025 as the research objects, this study uses CiteSpace software to conduct quantitative and visual analysis from the aspects of the number of published papers, cooperative authors, research institutions, and key words, so as to explore the research status, hot issues, and development trends of the credit bank for lifelong education. The research finds that the research on the credit bank for lifelong education presents three-stage characteristics: early start-up, rapid development, and then entering a steady stage; core authors have made important contributions but cross-team cooperation is insufficient; research institutions have formed a cooperation network but with low density; the research hotspots revolve around "building a lifelong learning system", showing a progressive development context and forming a "system-technology-scenario" trinity pattern, but there is still room for deepening in some fields. Based on this, in the future, research and practice can be promoted from aspects such as adapting to regional differences, focusing on special groups, and improving the quality assurance system.

Keywords: Lifelong Education; Credit Bank; Bibliometrics

1. Introduction.

As the core institutional carrier supporting the learning society, the credit bank for lifelong education has developed rapidly in China in recent years under the promotion of national policies. At the beginning of 2025, the "Outline of the Plan for Building a Powerful Education Country (2024-2035)" clearly proposed to "construct a lifelong learning system based on the qualification framework, with the credit bank as the platform and the certification of learning achievements as the focus", and positioned it as a key link in the education digitalization strategy [2]. At the same time, the Ministry of Education listed the innovative model of "standard mutual recognition, credit intercommunication, and talent interaction" of the Guangdong Credit Bank as a typical case of key tasks in the construction of a learning society, demonstrating the high recognition of the national level for the practical achievements of the credit bank [1]. In terms of technology empowerment, big data, blockchain, and artificial intelligence have been deeply integrated into the system architecture of the credit bank. For example, the "four-in-one" service platform built by the Guangdong Credit Bank has collected more than 1.53 million learning accounts and 14.6 million learning achievements, realizing the digital certification and cross-domain circulation of learning value[1][3].

2. Research Design

2.1 Research Tools

This study uses CiteSpace, an information visualization software developed by Dr. Chen Chaomei, a Chinese scholar from the College of Information Science and Technology of Drexel University in the United States. This software is mainly used for measuring and analyzing scientific literature data, and can draw knowledge graphs of the development of science and technology fields, presenting comprehensive information in the field of scientific knowledge in an intuitive way. Through CiteSpace, researchers can identify key literatures, popular researches, and cutting-edge trends in a certain scientific field[4].

2.2 Data Sources and Research Methods

In order to more accurately discuss the authority of the relevant research and literature collection

of the vocational education credit bank, the data are from CNKI. The retrieval condition is set to "lifelong education" in the title, abstract, and keywords, and "credit bank" as the theme for accurate search, with no restrictions on the publication time, literature source, and supporting funds. As of June 23, 2025, a total of 809 relevant literature records have been retrieved, including 731 journal literatures and 65 master's and doctoral theses. The retrieved literature is exported in Refworks format, and the exported bibliographic information includes title, author, abstract, keywords, publication, publication time, author's institution, etc. Then, the bibliographic information in Refworks format is converted into a format suitable for CiteSpace, and then imported into the main interface of CiteSpace. The time span is set to 2006-2025 (the earliest publication time of the retrieved literatures is 2006), and the time partition is set to 1 year. CiteSpace literature analysis software is used to conduct visual analysis on 809 sample literatures, so as to show the research situation of China's credit bank in the field of vocational education in a clearer and more intuitive way.

3. Basic Status of Research on Vocational Education Credit Bank in China

3.1 Analysis of the Number of Annual Published Papers

By conducting statistical analysis on the number of published papers on the credit bank, we can understand the research process of China's credit bank for lifelong education. Taking the year as the statistical unit, according to the time series of 730 relevant literatures, they are divided into three stages.

The first stage is the early research stage (2006-2011). In this stage, the total number of published papers is at a low level, with an average of 5 papers per year. There are two reasons for this phenomenon. First, the research on the "credit bank" started relatively late. The concept of the "credit bank system" was first put forward by the United States in the mid-1970s, and South Korea was the first country to operate it institutionally. The "credit bank" adopts the name and some functions of the bank, and its purpose is to certify, accumulate, and convert the credits or learning achievements obtained by learners in various education systems and different learning paths, so as to promote people to carry out diversified, flexible, and continuous learning processes[5]. Second, the policy support is insufficient. In 2006, the paper "Research on the Theoretical Framework Model of the Curriculum System Connecting Secondary Vocational Education with Basic Education, Vocational Training, and Higher Vocational Education-One of the Series of Researches on Constructing China's Credit Bank" put forward the research on the credit bank under the background of the concept of lifelong education.

The second stage is the rapid development stage (2011-2019). In this stage, the number of published papers shows a rapid growth trend, increasing from 10 in 2010 to 61 in 2019, with a significant growth rate, which reflects that the credit bank for lifelong education has received more and more attention during this period, and the research hotspots have increased rapidly. The main reason for this popularity is the support of national policies. The document "Ministry of Education: Open Universities will Establish a 'Credit Bank' to Realize the Accumulation and Conversion of Learning Achievements" points out that it is necessary to explore the establishment of a "credit bank", convert various learning achievements of learners into credits for storage, realize the conversion of different types of learning achievements, and provide a basis for learners to apply for relevant academic certificates, degree certificates, graduation certificates, qualification certificates, etc. [6]. In 2019, one of the main factors for the peak number of published papers is that some regions such as Jiangsu and Ningxia began to build credit banks. Jiangsu Province will establish and implement a lifelong vocational skills training system covering all workers in urban and rural areas, running through the whole life of workers' learning and work, adapting to the needs of employment and entrepreneurship, talent growth, and economic and social development[7]. Ningxia has gradually created a lifelong learning atmosphere of "everyone can learn, everywhere can learn, and at any time can learn" through the open educational learning experience of community education[8].

The third stage is the steady development stage (2019 to present), as shown in Figure 1. The number of published papers was relatively stable from 2019 to 2024, which were 61, 52, 57, 57, 40, and 46 respectively. This indicates that after the rapid growth, the research on the credit bank for lifelong education has entered a relatively

stable stage, and the number of researches remains at a certain level. After the rapid growth in the early stage, the main research directions and hotspots of the credit bank for lifelong education have been fully explored, and the research has entered a stage of in-depth development.

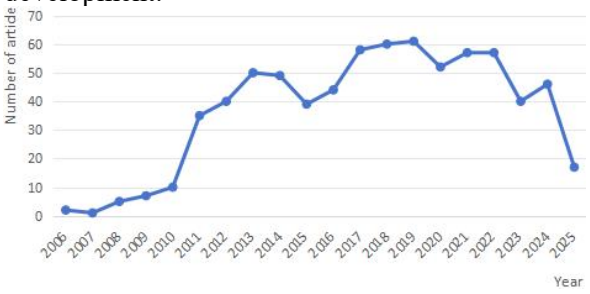

Figure 1. Trend of the Number of Annual Published Papers

Note: The vertical axis represents the number of papers published, and the horizontal axis represents the year.

3.2 Analysis of Core Authors and Their Cooperation Distribution

In the CiteSpace operation interface, the node is selected as the cooperative author (Author) for visual analysis, and a total of 392 nodes (N = 392) and 126 connections (E = 126) are obtained, with a network density of 0.0016. As shown in Figure 2, each node represents an author, the connection between nodes represents the cooperative relationship between authors, and the larger the node and the name, the more papers the author has published. It can be seen that the author group centered on Zhang Weiyuan has relatively dense connections, which indicates that there is a frequent cooperative relationship between them. This close cooperation mainly comes from their common project support to jointly promote the research on the credit bank for lifelong education. In addition, from the distribution of connections, although some authors have formed relatively close cooperative relationships, the overall network density is not high, and no obvious cooperative research team has been formed. This indicates that there is still room for further expansion of the cooperation among authors in the field of the credit bank for lifelong education, and the exchange and cooperation between different research groups can bring more innovative ideas to the research on the credit bank for lifelong education.

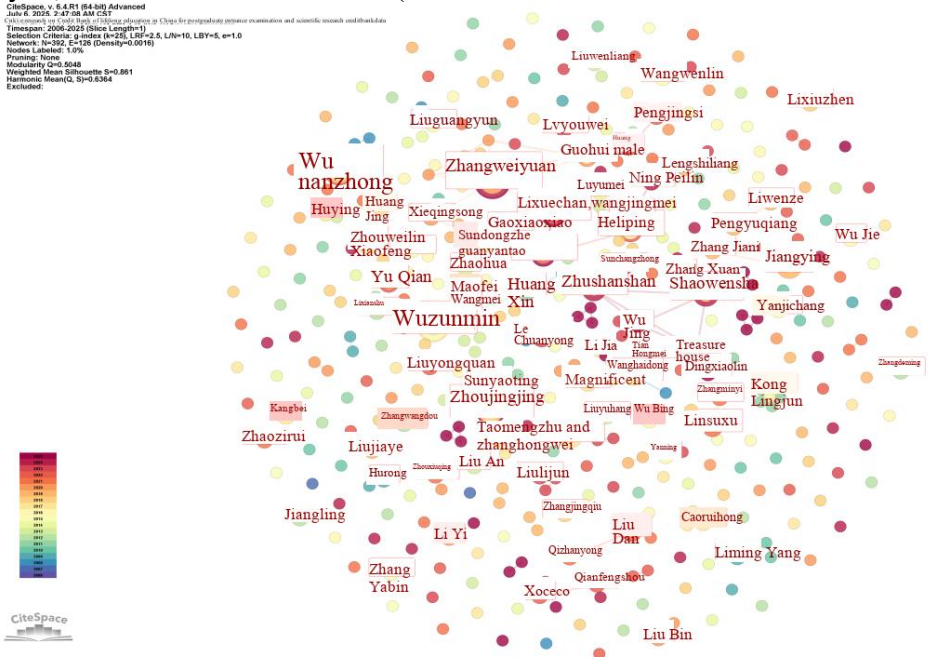

Figure 2. Co-occurrence Map of Cooperative Authors

Note: The names in the figure are the names of relevant authors, and the connections between the names represent the cooperative relationship between authors.

2.3 Analysis of Research Institutions

In the CiteSpace software operation interface, the node type is selected as Institution for visual analysis, and Figure 3 is obtained. A total of 348 nodes (N = 348) and 143 connections (E = 143) are obtained, with a network density of 0.0024. On the whole, there are a large number of institutions participating in the research on the credit bank for lifelong education, forming a

relatively large cooperation network, but the network density is relatively low. This indicates that although many institutions are involved, the cooperative relationships between institutions are relatively scattered, and a very close cooperative cluster has not been formed.

Figure 3. Co-occurrence Map of Research Institution Cooperation

Note: The names in the figure are the names of relevant research institutions, and the connections between the names represent the cooperative relationship between institutions.

4. Hotspot Analysis of Research on Vocational Education Credit Bank in China

4.1 Analysis of Key Word Co-occurrence Network

Key words are a high-level summary of the research content of literatures. High-frequency key words can reflect the hotspots of a certain research field to a certain extent. The key word co-occurrence analysis function of CiteSpace can intuitively present the current research points and the previous research hotspots in a certain research field [9].

In order to more clearly observe the research topics and their changes, and deeply explore the main research topics and hotspots in this field, it is necessary to conduct co-occurrence analysis on key words to generate a key word co-occurrence map in the research field of the credit bank for lifelong education, as shown in Figure 4. There are 466 nodes and 1085 connections in Figure 4, with a connection density of 0.01. From the overall structure of the map, the key word network of the research related to the credit bank for lifelong education is relatively complex. The nodes in the figure represent key words, and the connections between nodes represent the co-occurrence relationship between key words, that is, these key words appear frequently in the same literature. Although there are many connections in the map, the overall network density is relatively low, which means that although there is a certain correlation between the key words in the research field, there is still room for further exploration and expansion. A moderate network density reflects that the research in this field has a certain concentration and openness, and new key words and research directions are constantly emerging.

As key words, "credit bank" and "lifelong education" are closely related to a number of key words, such as "open university", "lifelong learning", "continuing education", etc. This indicates that the application of the credit bank in the lifelong education system and vocational education is the research focus, and in the research field of the credit bank for lifelong education, scholars focus on how to use the credit bank to break the barriers between various types of education (especially between formal and non-formal/informal education), and finally serve the national lifelong learning and the construction of a learning society. There are also some potential research directions and key words in the map. Although some of them have not emerged in large numbers, with the

development of technology and the upgrading of learning achievement certification technology, technical key words such as "blockchain", "digitalization", and "information technology" may appear more frequently in future research. The map also mentions key words related to scenarios such as vocational education, open education, and community education, which indicates that in the future, for the vocational education scenario, we can deepen the integration of industry and education and promote the connection between enterprise training courses and the credit bank; for the open education scenario, we can strengthen the hub role of open universities and build a regional credit bank service platform; for the community education scenario, we can develop an aging-adaptive learning certification module and incorporate community cultural activities and voluntary services into the credit accumulation system. Truly realize "live and learn", as shown in Table 1.

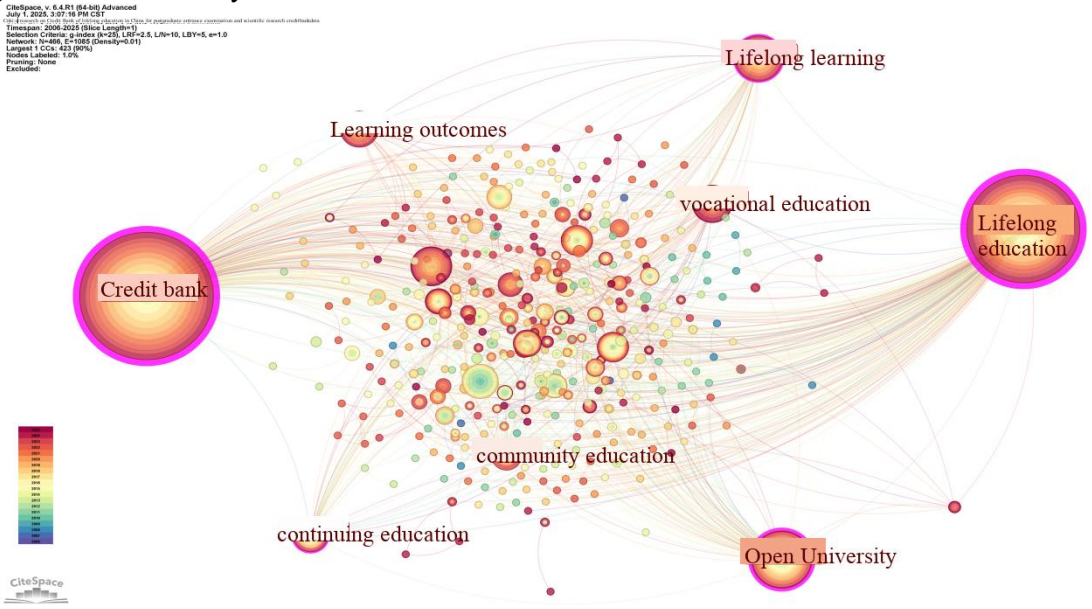

Figure 4. Key Word Co-occurrence Map

Note: The words in the figure are the relevant key words, and the connections between the words represent the co-occurrence relationship between key words.

Table 1. Statistical Table of Key Word Analysis

Count	Centrality	Year	Keywords
357	0.80	2007	Credit bank
270	0.62	2006	Lifelong education
83	0.22	2011	Open University
59	0.13	2009	Lifelong learning
36	0.12	2009	Continuing education

3.2 Key Word Clustering Analysis

The clustering visual knowledge graph of "credit bank for lifelong education" is obtained by CiteSpace, and 10 largest clusters are obtained, as shown in Figure 5. Based on the LLR key words recommended by the cluster abstract, after sorting out and summarizing the literatures, the research hotspots in this field are analyzed and concluded to be mainly reflected in the following three aspects.

Lifelong education and credits (#0 Lifelong Education,#1 Credit Bank,#6 Self-taught Examination). In the research on the credit bank for lifelong education, the goal of establishing the credit bank is to support most people who have entered society to realize "live and learn", and can break the rigid rules of the old-version self-taught examination (such as: only recognizing classroom teaching, not recognizing work experience). The establishment of the credit bank can improve the learning interest of many people and increase the participation rate of older learners to a certain extent.

The technical chain of the credit bank (#2 Open University,#3 Credit Conversion,#7 Credit Mutual Recognition). The operation of the credit bank relies on the open university to integrate data, credit conversion to endow value, and credit mutual recognition to realize circulation. Open universities in various regions are responsible for integrating information in the construction of the credit bank, and structuring the learning records of various scenarios to lay a foundation for the subsequent value conversion. Credit conversion is very important in the

implementation process of the credit bank, and its technical core is to build a dynamic evaluation model according to the knowledge, skills, social and other dimensions of the learning content. However, with the expansion of the distribution area of the credit bank, credit mutual recognition has become more and more important. The certification between different regions is like the "cross-border circulation function" of currency in the banking system. A credit bank without credit mutual recognition will greatly reduce the value of credits.

The application scenarios of lifelong education implementation (#4 Lifelong Learning,#5 Community Education,#8 Continuing Education,#9 Adult Education). The implementation of lifelong education mainly relies on three types of scenarios: community education provides learning places, continuing education and adult education serve key groups, and lifelong learning cultivates behavioral habits. As a support system, the credit bank plays a key role in these three types of scenarios. Specifically, community education builds learning places around residents, bringing elderly courses and skill training into daily life; the credit bank converts the abilities obtained by residents in these activities into standardized credits, so that the knowledge learned on the way to buy vegetables can also be officially recognized. Continuing education mainly helps on-the-job personnel improve their work skills, and adult education serves groups with insufficient academic qualifications. The credit bank establishes an "ability exchange system" for these two groups of people-the professional certificates obtained by workers can be converted into credits needed for promotion, and the work experience of take-away riders can also be converted into scores for academic education. The lifelong learning behavior that runs through all scenarios obtains continuous motivation through the real-time recording and credit circulation of the credit bank: when residents see that the credits of community courses can be used for enterprise training, and the credits of enterprise training can improve academic qualifications, they are naturally more willing to persist in learning. This interlocking mechanism finally realizes "everyone can learn, everywhere can learn".

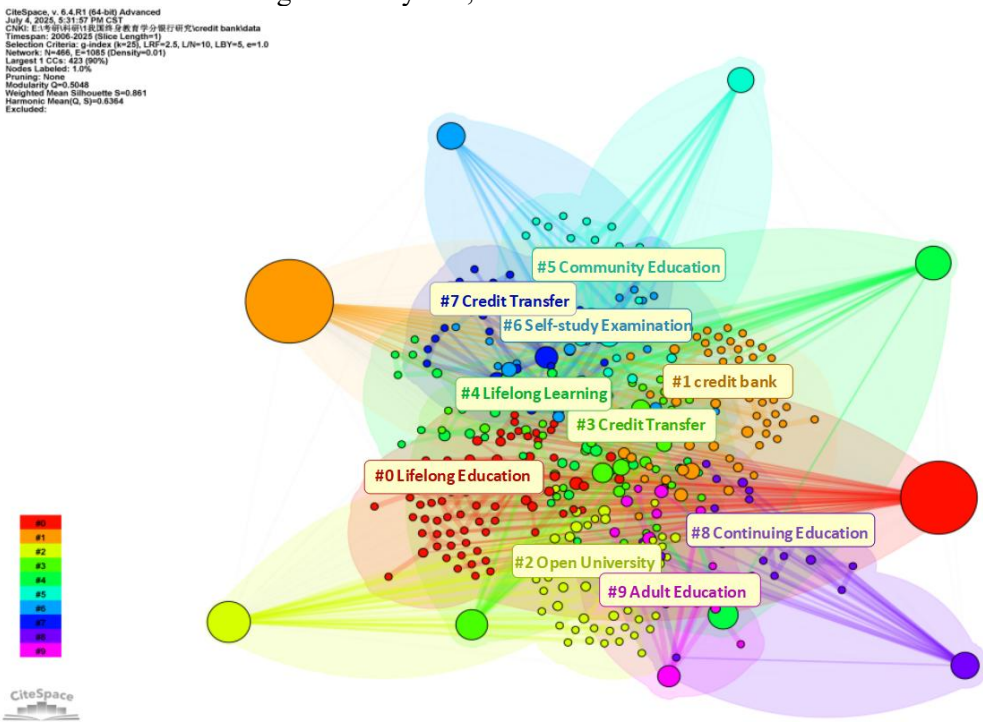

Figure 5. Key Word Clustering Analysis Map

Note: The numbers and words in the figure represent the cluster numbers and the corresponding cluster themes.

3.3 Key Word Burst Analysis

Visual analysis is carried out with "key words" as nodes, and burst analysis is conducted. This helps to determine the outbreak time of research hotspots, so as to grasp the dynamic change trend of the research field. By analyzing the burst keyword map, we can understand the research direction of the credit bank and its

future development trend. As shown in Figure 6, the map covers the literature data from 2006 to 2025, and lists the top 16 key words with the strongest burst strength. These key words reflect the changes of research hotspots in different time periods. Each key word has its corresponding burst strength (strength), start year (begin), and end year (end). The higher the burst strength, the greater the growth rate of the research attention received by the key word in the corresponding time period; the duration of the key word reflects the durability of the research hotspot in the academic field. It can be seen from the figure that the key word with the highest strength is "South Korea" from 2009 to 2013, the key word with the second highest strength is "qualification framework" that emerged from 2019 to 2022, and the key word with the lowest strength is "operation mechanism" from 2019 to 2020.

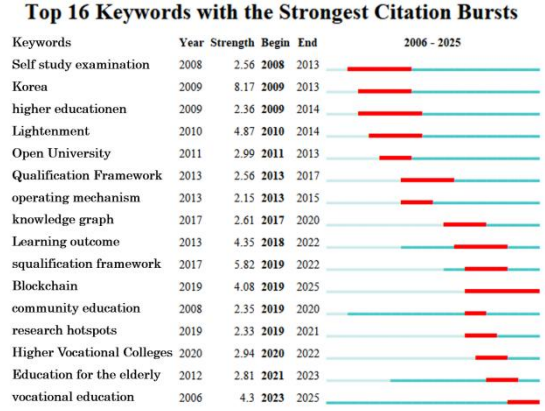

Figure 6. Key Word Burst Analysis Map

Note: The figure shows the top 16 key words with the strongest burst strength, including the key word, the year when it burst, the burst strength, the start year, and the end year.

In the early research stage from 2006 to 2011, the burst key words mainly include "self-taught examination", "South Korea", "higher education", "enlightenment", etc. This indicates that in the early exploration stage, the comparative research method was mainly adopted, and attempts were made to extract the content suitable for China's system by analyzing the cases of foreign credit banks represented by South Korea, such as national standards and framework design. At the same time, the emergence of "self-taught examination" and "higher education" indicates that the traditional academic education system is still regarded as the core reference, and the research mainly focuses on the credit mutual recognition in the formal education field, and a systematic plan covering non-formal learning has not been formed. Essentially, this stage has completed the positioning enlightenment of the credit bank as a hub facility for lifelong education, but it is still limited by the development bottleneck of "theoretical introduction leading, practical innovation weak".

In the rapid development stage from 2011 to 2019, the research focus was shifted to standard formulation and system design based on the previous research. Among them, the continuous emergence of "qualification framework" and "operation mechanism" marks the deepening of system construction. The core tasks of this stage focus on breakthrough exploration in three dimensions: first, the establishment of a national standard framework for credit certification; second, the focus on the innovative design of the organizational structure, exploring a multi-subject collaborative governance model across education administrative departments, colleges and universities, and industry enterprises; finally, the need to improve the standardized paradigm of the operation process. In the later stage of this stage, there was a significant shift to technology enlightenment. The emergence of "blockchain" and "knowledge graph" reflects the penetration of new technology paradigms, and the relevant discussions mainly focus on the academic adaptability analysis of concepts such as distributed storage and knowledge association network. The initial stage of this technology application is in sharp contrast with the in-depth promotion of system construction, which profoundly reveals the gradual characteristics of China's education governance reform of "system first, technology follow-up".

In the steady development stage from 2019 to the present, technology implementation and group sinking have been carried out. On the one hand, the burst of "blockchain" continues until 2025, indicating that technology implementation has become a key research direction, focusing on practical issues such as data security and credit certification; on the other hand, the late outbreak of "elderly education", "vocational education", and "community education" reflects the precise coverage of research to vulnerable groups (the elderly population) and key fields (skill improvement of industrial workers), reflecting the strengthening of the inclusive service orientation.

4. Conclusions and Future Outlook

On the whole, the research on the credit bank for

lifelong education in China shows distinct characteristics in terms of the number of published papers and development trend, core authors and their cooperation models, distribution and coordination of research institutions, and focus of research hotspots, and at the same time points out the direction for future development.

In terms of the number of published papers and development trend, the research shows obvious phased characteristics, which can be divided into three stages: early research, rapid development, and steady development. In the early stage, the average number of papers published per year was small, and it was in the initial stage; in the rapid development stage, the number of published papers increased significantly, reflecting the impact of national policies and the improvement of attention in the field of vocational education; in the steady development stage, the number of published papers tended to be stable, indicating that the previous research hotspots have been explored to a certain extent, but there is still room for expansion of the research scale. In the future, it will face the challenges of breaking through bottlenecks and deepening innovation, and will develop in a more refined and in-depth direction.

In terms of core authors, a group of core authors such as Zhang Weiyuan and Zhou Jingjing have carried out research from different angles such as credit certification and the relationship between the qualification framework and the credit bank, laying a foundation for this field. However, from the perspective of the cooperation model, no extensive cross-team cooperation has been formed, which limits the depth and breadth of the research. In the future, it is necessary to strengthen the cooperation between core authors and other authors, and form a multi-disciplinary and multi-perspective research team to solve difficult problems.

In terms of the distribution and coordination of research institutions, many institutions have participated in forming a relatively large cooperation network, but the overall density is low. Intra-regional cooperation is common, and some regions have formed research cluster advantages. Cross-regional and cross-type cooperation cases have brought new ideas, but there are still many institutions on the edge of cooperation and unable to fully integrate.

The research hotspots have always revolved around the core goal of "building a lifelong learning system", showing a progressive development context of "theoretical introduction-system construction-technology empowerment-scenario implementation". "Credit bank", "lifelong education" and "open university" are closely related, highlighting their hub role. Cluster analysis reveals three research dimensions: lifelong education and credit system, technical chain, and application scenarios; burst analysis shows the phased migration of research hotspots, from the introduction of foreign cases to system construction, and then to technology application and the outbreak of inclusive scenarios, reflecting the transformation of research from theory to technology implementation and from elite education to covering vulnerable groups. At present, a "system-technology-scenario" trinity research pattern has been formed, but there is still room for deepening in aspects such as cross-regional credit mutual recognition standards.

Based on the above research conclusions, the research and practice of the credit bank for lifelong education can be promoted from the following aspects in the future. First, adapt to regional development differences and provide precise credit services. In view of the uneven distribution of regional economy, industry, and educational resources, industrial agglomeration areas in the eastern region can rely on industrial advantages to explore an "industry-education" integration model. For example, the Yangtze River Delta intelligent manufacturing industrial belt can develop cross-school and cross-enterprise credit mutual recognition course modules; the central and western regions with characteristic industries can create "industry-characteristic credit packages", develop localized courses, and explore cross-regional conversion paths. Second, focus on the needs of special groups and expand the path of fair empowerment. Develop a "military skills-vocational skills" conversion standard for veterans, design flexible learning tasks and credit recognition methods for disabled students, and build an "experience-credit" conversion channel for older re-employed personnel to help their career development. Third, improve the quality assurance system and build a "standard-supervision-feedback" closed-loop mechanism. Refine quality standards, clarify the credit assignment standards for different learning achievements, and establish a sampling inspection system; strengthen collaborative

supervision and dynamically supervise all links of operation; establish a feedback and optimization mechanism, collect feedback on service quality, and iteratively optimize to ensure the sustainable development of the credit bank.

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