

A Knowledge Graph Perspective: Visualization Analysis of Basketball Teaching Research in China

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Abstract

China basketball teaching research has gone through a complicated and long road. After more than 60 years' development, great changes have taken place in the research of basketball teaching in many aspects such as curriculum and teaching methods. Scientific knowledge graph is an application software tool which can objectively reflect the research trends of a certain discipline or research field and present a large amount of knowledge information in the form of a specific graph. It can easily make up for the shortcomings of previous research, so as to obtain more rational and scientific research results. In this paper, 5703 kinds of academic journals were collected from the general online database of China Academic Journals in China Knowledge Network, and the database with accurate sample data was arranged. Use the Cite space on the periodical data during the period of 2005-2018 to implement the knowledge map of keyword networks. The time slice of the period 2005-2018 was set to 5, the Top N was set to 50, and the node type was selected as Keywords. Other parameters are set as default parameters. After running the software, we get a co-occurrence knowledge map of keywords. Then we used literature, visualization analysis and other research methods, and applied Cite Space software to analyze the data of the journals selected in this paper, visualize the development history of basketball research in China and the cooperation between institutions and authors, and draw a knowledge graph of the relevant research areas to provide some reference for the development of basketball teaching research in China.

Keywords: basketball teaching research, Cite Space, visualization analysis.

1 Introduction

Scientific knowledge can not only be generated and stored in the Internet, but also spread and utilized in the Internet. It is a huge and difficult project to build a variety of large-scale and different types of knowledge networks and collect and sort out a large number of literature data only by hand. Therefore, scientific knowledge chart is created to meet the needs of the present era. Nowadays, many high-quality large databases have been established, which has promoted the great development of information processing technology. In addition, the research and development of information visualization technology also provides good technical support for better constructing knowledge networks. We are now live in a digital and electronic world. Cite spatial information visualization software provides strong technical support for the organization of literature data and the construction of knowledge map, and explores hot topics and frontiers based on scientific theories. Scientific knowledge map is a kind of scientific application software.

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It is more scientific and rigorous than manual methods, which makes the research results more objective. With the progress of the times, the innovation of basketball teaching concept and the practical needs of the deepening reform of education, the overall research on basketball teaching in China has shown a good trend of steady rise and achieved fruitful results. This study mainly focuses on the main elements contained in the development of basketball teaching research, analyzes the development of basketball research in different historical stages in China, and the cooperation between research institutions and authors, aiming at providing reference and certain references for the construction of basketball teaching in China.

Guided by visual analysis technology and knowledge graph, we compiled the development history of China's basketball teaching research field and the evolution of research themes in detail, created the knowledge graph using Cite Space software to understand its historical process, explored the hot research topics and development trajectory of China's basketball teaching research field, and proposed some corresponding references for promoting the progress of China's basketball teaching career. At present, our country is in the reform period of physical education. Research and practice related to the reform of basketball teaching are rising. With the historical process and research progress, new research topics, research difficulties and research frontiers are emerging. It has become a necessity of the times to introduce knowledge map and information visualization technology into basketball teaching to make the research results more specific and scientific, and to make up for the shortcomings and deficiencies of previous research in a scientific way [1]. By analyzing the trend of research results, the distribution and cooperation among institutions, the headquarters and cooperation of core authors, and the evolution of research topics, we can grasp the law of the development of basketball teaching research and review the history of the development of basketball teaching research in China, providing references for future research..

2 Literature Review

Knowledge map is a document analysis tool based on information theory and visualization technology in a new research field. It is a graphical means to convey complex knowledge by mining data, processing information, measuring and drawing, and intuitively shows the knowledge structure and relationships in the development of a scientific field, and showing the relationship between knowledge structures and evolution mode. Through citation analysis, co-occurrence analysis and other research methods, combined with information science, statistical science, mathematics and other related disciplines, the visualization analysis technology is used to construct graphics, which visualizes the core content of the correlation between field and disciplines, providing a practical and valuable reference for discipline research. At present, scholars all over the world use this research method to pay attention to the growth of science, the transformation of scientific paradigm, evolution of discipline fields and the discipline structure[3].

2.1 Teaching

The term "teaching" is defined in the Dictionary of Education as "the joint activity of teaching and learning between teachers and students, mediated by the content of the curriculum, and the basic way to achieve the purpose of education in schools [4].

2.2 Physical Education

Mao Zhen-Ming defines "physical education research" in "Theory of Physical Education Teaching": "Physical education research aims to improve the theory of physical education and improve the quality of physical education by taking the practical problems of physical education as the main research object and applying the methods and means of scientific research and teaching research to reveal the essence behind the phenomenon of physical education and explore the pattern of physical education [5].

2.3 A summary of the related research on basketball teaching in China

The research results on basketball teaching in China are relatively more. After a comparative analysis of the research results, it is found that most researchers mainly study in three aspects: textbook construction, teaching methods and curriculum setting. In terms of teaching material construction; The basketball part of the book "Ball Games" is generally considered to be the first basketball textbook in the history of China, published in 1961 by the People's Sports Publishing House and written by Li Zhen-Zhong, Niu Zhong-Qi, Shi, Liu Yu-Cai. This book fills a gap in the history of basketball textbooks. With regard to teaching method, Zhang Xun (2001) thinks in the article "Teaching Methods and Means of Basketball General Course" that one of the goals of basketball general course is to arouse students' interest in basketball to the maximum extent, so that students can be happy in the process of basketball class and achieve the goal of fitness and health. On the curriculum design, Li Yan pointed out in the article after in-depth research and analysis that curriculum reform should be based on a full understanding of the basic vocational model, reflect distinctive sports characteristics, improve the corresponding management system, adhere to the equal emphasis on theoretical research and social practice, and keep pace with the times [6].

3 Research Analysis

By searching the periodical literature on basketball teaching in CNKI database, the collected periodical literature is processed and visualized, and relevant research information is obtained, which provides scientific basis and relevant theoretical guidance for the follow-up research of this article. We got 6059 papers. The data used in this paper are all from the online publishing database of academic journals in China, China Knowledge Network. In order to ensure the validity of the data studied in this paper, by consulting books on retrieval strategies, scientific retrieval strategies and data cleaning strategies are formulated for this paper. According to the retrieval portal of CNKI database, in order to ensure that the "basketball teaching" literature in the title and keywords can be retrieved, this paper retrieves the periodical articles with the word "basketball teaching" from the subject field in the retrieval portal of China Academic Periodical Comprehensive Database of China Knowledge Network.

3.1 Analysis of literature

In this study, we applied the literature management software NoteExpress 2 for data cleaning, which comprised information import, filtering, full-text download, and numerous management functions around the core literature information of scientific research. The data cleaning work was performed as follows: Create a new test data folder data in the sub menu of the NoteExpress 2 interface sample, right-click on the data folder and select Import Catalog to find the previously downloaded sample data catalog file with a total of 6059 documents. Select the "find duplicate

entries" option in the search menu of NoteExpress 2 interface. Select the previously created data group for the folder you want to check, General for the title type, and Fuzzy for setting the matching degree. Then fuzzy search is started, and the 356 duplicate documents found are deleted. By repeating the above steps, we selected All in the field to be checked, General for the title type, selected the main fields to be checked, such as author, title, second and third author, number of word, periodical, date, keyword, original publisher, author institution, picture, etc., set the highest matching degree, and then began to search accurately. No duplicate entries were found during the second inspection. The rest of the data are exported to obtain accurate sample data for this paper, totaling 5703 academic journals.

3.2 Visually analyzed

It is an analytical method for visualizing the relevant knowledge graph generated by CITESPACE software to facilitate a visual understanding of the research area. In this study, Citespace (version 5.3R4), a scientometric software, was used to make an in-depth visual analysis of China's basketball teaching research by importing selected periodical data, setting relevant parameters, selecting a reasonable research scope and constructing an intuitive scientific knowledge map.

4 A Review of Relevant Studies on the Aspects of Visualization Knowledge Graphs

4.1 Statistics and analysis on the number of Publications

The formation of a research field must go through the process of initial establishment, growth, maturity and decline. Therefore, we have arranged and analyzed the publications in the field of basketball teaching and research in China. Figure 1 shows the trend of the number of papers in Chinese basketball teaching research journals.

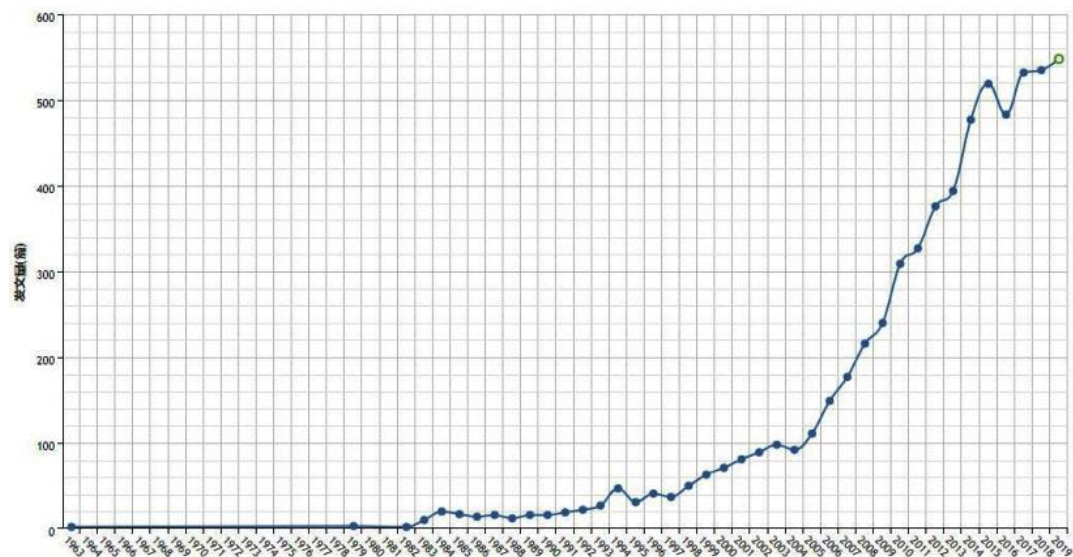


Figure 1: Trends in the number of articles published in the field of basketball teaching research in China

As can be seen from the figure, from 1962 to 1982, the research results (published amount) of basketball teaching and learning research were basically scattered. Only 14 articles were published in the past 20 years. During the ten years from 1983 to 1993, the research achievements in the field of basketball research in China showed a slow development trend. The annual number of articles published in journals was around 20. The research at this stage tends to explore the teaching methods, such as "memory teaching method", "heuristic teaching method" and "game teaching method", which greatly promoted the development of basketball teaching research. After 1994, the research results of basketball teaching in China began to enrich gradually, and the number of articles published in periodicals showed a steady growth trend, reaching 100 for the first time in 2004. After 2005, China's basketball teaching and research achievements entered a period of rapid development, with a huge increase. In 2018, the number of articles published in journals reached 535.

4.2 Evolution of Research Themes during 2005 - 2018

Scientific knowledge graph was first applied to basketball instructional research in 2014. Cai Yan-Fang, a teacher of Shanghai Institute of Physical Education, published an article titled "Metrological Analysis of Basketball Scientific Research Papers in Chinese Core Sports Journals in China in the Last Decade" in the Journal of Shanghai Institute of Physical Education, which pioneered the introduction of scientific knowledge mapping in basketball teaching research. This article focused (2003-2012) on the statistics and analysis of basketball research articles in core Chinese sports journals. From the above-mentioned research results in China, we can see that the basketball teaching research is thriving and has achieved fruitful research results. However, the collaborative research combined with econometrics and information visualization technology is still in the initial stage. Thus, this paper used CITESPACE visualization software and information visualization technology to conduct an in-depth analysis on basketball teaching research, explore the development of basketball teaching research in China, and then promote further development of basketball teaching research.

To study the evolution of research themes during 2005-2018, the knowledge graph of keyword networks was analyzed using CITESPACE on journal data during 2005-2018. The time slice of the period 2005-2018 was set to 5, the Top N was set to 50, and the node type was selected as KEYWORD. The remaining parameters were set as default. After running the software, we obtained the co-occurrence knowledge graph of keywords (Fig. 2).

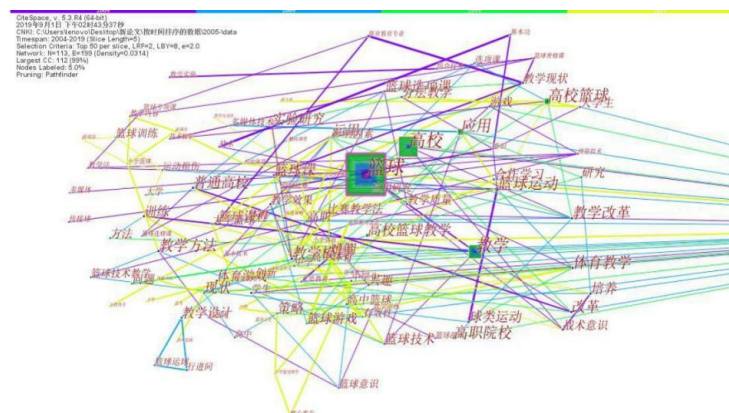


Figure 2: Co-occurrence of high-frequency keywords in basketball teaching research in China during 2005-2018

In this stage, basketball teaching research tends to focus on colleges, reform, new curriculum, multimedia, and teaching methods. We analyzed them as follows:

Reform: This period was in the midst of education reform at a full swing. The new requirements of the Physical Education and Health Curriculum Standard for the basketball teaching were still being further implemented and enforced. Hence, there was a trend of research reform. In addition, it can be discovered from the study that the research in the field of basketball teaching was closely related to the relevant sports policies formulated by the state, indicating that the development trend of sports research is highly influenced by the relevant policies.

Colleges: There were more studies on colleges at this phase. This was mainly because colleges were currently the leaders in basketball teaching and research in China. Moreover, most of the researchers working in this field were from major colleges. This is why colleges received great attention in basketball teaching research during this period. **Multimedia:** With the advancement of science and technology, multimedia-assisted teaching has started to be widely used in basketball teaching. Multimedia teaching breaks the time and space limitation of traditional physical education methods. Students can have a more intuitive understanding of technical movements, techniques and tactics, and cooperation through more intuitive image technology, which effectively improves the teaching efficiency, and derives the list of keywords according to the knowledge information in Table 1.

Table 1: List of high-frequency keywords in China's basketball teaching and research from 2005 to 2018.

Year	Theme1	Theme2	Theme3
2005	University	Basketball teaching	Reform
2006	Reform	Basketball teaching	University
2007	University	Teaching status quo	Basketball course
2008	University	New curriculum	Competition
2009	Teaching status quo	Countermeasure research	
2010	University	Teaching method	
2011	Multi-media technology	Multi-media applied	
2012	Cooperative learning	Applied	Basketball Consciousness
2013	University	key competence	Teaching strategy
2014	High school physical education	College basketball	
2015	Game teaching method	Experiential learning	
2016	University	Teaching method	
2017	Teaching method	Basketball course	College student
2018	Teaching method	Experiential teaching	

New Curriculum Reform: From the first launch of the new curriculum reform in 2004 to its nationwide launch in 2010, the focus of the reform was placed in deepening education reform and comprehensively promoting quality education, aiming to build a basic education curriculum system that meets the requirements of quality education in the 21st century. Under this background and national requirements, basketball teaching inevitably catered to the social development trend for its own development research.

Teaching methods: The teaching methods developed in this period were no longer applying the

traditional indoctrination teaching and started to emphasize experimental teaching and inquiry-based teaching. In the new teaching method, teachers play a guiding role and the students are the main subjects of the course. The inquiry learning method was used to fully motivate students' enthusiasm and subjective initiative in learning. Along with this innovation in teaching methods, terms frequently used during this period include such as experimental teaching method, heuristic teaching method, cooperative learning method, and experiential learning. Terms like experimental teaching and basketball curriculum then became buzzwords.

Basketball teachers: In the new period requiring programmatic documents, basketball teachers had been positioned very differently from the past and were required to apply student-centered teaching rather than teacher-centered. Hence, teachers play a full guidance role.

5 Conclusion

After more than sixty years of development in the field of basketball teaching research in China, the overall research results show an upward trend with obvious historical stages and unbalanced characteristics development. Especially after the reform and opening up, this research has developed rapidly. Through the analysis of the distribution and cooperation characteristics of basketball research institutions in China, we learned that research institutions were relatively homogeneous, basically dominated by colleges and had less cooperation in general. And a closer cooperative network relationship was not formed yet, and there was only a few overall cooperation.

By constructing a keyword co-occurrence network diagram in the field of basketball teaching and research in China, we know that the research themes of basketball teaching and research in China were closely related to the historical background, and the research themes is accompanied by the realistic needs of social progress and educational reform. Every stage presented its different characteristics. Often, new research topics are born with the introduction of national programmatic documents closely related to the relevant sports policies formulated by the state, or they are formed on the basis of previous themes, which are historic, continuous and phased.

5.1 Recommendations

Individual research teams and individuals should also take the initiative to seek cooperation, actively listen to the opinions and opinions of different experts, and start from their own. Teams with strong scientific research ability should actively help those with weak scientific research ability to seek development and promote the all-round development of basketball teaching and scientific research in China.

Through the research on the research topics, it is found that the teaching mode has always been the top priority of experts and scholars in the field of basketball teaching. At present, different scholars have different opinions and definitions of the model, easily causing confusion and chaos. We hope that scholars in this field can unify the concept and standardize it in the future.

According to the literature collected in this paper, most of the research on basketball teaching focuses on basketball teaching in colleges and universities, ignoring youth groups to some extent. According to the documents collected in this paper, the research on basketball teaching in China is mostly concentrated in colleges and higher vocational colleges. Primary and secondary

school students are in the primary stage of their life, with strong imitation, teacher-oriented and plasticity. The research on basketball teaching in primary and secondary schools was also of great significance, which is worth our thinking.

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