

Metrology Analysis of Track and Field Teaching Material Research in China Based on the Method of CiteSpace V

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ABSTRACT

The research of samples is 450 articles about China's track and field teaching material from CNKI database, by using knowledge map and CiteSpace V software, the paper summarizes the publication volume, main research journals and critical path algorithm of track and field teaching materials in China, presenting high-yield institutions, authors, cooperation and research focus. It provides reference for the reform and innovation of track and field teaching materials in China.

Keywords: track and field teaching materials, sports, knowledge map

I. INTRODUCTION

The teaching material is the main constituent element of teaching and the important component of curriculum. The quality of track and field teaching materials directly affects the development of sports in China. Therefore, it is a great significance to explore the research context, review and summarize relevant research, grasp the research trend, understand the frontier issues of research and promote the development of track and field materials in China. This research use CNKI to get relevant research literature and CiteSpace V software, the results reveal the dynamic influences of different research topics, knowledge network on track and field teaching material. These results assist academics and practitioners by revealing what we know about track and field teaching material and what we need to know in the future.

II. DATA SOURCE

Our quantitative approach relies on citation data from top-tier sports journals over the timeframe 1980–2020 in CNKI database. This study use advanced search, which the "subject" is "track and field teaching material", a total of 477 articles to retrieve relevant literature, the filtered output as a result, the exclusion of academic literature, screening effective with 450 papers, including 312 journals papers, 138 theses of Master's and Doctoral.

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III. RESEARCH METHODS

To address our research questions, we incorporate different components to identify the most influential works and topics, to show the evolution of the research field over time, and to identify the next important research topics in track and field teaching materials.

A. Bibliometric method

We mainly retrieved citation data for all articles published in top peer-reviewed sports journals from the CNKI database. we collected the data about quantity of literature, sources of journal, authors and institutions, which were statistically summarized, and the relevant knowledge of bibliometrics was used to explain the statistical results.

B. Visual analysis

The CiteSpace V is known as "citation space", is a focus on the scientific analysis contains the potential knowledge, background of scientific metrology, data visualization and gradually developed a citation visualization analysis software. This study using functions such as analysis of the authors, institutions, keywords, etc. in CiteSpace V.

IV. RESULTS AND ANALYSIS

A. Annual publication volume

"Fig. 1" shows that before 1984, there were only 6 articles published in the teaching materials of track and field. From 1984 to 1998, there was a wavy increase, which meant that more and more scholars began to

study and explore the teaching the research area. This period is in the beginning of China's reform and opening up, the market economy is booming. From 1998 to now, the publication volume, reference and citation of research literature are in their heyday and the

most prosperous period in the whole timeline. Although more and more scholars pay attention to the research of track and field teaching materials, the total number of published articles is low and insufficient.

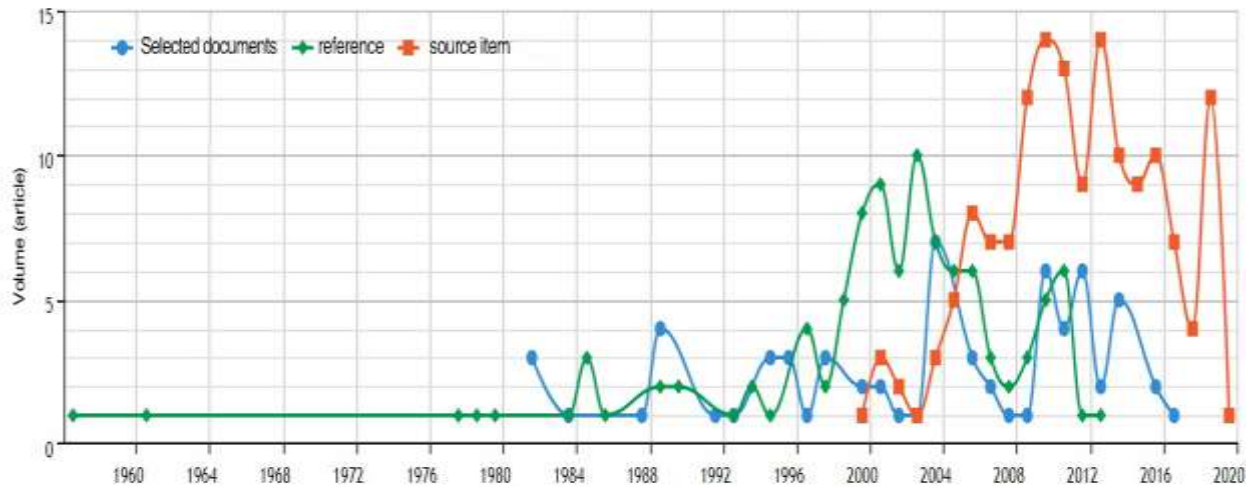


Fig. 1. Trend of the publication volume of track and field teaching materials research in China.

B. Analysis of high-yield research institutions

“Table I” shows the top 10 institutions with a total of 51 publications, accounting for about 16.3% of the total. This indicates that the distribution of institutions is relatively scattered. Among them, there are 5 specialized in physical colleges and universities, with 25 papers in total, accounting for 49.0% of the

total. The total number of papers issued by normal colleges is 26, accounting for 50.9% of the total, indicating that normal colleges are an important base for the research in China. Fujian Normal University, Wuhan Institute of Physical Education and Shandong Institute of Physical Education are the top three institutions for the research field in China.

TABLE I. LIST OF HIGH-YIELDING INSTITUTIONS FOR RESEARCH ON TRACK AND FIELD TEACHING MATERIALS IN CHINA

No.	High-yield institutions	Number
1	Fujian Normal University	6
2	Wuhan Physical Education Institute	6
3	Shandong Institute of Physical Education	5
4	Beijing Sport University	5
5	Hunan University of Science and Technology	5
6	Xi 'an Physical Education College	5
7	Shaanxi Normal University	5
8	Shanxi Normal University	5
9	Beijing Normal University	5
10	Capital Physical Education College	4

The publication volume of master's and doctoral theses and journal papers reflects the active and attached degree of core institutions in the field of track and field teaching materials research. They are more comprehensive and in-depth than journal papers. According to statistics, there are only 3 doctoral dissertations, all of which are from Beijing Sport University. It can be seen from “Fig. 2” that 71 master's theses with publication volume ≥ 2 were published, among which 13 were published by Henan University(18.3%), Beijing Sport University and Shandong Normal University each published 12

articles(16.9%), Fujian Normal University published 9 papers(12.6%), Hunan Normal University and Wuhan Institute of Physical Education each published 7 papers(9.8%), Shanxi University published 4 papers(5.6%), Guangxi Normal University published 3 articles(4.2%), Chengdu Institute of Physical Education and Capital Institute of Physical Education published 2 papers each(2.8%). Most of the high-yield institutions are located in Beijing, Shanghai, Guangzhou and eastern regions, which are closely related to the economic foundation and regional development level.



Fig. 2. Source unit of High Yield Master's Degree Thesis for Research on Track and Field Teaching Materials in China (publication volume ≥ 2).

C. Analysis of published journals

1) *Quantitative analysis*: The high publication volume reflects the influence of the journal. According to the analysis of the literature sources of the journals in the field of track and field teaching materials research, "Table II" shows that Track and Field is the most publications, with 18 articles, accounting for 15.79% of

the top 10 journals. Physical Education in Chinese Schools, Physical Education Teaching and Contemporary Sports Science and Technology each published 17 articles, accounting for 14.91%. The top four journals accounted for 60.52%, reflecting the attention paid by the four journals to the research field of track and field textbooks.

TABLE II. HIGH-YIELDING INSTITUTIONS (N=312)

No.	High-yield institutions	Number	percentage
1	Track and field	18	15.79%
2	Chinese School Sports	17	14.91%
3	Sports teaching	17	14.91%
4	Contemporary Sports Technology	17	14.91%
5	Journal of Xi'an Institute of Physical Education	8	7.02%
6	Sports teachers	8	7.02%
7	Movement	8	7.02%
8	Sports science and technology literature bulletin	7	6.14%
9	Journal of Sports Science and Sports	7	6.14%
10	Youth Sports	7	6.14%

2) *Analysis of concerns*: The keywords are highly refined as literature research topics, which can reflect the textual attribute characteristics of the sample literature. Keywords with high frequency are the research hotspots in this field. Using CiteSpace V visualization tool, select the node for "Keyword", draw a map of track and field teaching material keywords co-occurrence and the size of the node correspond to the frequency of the Keyword appears high and low, the bigger the node, the more likely it is research hot spot area.

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Fig. 3. Cluster analysis of keywords.

In “Fig. 3”, the nodes of “Track and field Teaching” and “Track and Field Teaching Material” were the largest, and their frequencies were 61 and 54 respectively, which were located in the center of the graph. Track and field, teaching material, reform and other key words complement each other. In addition, physical education major, track and field curriculum, physical education and other key words are also high-frequency keywords in the field of track and field teaching materials research.

D. Analysis of high-yielding authors

1) Quantitative analysis of authors: The publication volume represents the output of scientific research

results and can be used as a basis for evaluating scientific talents. According to the actual situation of the author's publication amount, the top 10 high-yielding authors were selected for research. It can be seen from “Table IV” that Li Xiuzhen ranked first with 5 papers published. Shi Yongfan ranks second with 3 essays. The other top 10 high-yielding authors all published 2 articles. The amount of articles published by each author is not much different, which indicates that there are no outstanding research leaders in the field.

TABLE III. HIGH-YIELDING AUTHORS (PUBLICATION VOLUME ≥2)

No.	High-yielding authors	Publication volume
1	Li Xiuzhen	5
2	ShiYongFan	3
3	ya-nan	2
4	ZhangShunShan	2
5	Yi Changlin	2
6	Wang Shilian	2
7	Shen Shunyao	2
8	Liang Qinggang	2
9	Li wei,	2
10	Li Tongling	2

2) Collaborative analysis of authors: Using visualization tools of CiteSpace V, the network node selection the Author mapped the co-occurrence graph which represent the size of the number of how many papers and the attachment between the mutual relations of cooperation. It can be seen from “Fig. 4” that Li Weiya, Wang Shilian, Chen Zhiqing and Gao Daozi are

the main members of the cooperation group in the research of track and field textbooks in China. On the whole, there are few researchers and scattered author nodes, which indicates that the cooperation between authors is not optimistic and the academic interaction is less, which limits the development of track and field textbook research in China.



Fig. 4. Co-occurrence chart of authors.

E. Research trend

In order to discover the athletics teaching material research and development trend in CiteSpace V, by setting the "TimeZione View" operations, we map the keywords co-occurrence graph zones. From "Fig. 5", we find that before 1998, the key words were mainly school physical education teaching, track and field teaching materials, students' physique, track and field teaching, track and field education major, teaching materials, national Physical Exercise Standards, etc., which is consistent with the development of field of track and field scientific research. After 1998, it

includes electronic teaching materials, adaptability, multimedia setting, teaching materials construction, theoretical basis, knowledge system and other cutting-edge vocabulary which marks the research advances with the times, crossover exploration, innovation development. Keywords is highly concentrated literature content, reflecting the focus of research field and academic topics of interest to researchers. According to the knowledge graph, the research of track and field teaching materials can be divided into three groups, teaching method research, study of textbook content and interdisciplinary studies.

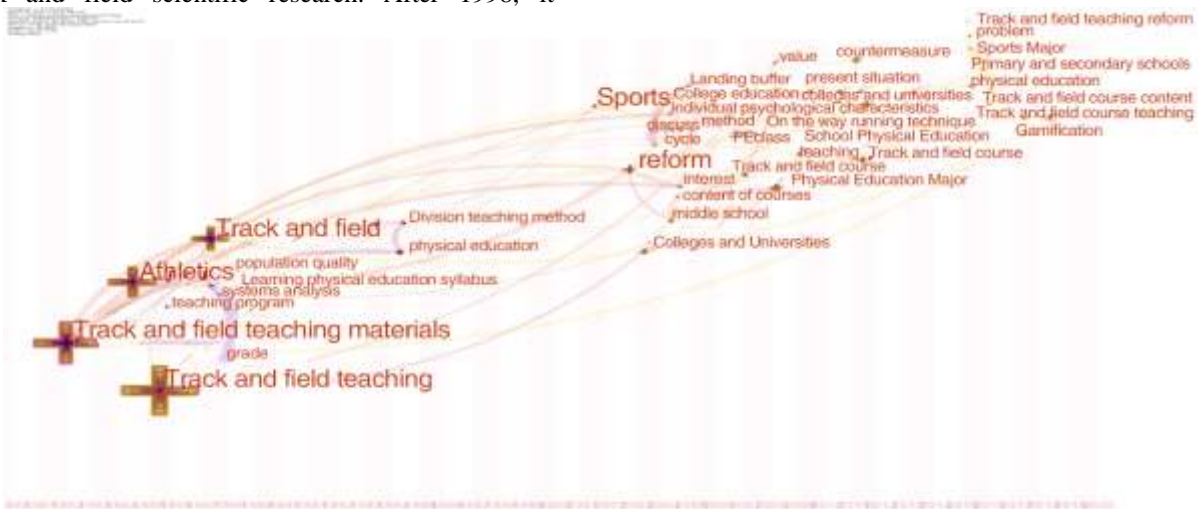


Fig. 5. Time zone co-occurrence of key words.

V. CONCLUSION

According to our study, the number of research documents in the field of track and field teaching materials is small in China, and the research peak is mainly concentrated in the reform and opening (1978) up to now. There are no dominant authors in the literature, and there are only 5 core authors at most, and there is no effective cooperative group among the authors. The institutions that publish papers are mostly

normal universities, followed by comprehensive universities. The lack of core journals indicates that the overall quality of literature needs to be improved. There are three main types of literature research topics which is teaching method research, study of textbook content and interdisciplinary studies. We hope that this work inspires other researchers to continue to expand the boundaries of our knowledge about track and field teaching materials.

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