



The Research Direction and Development Trend of Physical Education Teaching from the Perspective of Educational Informatization Quantitative Analysis Based on Knowledge Graph

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Abstract. With research literature on physical education informatization collected by CNKI as the research object, guided by the theory of information metrology, it can conduct co-citation and cluster analysis by using knowledge Atlas and Cite space v visualization software. Through the time distribution, institution distribution, representative figures and so on, the research status of physical education informatization research literature is analyzed to explore its research frontiers and hot spots. The research shows that the annual literature quantity of physical education informatization research is increasing from 1 article in 2001 to 45 articles in 2022. The research hot spot of physical education informatization mainly focuses on “informationization”, “physical education teaching”, “educational informatization” and “college sports”.

Keywords: educational informatization · Physical education · Knowledge map · Quantitative analysis

1 Preface

Without information, there will be no modernization, and without educational information, there will be no modernization of education. China’s Education Modernization 2035 emphasizes that China will realize the overall modernization of education by 2035, and education informatization is the only way to realize the modernization of education [1]. Physical education informatization is the basic requirement of school education modernization. The research of informationized physical education teaching literature is conducive to tracking the development process of informationized physical education, exploring the research hotspot of informationized physical education and predicting its future development direction, so as to provide reference for the informationized construction of school physical education in the future.

2 Data Sources and Research Methods

2.1 Determination of Research Objects

In this paper, the metrology method and visual presentation means commonly used in knowledge graph research, Cite space software developed by Dr. Chen Chaomei based on JAVA platform is used as the research tool, cluster analysis, word frequency analysis and other basic methods are used, and the journal papers published in the field of physical education informatization research are taken as the research object. Quantitative statistics and qualitative analysis were carried out on the time distribution and research hotspot of the literature. Set the annual slicing time as 2 years, threshold as 10, keyword co-occurrence map, keyword time zone view, etc., and generate and output corresponding reference information.

2.2 Data Sources

In order to ensure the representativeness and authoritativeness of the research data, this paper selects the database of China National Knowledge Network (CNKI) as the data source for retrieval, and takes “physical education informatization”, “physical education informatization” and “physical education informatization” as the search keywords. The data collection time is April 10, 2023. The published papers ranged from 2001-01-01 to 2022-12-30, with a time span of 20 years. After re-weighting, erratum and selective cleaning, 454 papers (481 in total, 27 irrelevant papers were excluded) were retrieved as the samples of this study. These documents are exported in “Refworks” format for document visualization and “Endnote” format for file storage and other data analysis.

3 Research Results and Analysis

3.1 Annual Number of Publications on Physical Education Informatization Research

In order to study the development direction and trend of Chinese university informatization sports research, the knowledge map of the evolution of key words in the field of university informatization sports in the context of time is drawn by Cite Space software, as shown in Fig. 1. Combined with the annual analysis of research results of Chinese university information sports, this paper divides the stages of research of Chinese university information sports teaching into three stages and presents the evolution of research fields of university information sports from the time dimension.

As can be seen from Fig. 1, during 2001–2022, the annual number of literature on physical education informatization research increased from 1 in 2001 to 45 in 2022. From the perspective of literature publication, it can be roughly divided into three stages. In the first stage, 2001–2008, the annual number of articles was less than 10. The peak appeared in 2007, and the number of publications was 10, which indicated that this topic had not attracted widespread attention of researchers, and it was in the primary stage of physical education informatization research at that period. The second stage was from 2009 to 2017, with a total of 146 papers, and the peak appeared in 2017, with

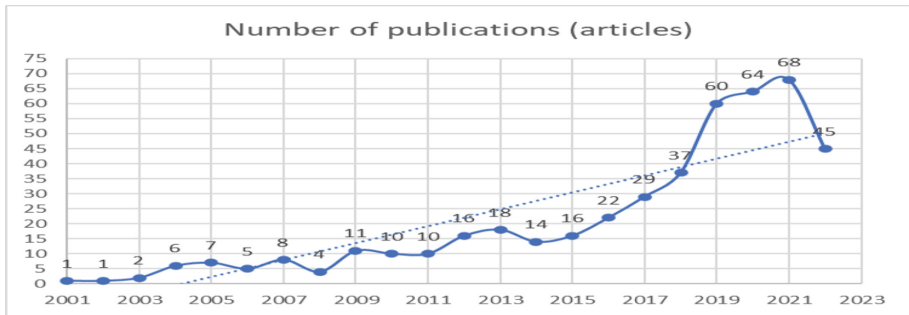


Fig. 1. Trend chart of annual publication volume

29 papers. The research on physical education informatization has shown steady growth. The successful holding of the 2008 Beijing Olympic Games has greatly promoted the application and development of informatization and digitalization in school sports. At the same time, some scholars analyzed the status quo and existing problems of sports informatization service at this stage, and put forward innovative and innovative ideas of sports informatization service. The third stage is 2018–2022, the research on information-based physical education teaching presents rapid prosperity, information-based teaching, teaching reform and “Internet+” have become the research hot spots of scholars. There are a large number of literatures in this stage, and the research perspective is broader and the research content is more in-depth, showing a diversified development trend.

3.2 Analysis of Hot Keywords in Physical Education Informatization Research

In the development process of the research of a certain subject field, the research hotspot is the focus of the research of a large number of literature groups with some internal correlation [2]. Keywords or subject words often condense the central content of the author’s research, so the main hot spots in a research field can be reflected through statistics on the frequency of keywords or subject words in a research field [3]. Based on this, this paper uses knowledge graph software to visualize and analyze the high-frequency keywords of physical education informatization research from 2001 to 2022, which can clearly and accurately understand the hot topics in the field of physical education informatization research and analyze the correlation between their hot research fields. All 454 downloaded literatures can be imported into this software by running Cite Space v, where “time slicing” is set to 2001–2022, and the value of “years per slice” is 2. Set Node Type to keyword, node threshold to Top N = 10, and retain default values for other thresholds. Open the visualization window, and get the map of hot network knowledge in the field of physical education informatization research from 2001 to 2022 (Fig. 2) and the list of high-frequency keywords (Table 1).

The co-occurrence analysis map of the research keywords of adolescent health behavior (Fig. 2) reflects that the main hot spots in the research field of physical education informatization include “physical education”, “information literacy”, “Internet+ education”, “college physical education”, “curriculum informatization”, etc. Table 1 shows

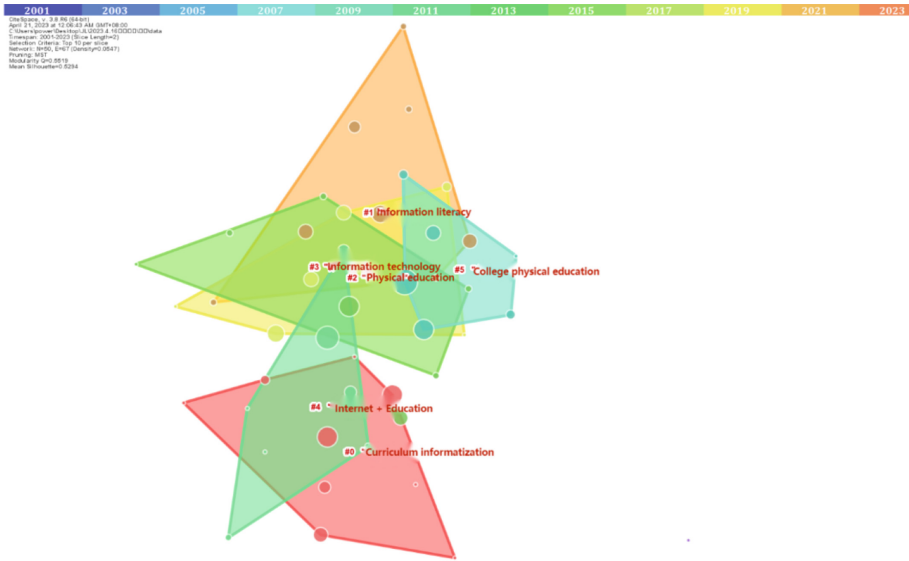


Fig. 2. Keyword co-occurrence analysis

that in addition to the analysis of physical education and information literacy, hot research words mainly focus on education informatization, teaching reform, informatization, etc. It can be seen that the research on adolescent health behavior is obviously focused on the discussion of education informatization, physical education, information literacy, Internet+ education and other related issues.

Centrality refers to the number of any shortest path through the store in the network where it is located, and it is a measure of the direct role of network nodes in the overall network. Nodes with large centrality are relatively easy to become key nodes in the network [4]. From the perspective of centrality, “physical education”, “educational informatization”, “informatization”, “college sports”, “information literacy”, “Internet+”, “sports informatization” are above 0.1, indicating that the research of physical education informatization starts from education informatization, physical education, college sports, information literacy and so on.

4 Development Trend of Physical Education Informatization Research

On the basis of the high-frequency keywords summarized above, “Time zone View” is selected in “Layout” to obtain the visual view spectrum of the changes and time zone of research hotspots (as shown in Fig. 2), from which the evolution and development trend of research hotspots in physical education informatization in the past 20 years can be seen. Then, according to the keywords for secondary retrieval, download citation rate and download high literature study, analysis, combined with the text content of the physical education informatization related hot research is summarized as follows.

Table 1. High frequency keywords of physical education informatization research from 2001 to 2022

Freq	Centrality	Year	Cited Reference
123	0.80	2005	physical education
106	0.47	2004	informatization
91	0.81	2001	educational informatization
41	0.09	2015	educational reform
38	0.32	2017	college physical education
35	0.17	2017	Information-based teaching
32	0.28	2005	Information technology
21	0.31	2004	Physical education teacher
18	0.12	2011	Sports informatization
17	0.17	2004	Information literacy
16	0.07	2005	Informatization construction
9	0.12	2017	Internet+
9	0.03	2004	Information age

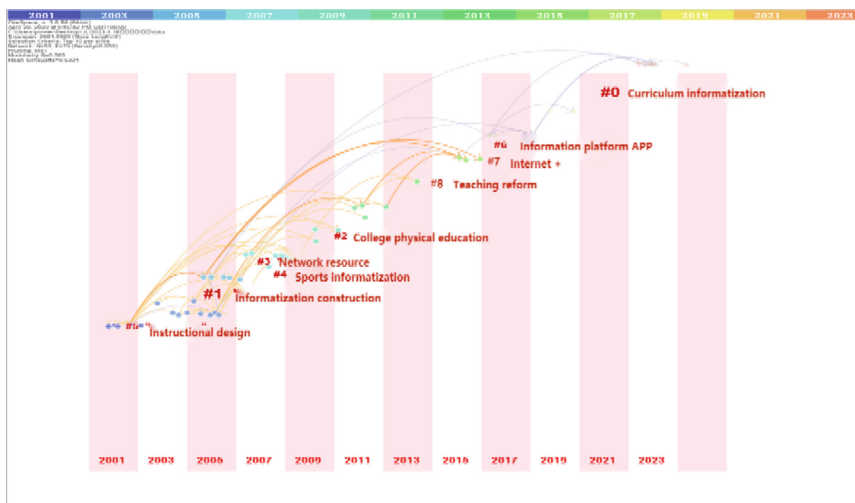


Fig. 3. Visual map of hot time zones in physical education informatization research

Combined with the keyword and time zone map analysis in Table 1 and Fig. 3, during 2001–2008, the key nodes of instructional design, information construction, education information and other keywords were large, and the co-word connections were numerous and complex, indicating that these keywords appeared frequently and had strong centrality in the co-word network. These keywords also represented the research of physical education informatization in this period. In 2003, The State Council promulgated the

Action Plan for Education Revitalization (2003–2007) to encourage distance modernization and information-based education. Zhou Qiang studied and analyzed the feasibility of the integration of physical education teaching and informatization, and initially constructed the basic process of physical education informatization [5]. From 2009 to 2017, college education, Internet+, teaching reform and sports informatization have become the main concerns of scholars, and the use of new information means to construct sports curriculum resources has become one of the important issues [6]. Reasonable use of multimedia to assist PE teaching plays a positive role in improving teaching efficiency. Since 2018, “Internet+”, information platform and curriculum information memory have not received wide attention. The 13th Five-Year Plan for the Development of National Education was put forward in 2017, in which the active development of “Internet plus education” is mentioned, and “Internet Plus” is also a hot research topic in recent years, which indicates to some extent, Education and teaching in the information age is highly related to the national education policy. Educational technology is the means to support the reform of education and teaching in the information age.

5 Conclusion

In this paper, literature metrology analysis is carried out on the research results of physical education informatization in the past 20 years. The research results show that the annual literature quantity of physical education informatization research is on the rise on the whole and will reach the peak in 2021, which provides an important theoretical reference for the development of information education in the new era.

From the perspective of research hotspot and evolution path, physical education informatization research is mainly carried out in physical education, information construction, information technology, teaching reform, Internet+ and other fields. The research mainly focuses on the relevant contents of teaching reform. The development of physical education informatization research is closely related to the development of the Internet and is the product of scientific and technological progress. From the perspective of future development trend, in the process of applying information-based teaching to physical education, it is an important direction in the future to create a more efficient and safe information-based platform and further develop the information-based physical education resources and information-based physical education that schools can provide.

References

1. Central People’s Government of the People’s Republic of China. The CPC Central Committee and The State Council issue China’s Modernization of Education 2035. [EB/OL]. http://www.gov.cn/xinwen/2019-02/23/content_5367987.
2. Baolin Dong, Leqing Zhu, Yujun CAI. Temporal and Spatial Characteristics, Evolution and Hot Topics of Foreign Competitive Sports Research [J]. *Journal of Chengdu University of Physical Education*, 2013, 39(11):34-42
3. Jie Li, Chaomei Chen. *Cite Space: Technology Text Mining and Visualization* [M]. Beijing: Capital University of Economics and Business Press, 2016:180

4. Chen, C. Cite Space II: Detecting and visualizing emerging trends and transient patterns in scientific literature[J]. *Journal of the American Society for Information Science and Technology*, 2004, 57(3), 359-377
5. Qiang Zhou. On the Information Construction of Physical Education [J]. *Journal of Wuhan University of Physical Education*, 2005, 39(10):126-127.
6. Xiang Shen. Research on Taekwondo Curriculum Construction in Ordinary Universities under the Background of Education Informatization [J]. *Journal of Physical Adult Education*, 2017, 33(4):82-83.

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