Research hotspots and trends in digital sports

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Abstract: In recent years, the driving role of digital technology in economic and social development has become increasingly prominent, and there are many problems that need to be explored and solved in the process of high-quality development of sports. This article uses Citespace to visually analyze relevant literature from the CNKI database from 2010 to 2023, and discusses in detail the hotspots and development trends of sports digitalization research from the aspects of literature quantity, literature authors and institutions, and literature keywords.

Keywords: sports; Digitization; Citespace

1. Introduction

Digital technology, as a leading force in technological revolution and industrial transformation, is fully integrating new concepts, new formats, and new models into various fields and processes of human social development, profoundly changing the ways of production, life, and social governance. The Party Central Committee highly cares about and attaches great importance to the sports industry, always leading the healthy and orderly development of sports from the perspective of the great rejuvenation of the Chinese nation and the people's aspirations for a better life. The 14th Five Year Plan for Sports Development points out that "through digital transformation and reform, we will promote the optimization of the sports industry structure and process reengineering, and achieve the goal of deepening institutional reform and high-quality development of the sports industry and sports industry.". Based on this, this article attempts to analyze and summarize the hotspots and development trends of digital sports research in recent years.

2. Research methods and data sources

2.1 Data sources

The literature used in this study was all from China National Knowledge Infrastructure (CNKI), and 297 relevant articles were retrieved, each containing information such as author, institution, publication time, keywords, and abstract.

2.2 Research Methods

This article adopts the scientific knowledge graph in bibliometrics, exports the selected 297 articles in Refworks format, runs in JAVA environment, and uses CiteSpace. 58.R3c for data processing and analysis. The time span is from 2010 to 2023, with a time slice of one year. Based on the research purpose and needs, specific visualization analysis projects are determined, and ultimately analyzed by keywords, authors, and research institutions.

3. Research results and analysis

3.1 Number of publications and trend analysis

The annual publication volume can reflect the development speed and evolution pattern of the research field, and can better predict the development prospects and status of the field. The publication volume and trend of literature related to digital sports in the CNKI database in the past 24 years can be roughly divided into three stages. In the first stage (2001-2010), there was a slow growth trend, and in 2005, it reached the highest annual publication volume of this stage, but only four articles were published. In the second stage (2010~2020), the number of documents issued showed a fluctuating and steady growth trend year by year, and the number of documents issued each year was about 15. This situation was related to the popularity of electronic products in China and the rapid development of the Internet during this period. In the third stage (2020-2024), the number of publications in this field showed an explosive growth trend, reaching a historical high of 70 in 2023. This situation is related to public health emergencies. Overall, the number of publications in the field of digital sports has been steadily increasing since research began, and in recent years, the research heat has been increasing, indicating that there are still many issues to be studied. It is believed that it will soon become a new hot research topic in the sports industry.

3.2 Co occurrence analysis of core authors

The co-occurrence graph of authors can reflect the core authors in the research field and the collaborative relationships between authors. In the co-occurrence map of digital sports authors, Shen Keyin (11 articles) has the highest number of publications, followed by Berlin (5 articles), Lin Shuting (4 articles), Kou Mingyu (3 articles), and others. There is a certain cooperative relationship among high-yield authors, mainly forming a relatively stable research team consisting of seven core members: Shen Keyin, Berlin, Xu Lei, Gao Yingbo, Xu Wei, Song Lixia, and Zhao Fuxue. The two groups, led by Shen Keyin and Berlin, have made significant contributions in the field of digital sports research. In terms of cooperation, although the authors in this field have close cooperative relationships and formed relatively stable cooperative groups, the number of articles published by each author is still relatively small and further output is needed. At the same time, this also indicates that the development space in the field of digital sports research is enormous and requires more in-depth exploration by scholars.

3.3 Co occurrence analysis of research institutions

The collaborative network of research institutions can indicate the publication status and cooperation relationships of various institutions in the research field. In the co-occurrence chart of institutional cooperation, the School of Economics and Management of Wuhan Sport University (14 articles in 2020) and the Sports Social Science Research Center of Wuhan Sport University (10 articles in 2020) have published more than 10 articles. Next are the School of Sports Science at Jishou University (5 papers in 2019) and the School of Sports Science at Fujian Normal University (5 papers in 2022). It can be seen that similar to the co-occurrence analysis of the core authors in the previous text, there is not only a certain cooperative relationship between high-yield publishing institutions, but also a close cooperative relationship among various institutions, but the number of individual institutions publishing is not high. In summary, although "digital sports" appeared earlier in China, the depth of related research is still relatively shallow, and further exploration by scholars in this field is needed for the peak of research.

3.4 Keyword co-occurrence analysis

By analyzing keywords, we can quickly grasp the research status and hotspots of digital sports. Frequency and intermediary centrality are two important indicators reflecting the research hotspots in this field. The frequency of keywords in the co-occurrence graph is ranked from high to low, namely sports industry (40), digital economy (22), sports teaching (13), universities (10), etc. Arrange the highly central keywords in order, namely sports industry (0.17), sports teaching (0.11), digital sports (0.11), sports culture (0.05), etc. It can be seen that the current research and application of digital sports mainly revolve around the sports industry and sports teaching. Not all high-frequency keywords have high centrality, and the keyword "sports industry" (frequency 40) with a centrality of 0.17 not only has high frequency but also prominent centrality. Therefore, "sports industry" is the research core and hotspot in this field, and plays a network supporting role in many research directions.

3.5 Keyword clustering analysis

The digital sports keyword clustering map has a total of 52 tags, and 10 clusters with tag numbers less than 10 are selected for analysis. Cluster # 1 sports industry, # 2 sports curriculum, # 3 sports, # 4 sports culture, # 6 sports teaching, # 7 traditional sports, and # 8 sports news are all related to the specific application areas of digitalization in sports. Cluster # 0 digitalization, # 5 network, and # 9 smart contract indicate the specific ways and methods used for digitizing sports.

And the clustering # 1 sports industry involves keywords such as digital economy, sports tourism, sports consumption, and sports economy, indicating that the current currency circulation and economic development of the sports industry are closely related to digitization. The clustering of # 2 physical education courses and # 6 physical education teaching includes keywords such as universities, development, teaching optimization, and micro courses, indicating that digital physical education teaching is a necessary path for the reform and innovation of physical education teaching forms under the trend of rapid social development. At present, research on this teaching form mainly focuses on major universities, and the application of digital physical education teaching in primary and secondary schools still needs further exploration.

3.6 Cluster Timeline Analysis

The digital sports keyword clustering time graph intuitively displays the evolution process of each keyword in the time dimension. Cluster # 0 digitization and # 2 physical education courses started earlier, both starting in 2010, and their span time has continued to this day. Cluster # 1 sports industry also has a relatively long span of time, which has been ongoing since 2011. In addition, these three clusters contain relatively more keywords, so it can be seen that these three directions are hot topics that researchers in this field continue to pay attention to. Cluster # 9 smart contracts have emerged in the past five years and have continued to this day, which can be seen as a research hotspot and future development trend in this field in recent years.

3.7 Keyword Emergence Analysis

The most prominent keyword in the keyword emergence graph is "sports industry" (2021-2024), while the least prominent keyword is "sports major" (2015-2016). The research on digital sports from 2010 to 2024 can be roughly divided into two stages: the first stage (2010-2010) mainly focuses on the application of digitalization combined with physical education teaching, specifically the research on "physical education curriculum", "sports culture", "physical education teaching", "physical education textbooks", and other aspects. The second stage (from 2020 to present) is the application of digitalization in the sports industry and other areas. Keywords such as "sports industry", "digital economy", and "sports tourism" have all shown high explosive phenomena during this period. The explosive intensity of "sports industry" and "digital economy" is as high as 7.62 and 4.89, and it is expected that research in these areas will become future research hotspots and development trends in the field of digital sports research.

4. Research hotspots and future prospects

4.1 Research hotspots

4.1.1 The number of studies on digitalization of sports has surged between 2020 and 2024, mainly focusing on the sports industry, sports teaching, and sports culture dissemination. The hot topics in the digital research of the sports industry mainly focus on technology driven and immersive experiences, personalization and customization, smart venue construction, privacy protection and compliance, lack of digital sports information talents, and the development of digital sports in the field of national fitness. This is related to the development trend of sports marketization and industrialization in China. As a new highlight of national economic development and an important force

for economic transformation and upgrading, the sports industry is an important foundation for supporting the high-quality development of China's sports industry in the new era for the next 10 years.

4.1.2 The hotspots of digital research in physical education teaching mainly focus on the application of virtual reality technology, the development of online education platforms, personalized learning and teaching, the improvement of teaching resources and curriculum systems, digital empowerment and educational management, as well as social interaction and cooperation. These hot research topics have brought innovation and change to physical education teaching, making it more adaptable to the needs and learning methods of modern students.

4.2 Future Outlook

Based on the number of sports digitalization literature indexed by CNKI from 2010 to 2023 studied in this article, it can be seen that during this period, China's sports digitalization research has gone through a development from scratch, from less to more. The large number of related articles published since 2020 reflects the rapid development of related research in China; From the co-occurrence graph of keywords in sports and digitalization related literature, research on sports digitalization will involve multiple aspects such as technological integration and innovation, popularization of personalized and customized services, construction of smart sports venues, and policy and market drivers. These trends will jointly promote the in-depth development of digital transformation in sports, bringing more opportunities and challenges to the high-quality development of sports.

5. Conclusion

The rapid development of digital technology is profoundly changing the field of sports, driving it towards higher quality and efficiency. From the research trends in recent years, digital sports has become an important research direction in the field of sports and will continue to maintain its popularity in the future. Looking ahead to the future, research on digital sports will continue to expand in depth and breadth. In terms of research depth, it is necessary to further explore the deep integration of digital technology and various fields of sports, and promote the comprehensive digitization of sports teaching, industry, and culture. In terms of research breadth, it is necessary to strengthen interdisciplinary research, draw on advanced foreign experiences, and improve the internationalization level of research. In addition, cooperation between researchers and institutions should be further strengthened to jointly promote the high-quality development of digital sports.

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