ISSN: 2710-0170

Research Status and Development Trend of Artificial Intelligence Empowering Physical Education Teaching in China

-- Evidence from China

Shuanfeng Li, Yun Li*

School of Southwest University, Chongqing, China;

* Corresponding Author

Abstract

To systematically sort out the research status, hot topics and evolution trends of artificial intelligence (AI) empowering physical education teaching in China, this study takes 111 valid core journal papers included in China National Knowledge Infrastructure (CNKI) as analysis samples and adopts CiteSpace software to conduct bibliometric and visual analysis of literature. The conclusions are as follows: mature cooperative networks have not yet been established among major research institutions and author groups engaged in research on AI empowering physical education teaching in China; the research hotspots in this field concentrate on physical education, school physical education, physical teaching, sports training and other fields; the research evolution of AI empowering physical education teaching in China can be divided into three stages. The first stage mainly involves the early exploration of intelligent technology application in physical education teaching and basic research on cognition and skill acquisition in physical learning. The second stage focuses on the systematic promotion of intelligent reform in physical education and key technological breakthroughs in competitive sports and national fitness. The third stage centers on AI-enabled professional development of physical education teachers and multi-dimensional reflections on the in-depth application of artificial intelligence.

Keywords

Artificial Intelligence; Physical Education Teaching; Research Status; Development Trend; CiteSpace.

1. Introduction

At the beginning of 2025, the Central Committee of the Communist Party of China and the State Council issued the Outline for Building a Powerful Country in Education (2024–2035), which clearly proposes to "forge new development tracks and foster new development advantages" by comprehensively advancing educational digitalization, and defines artificial intelligence technology as a core driving force for systematic educational transformation. As an indispensable component of China's education system, traditional physical education is confronted with prominent challenges, such as large individual differences among students and strong subjectivity in physical education evaluation. Supported by national policies and rapid advances in artificial intelligence, China's physical education has actively explored integration with AI. Representative applications including metaverse physical education and generative artificial intelligence are driving the transformation of traditional physical education from "standardized" and "experience-driven" modes toward "personalized" and "precision-oriented" models. Equipped with intelligent wearable devices, AI can capture students' motion postures, monitor their exercise load, and generate personalized training plans tailored to

ISSN: 2710-0170

individual characteristics, effectively improving physical teaching efficiency and students' participation in sports.

To identify future research priorities of AI application in physical education teaching, this paper systematically reviews and analyzes research achievements concerning AI empowering physical education teaching in China from 1995 to early 2026. CiteSpace software is adopted to carry out quantitative and visual analysis of relevant literature, summarize research hotspots, evolutionary trends and core research contents in this field, and further propose future research directions, so as to provide references for the development of research on AI application in physical education teaching.

2. Research Methods and Data Sources

This study employs CiteSpace software for quantitative literature analysis. Developed by Professor Chen Chaomei's team with Java language, CiteSpace is an information visualization tool that relies on co-citation analysis and path-finding algorithms to mine disciplinary evolution paths and research frontiers. To analyze the research status and development trend of AI application in physical education teaching in China, this study restricts retrieved literature to journals indexed in SCI, CSSCI and Peking University Core Journals. The professional retrieval formula in CNKI is set as:SU=(Artificial Intelligence + Machine Intelligence + Computational Intelligence + Computer Vision + Knowledge Acquisition + AI) AND SU=(Physical Education + Physical Teaching + Sports Training + School Physical Education)

A total of 129 papers are retrieved. After screening titles and abstracts to eliminate 18 irrelevant papers, 111 valid papers are finally retained as research samples for analyzing the research status and development trend of AI application in physical education teaching in China.

3. Overview of Literature on AI Application in Physical Education Teaching

3.1. Annual Publication Volume

Annual publication volume depicts the evolutionary process of a knowledge domain from a temporal perspective. As shown in Figure 1, the period from 1995 to 2019 marks the embryonic stage of research on AI empowering physical education teaching in China, with only one paper published respectively in 1995, 2002 and 2005. The period from 2020 to 2023 witnesses rapid development of relevant research, with 20 papers published in three years, an average of about 7 papers per year. The years 2024–2026 see explosive growth of research output: 31 papers were published in 2024 alone, exceeding the total publications of the previous decade, and 40 papers were released in 2025, indicating that research on AI empowering physical education teaching has entered a prosperous new phase. Overall, research on AI empowering physical education teaching in China started late with insufficient research outputs, and many research issues remain to be further explored.

3.2. Analysis of Key Research Institutions

CiteSpace is used to analyze publication volume and cooperative relationships among institutions engaged in AI-enabled physical education research, generating the co-occurrence network map of research institutions (Figure 2). In the map, each node represents a research institution, and lines between nodes indicate cooperative ties between two institutions. Larger nodes and labels correspond to institutions with more published papers and greater academic influence.

The literature sample covers 122 research institutions. As shown in Figure 2, the four largest nodes belong to the School of Physical Education and Health of East China Normal University,

ISSN: 2710-0170

Jiangsu Collaborative Innovation Center of Sports and Health Engineering, Nanjing Sport Institute and the Department of Physical Education of Tsinghua University, which are the top four institutions with the most publications and hold important academic positions in this field. Among them, the School of Physical Education and Health of East China Normal University has the largest node and the largest number of published papers. CiteSpace analysis reveals that 122 institutions have formed 135 cooperative ties with a network density of 0.0183. This demonstrates that although certain cooperative relationships have been established among academic institutions, overall inter-institutional cooperation remains sparse. Future efforts should strengthen academic collaboration across institutions to jointly promote the advancement of AI-enabled physical education teaching research in China.

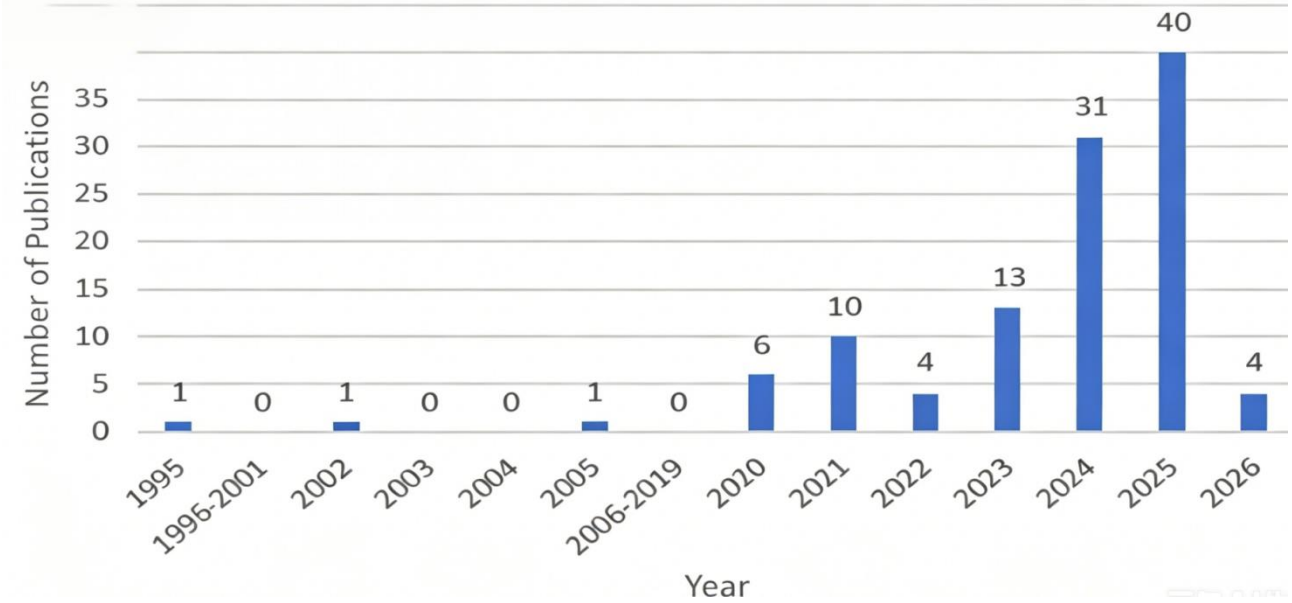

Figure 1: Annual number of publications in research literature from 1995 to 2026

3.3. Analysis of Core Researchers

Author co-occurrence network analysis is a fundamental bibliometric method that helps identify mature academic teams and their team effects from massive scholar groups. CiteSpace is applied to analyze authors of the collected literature, generating the cooperation network map of major researchers in the field of AI empowering physical education teaching (Figure 3).

According to CiteSpace statistical results, the sample literature involves 283 researchers, forming 89 research groups with two or more members. The research team led by Li Zhao, Wang Junhan and Guo Jianghao boasts a relatively large scale and extensive cooperation network, with 16 members in Li Zhao's team. Their representative paper Ten Key Issues and Development Directions in Physical Fitness Testing and Evaluation was published in the Journal of Chengdu Sport University. The team's research covers 14 universities including Beijing Sport University, Chengdu Sport University, Guangzhou Sport University and Nanjing Sport Institute, forming a broad cross-university cooperation network. Nevertheless, most research teams operate in relative isolation without stable and interconnected cooperative networks.

This study adopts Price's Core Author Law to identify core authors in this field, where Nmax refers to the maximum number of papers published by a single researcher. In this sample, Hu Haixu published the most papers . The threshold value M is calculated as 1.675, meaning authors with no fewer than 2 papers are defined as core authors. CiteSpace statistics show there are 21 core authors in this field, serving as the core driving force for disciplinary development. Further data analysis indicates core authors account for only 7.4% of all researchers and contribute around 31% of total publications, failing to meet the 50% threshold specified by

ISSN: 2710-0170

Price's Law. This proves that a stable core author group has not yet formed in research on AI empowering physical education teaching.

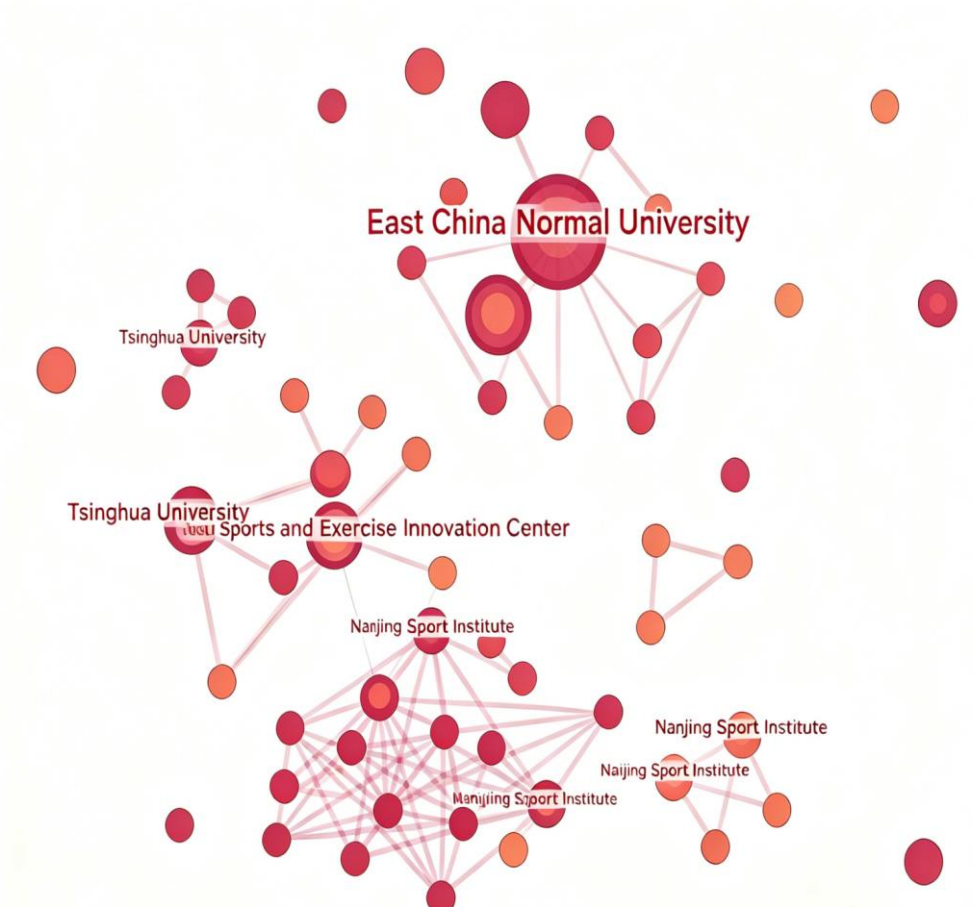

Figure 2: Network map of collaborations among major research institutions

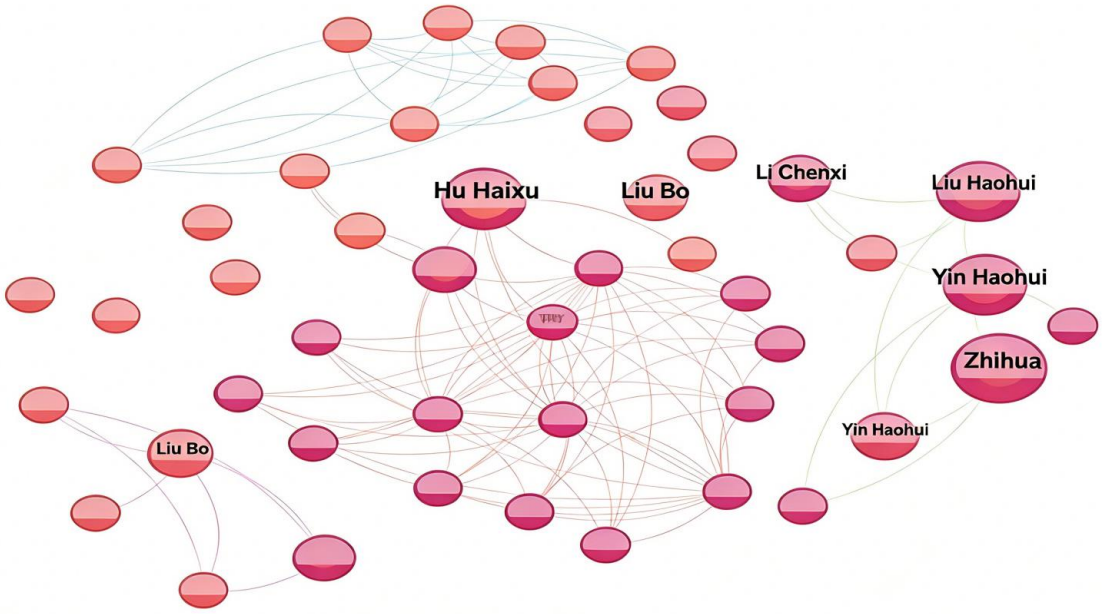

Figure 3: Network relationship map of collaborations among the principal investigators

3.4. Analysis of Highly Cited Classic Literature

Among the 111 sample papers, 10 papers have been cited more than 100 times, which can be divided into two stages with 2023 as the dividing line.

ISSN: 2710-0170

Stage 1: 2021–2022,Two highly cited papers exerted profound influence in this stage. The first is Digital Transformation: Igniting a New Engine for Contemporary Competitive Sports Training Reform by Hu Haixu and Yang Guoqing from Nanjing Sport Institute. The authors put forward the connotation, transformation paths and reshaping directions of digital transformation in competitive sports training at an early stage. They interpreted the nature of digital sports training via three progressive levels: digital conversion, digital upgrading and digital transformation, and constructed a cutting-edge theoretical framework of human-machine integration, providing a new direction for the digital development of sports training in China. The second paper is Connotation Characteristics, Development Dilemmas and Promotion Strategies of Physical Education Teaching in the Artificial Intelligence Era by Professor Yang Yun from Ocean University of China. After years of research and induction, Yang summarized four connotation characteristics of school physical education in the AI era: immersive teaching scenarios, personalized teaching contents, data-driven teaching processes and scientific teaching evaluation. She also identified four major dilemmas including ambiguous role positioning of physical education teachers and reduced students' autonomous learning ability, and proposed targeted countermeasures accordingly. These two pioneering papers lay a solid theoretical foundation for understanding AI application in school physical education and competitive sports from two distinct dimensions.

Table 1 Statistical Table of Some Highly Cited Papers

Stage	Title	Author	Journal	year	Citation Frequency / Times
Phase One	Digital Transformation: Igniting the Engine of Transformation in Modern Competitive Sports Training	Hu Haixu	Journal of Beijing Sport University	2021	100
	Connotation Characteristics, Development Difficulties and Promotion Strategies of Physical Education Teaching in the Era of Artificial Intelligence	Yang Yun	Journal of Sports Culture	2022	133
Stage Two	Mechanism of Action, Application Fields and Practical Paths of Digital Intelligence Technology Empowering the Modernization of School Physical Education	Wang Lilei	Sports Science Research	2023	239
	Research Status and Development Directions of Key Technologies in the Field of Sports Artificial Intelligence	Huo Bo	Journal of Capital University of Physical Education and Sports	2023	202

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Stage	Title	Author	Journal	year	Citation Frequency / Times
	Implementation Framework and Development Ideas of Smart Physical Education Teaching	Wang Jian	Sports Culture Guide	2023	135
	Demand Mechanism, Key Dimensions and Implementation Strategies of Artificial Intelligence Boosting the Development of Physical Education	Yin Zhihua	Journal of Chengdu Sport University	2023	122
	A New Path of Sports in the Chinese Modernization Drive: Missions and Directions of Digital Sports	Wu Zhangzhong	Sports Science	2023	114
	Cutting-edge Progress, Dilemma Reflections and Optimization Strategies of Artificial Intelligence in Boosting Athletic Performance	Su Yanfeng	Journal of Shanghai University of Sport	2023	110
	Application Scenarios, Hidden Risks and Mitigation Strategies of Artificial Intelligence Empowering Physical Education Evaluation	Zhang Xinmiao	Sports Science Research	2024	108
	An Analysis of the Value, Current Reality and Development Path of Integrating Artificial Intelligence into Physical Education	Liu Wei	Journal of Shenyang Sport University	2024	102

Stage 2: Post-2022,With deepening research on AI in school physical education, abundant theoretical and practical achievements have emerged, requiring systematic sorting of research contexts and in-depth discussion of newly exposed challenges. Highly cited papers in this stage focus on systematic topics such as the core dimensions of AI-driven physical education development, implementation frameworks of smart physical teaching, and hidden risks and solutions of AI-enabled physical education assessment.Yin Zhihua et al. systematically analyzed the demand mechanism and realization strategies of AI boosting physical education development, and proposed multiple approaches including improving AI infrastructure in schools, integrating AI into top-level physical education design, and enhancing physical education teachers' digital literacy from three dimensions: physical education management, teachers' instruction and students' sports learning. Zhang Xinmiao et al. focused on physical education assessment, summarizing multiple application scenarios of AI such as scientific

ISSN: 2710-0170

evaluation of teaching effects and regular monitoring of in-class exercise load. Meanwhile, their team revealed hidden risks including student privacy leakage, uneven distribution of sports and technical resources across regions and schools, and insufficient digital literacy among teachers and students, and put forward corresponding mitigation strategies. These studies mark that research on AI empowering school physical education has evolved from preliminary exploration to systematic and in-depth discussion.

4. Research Hotspots and Evolution Trends of AI Application in Physical Education Teaching

4.1. Research Hotspots

Keywords summarize the core content of academic papers. Keyword analysis of literature helps capture research hotspots and their evolutionary shifts in different periods. CiteSpace analysis of keywords extracted from 111 papers identifies 272 keyword occurrences, including 147 unique keywords. Keywords appearing no less than three times are defined as high-frequency keywords, totaling 19 items with cumulative frequency of 118, accounting for approximately 43% of total keyword occurrences (Table 2). The themes of high-frequency keywords present diversified characteristics. "Artificial Intelligence" ranks first with 39 occurrences, followed by "Physical Education" (17), "School Physical Education" (15), "Physical Teaching" (8), "Sports Training" (4), "Sports Industry" (4) and "Digital Technology" (4). The seven keywords alone account for 91 occurrences, around 33% of total keyword frequency. It can be concluded that Chinese scholars mainly focus on the application and development paths of AI integrated with physical teaching and school physical education.The top frequency and centrality of "Artificial Intelligence" (39 occurrences, centrality = 0.5) stem from national strategies of educational digitalization and building a powerful sports country. AI technologies deliver new solutions for personalized teaching, sports training monitoring and physical fitness improvement, especially in school physical education, where scholars concentrate on precise teaching and solutions to subjective evaluation defects in traditional physical classes, generating numerous papers on AI-enabled physical education reform and teachers' digital literacy cultivation.

Table 2 Statistical Table of High-Frequency Keywords

Sorting	Keywords	Frequency	Centrality
1	Artificial Intelligence	39	0.5
2	Physical Education	17	0.35
3	School Physical Education	15	0.2
4	Physical Education Teaching	8	0.16
5	Sports Training	4	0.14
6	sports industry	4	0.58
7	Digital technology	4	0.34
8	a country strong in sports	3	0.24
9	Digital Literacy	3	0.27
10	PE teacher	3	0.04
11	Kinesiology	3	0
12	Metaverse	3	0.37
13	athletic performance	3	0.06
14	Competitive Sports	3	0.04
15	Machine Learning	3	0.12

ISSN: 2710-0170

Sorting	Keywords	Frequency	Centrality
16	Digital Intelligence Technology	3	0.02
17	Digital Sports	3	0.12
18	AI technology	3	0
19	Sports Law	3	0.59

High-frequency keywords are interconnected, reflected in keyword centrality and co-occurrence network map (Figure 4). The 272 keywords form 236 correlation links. Keywords such as "Artificial Intelligence", "Physical Education", "School Physical Education", "Physical Teaching", "Powerful Sports Country" and "Sports Industry" occupy central positions with extensive connections to other nodes. Combined with high-frequency keyword statistics and co-occurrence mapping, research hotspots are categorized into three levels:Macro level: Strategic driving forces and development paths of AI empowering physical education, including Powerful Sports Country and Digital China;Meso level: Digital transformation models of school physical education and physical teaching;Micro level: Specific applications of AI technologies in sports training, athletic performance and teaching evaluation."Artificial Intelligence" acts as the core node connecting all three levels due to its highest frequency and centrality.

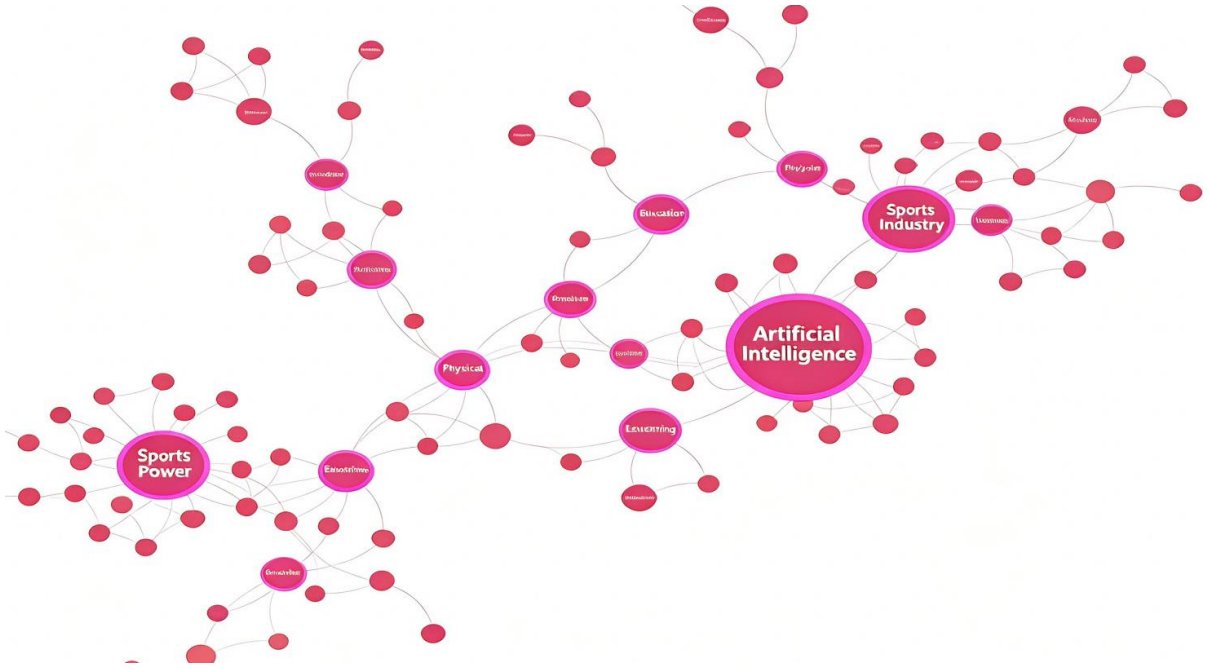

Figure 4 Keyword Co-occurrence Network

4.2. Evolution and Frontier Analysis of Research Hotspots

Keyword burst mapping intuitively reflects emerging trends and abrupt shifts of research hotspots, facilitating grasp of disciplinary frontiers and evolutionary contexts. CiteSpace burst analysis of keywords extracts the top 15 keywords with the strongest citation bursts (Figure 5). The research evolution of AI application in physical education teaching in China is divided into three distinct stages.

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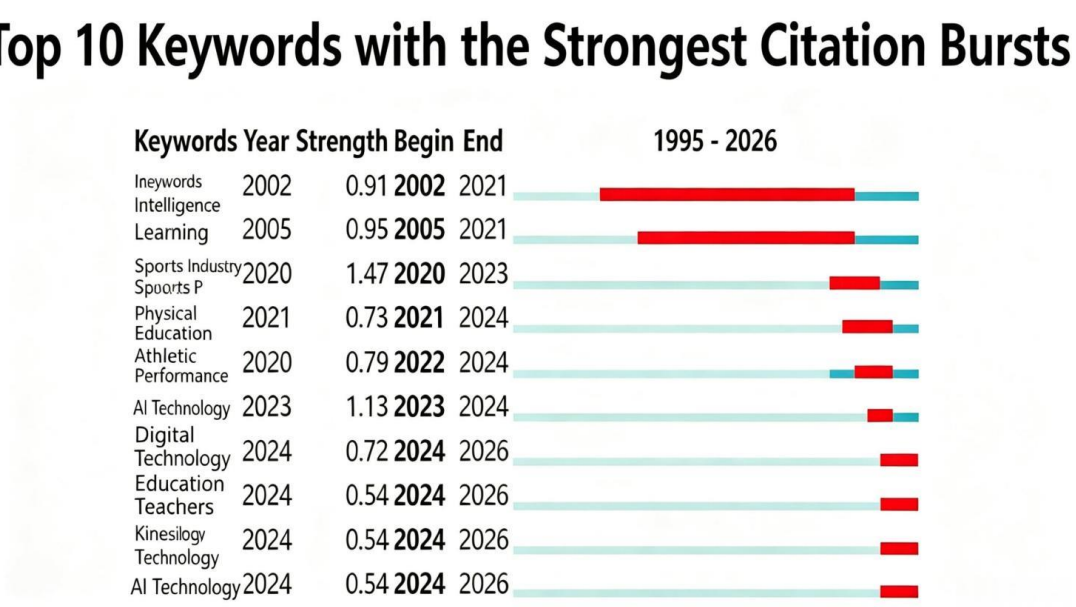

Figure 5 Map of the Top 10 Keywords with High Cited Burst Strength

4.2.1. Stage 1

2002–2021 (Initial Exploration Stage)This stage lays a long-term theoretical centered on two burst keywords: "Intelligentization" and "Learning". Relevant research explores early forms of intelligent technology in physical education and basic laws of cognitive processes in sports learning from information technology and cognitive learning theory perspectives. Two core research directions are summarized as follows:

(1)Early application exploration of intelligent technology in physical education teaching

Scholars mainly researched computer-aided instruction, AI expert systems and remote multimedia physical teaching systems, constructing early intelligent physical education platforms. Zhou Yong's team designed an intelligent remote multimedia teaching system that automatically adjusts teaching plans based on individual student differences via production rule knowledge bases and inference engines. Preliminary applications of intelligent sensors and algorithms for athlete motion analysis were also discussed, though limited by small sample sizes and insufficient data volume. Despite simple technical means, these explorations pioneered the integration paradigm of AI and school physical education.

(2)Basic research on cognition and motor skill acquisition in sports learning

The keyword "Learning" maintained burst intensity for nearly 20 years, indicating sustained academic attention to cognitive mechanisms of sports learning, motor skill acquisition laws and sports memory capacity. Researchers explored teaching objectives, strategies and evaluation from physical pedagogy perspectives, and adopted animal experiments and neurobiological methods to reveal how exercise regulates learning and memory. Lu Jie's team conducted swimming training experiments on rats with varying exercise intensities, finding that moderate-intensity exercise significantly improves spatial learning and memory and upregulates Orexin A expression in the cerebellum, while excessive training impairs memory and downregulates Orexin A mRNA. These molecular and neural circuit studies provide scientific evidence for differentiated teaching and coordinated development of motor ability and cognition. Meanwhile, scholars revised sports curriculum concepts, advocating "Health First" and lifelong sports education.

4.2.2. Stage 2

2021–2024 (Policy-Driven Practical Application Stage)This critical explosive stage witnesses the shift of intelligentization research from theoretical exploration to systematic application driven by national strategies including Powerful Sports Country and educational

ISSN: 2710-0170

modernization. Studies cover multiple dimensions such as physical education reform, competitive training, national fitness and sports industry. Two core research themes are identified:

(1)Systematic promotion of intelligent reform in physical education

National policies including the Outline for Building a Powerful Sports Country and Compulsory Education Physical and Health Curriculum Standards (2022 Edition) explicitly promote deep integration of AI and physical teaching, stimulating extensive research on AI-enabled school physical education. Zhang Xinmiao analyzed multiple application scenarios of AI in physical education assessment, including teaching effect evaluation, real-time exercise load monitoring and intelligent physical testing, while exposing risks such as student privacy leakage, technical limitations and uneven resource allocation across regions. Ye Songdong's team studied AI's role in bridging physical education equity, pointing out insufficient digital infrastructure and low teacher-student digital literacy may exacerbate educational disparities. Yin Zhihua's team constructed three core dimensions of AI-assisted physical education (teaching management, classroom instruction and motor skill learning) and proposed optimization paths including infrastructure construction and top-level curriculum design. Yang Yun discussed connotation features and dilemmas of AI-era physical teaching, suggesting strategies to improve teachers' digital literacy and cultivate students' autonomous learning capacity. Wang Lilei et al. interpreted the conceptual connotation of digital intelligence technology empowering school physical education modernization, elaborating five functional mechanisms and seven application scenarios such as personalized demand matching and quantitative teaching evaluation.

(2)Key technological breakthroughs in competitive sports and national fitness

Burst keywords "Athletic Performance", "Digital Technology" and "AI Technology" after 2023 reflect academic focus on scientific upgrading of competitive, school and mass sports. Guo Jianghao explored AI applications including virtual referees in competitive sports, virtual teachers in school physical education and virtual fitness partners for public sports, and analyzed technical, ethical and legal risks with corresponding countermeasures. Huo Bo et al. summarized core sports AI technologies including motion capture, wearable smart devices and big data for smart fitness spaces, predicting future directions such as digital twins and personalized exercise prescription generation. Hao Guang'an's team presented practical cases of smart physical classrooms at Peking University, introducing AI-assisted education systems adopting 3D human pose estimation and key frame evaluation to realize visualized motor skill assessment, instant feedback, face recognition and venue flow monitoring. These studies mark the in-depth integration of AI and school physical education, laying solid technical and practical foundations for subsequent research.

4.2.3. Stage 3

2024–2026 and Beyond (In-Depth Reflection & Human-Machine Coordination Stage)Research focus shifts from "what technologies can do" to "how teachers apply technologies effectively", centering on AI-enabled professional development of physical education teachers and rational reflection on potential risks of deep AI integration. Two major research hotspots are highlighted:

(1)AI-enabled professional development of physical education teachers

"Physical Education Teacher" became a burst keyword from 2024 onward. With deep integration of AI and physical teaching, scholars explored how teachers upgrade digital literacy and reshape professional identities with AI assistance. Liu Bin adopted grounded theory to analyze teaching practices of 29 frontline physical education teachers, identifying three functional mechanisms of AI supporting teaching efficiency, knowledge co-creation and human-AI collaborative education. AI drives teachers' transformation from experience-based

ISSN: 2710-0170

instructors to research-oriented guides via big data analysis and real-time feedback from intelligent assessment systems. Wang Ningli defined the connotation and value of AI empowering professional development of primary and secondary physical education teachers, identifying practical dilemmas including biased technical cognition, digital literacy gaps and superficial technology integration, and proposing improvement paths such as updating professional concepts and systematic digital literacy training. Ma Yanhong constructed a realization mechanism of digital empowerment for teachers' professional development from historical, theoretical and practical perspectives, emphasizing cultivation of technical awareness, sustainable digital resource ecosystems and comprehensive teacher training systems. These studies confirm that AI has evolved from an auxiliary classroom tool into an indispensable core element throughout teachers' lesson preparation, instruction and reflective improvement. Cultivating teachers' digital literacy and human-machine collaboration competence will become a priority of physical educator workforce construction.

(2)Multi-dimensional reflection on in-depth AI application in physical education teaching

Keywords "Digital Technology" and "AI Technology" remain prominent yet slightly less intense, as scholars shift from blind technological optimism to rational scrutiny of potential risks of AI integration. Jiang Jiajun's team defined sports large models, sorting their development history and current challenges including biased content generation, sports data bottlenecks and lagging governance systems. Liu Bo et al. outlined four value prospects and three inherent limitations of AI-enabled physical education, analyzing theoretical origins of risks such as eliminated student embodied experience and weakened interpersonal communication from embodied cognition, educational ethics and technological intervention perspectives. They proposed clear auxiliary boundaries for AI, embodied-friendly intelligent system design and unified standards for human-machine collaboration. Guo Jianghao and Xiong Wen adopted technical phenomenology to interpret sports AI connotations, identifying technical and educational ethical risks and proposing mitigation strategies including interpretable AI development and information security systems for AI-enabled physical education (AIPE). Collectively, these studies signal a disciplinary shift from technology-centric optimism to rational deliberation over AI's capacities, limitations and normative application boundaries in physical education.

5. Research Conclusions and Future Prospect

5.1. Research Conclusions

(1)The School of Physical Education and Health of East China Normal University, Jiangsu Collaborative Innovation Center of Sports and Health Engineering, Nanjing Sport Institute and the Department of Physical Education of Tsinghua University are the top four institutions with the most publications in this field. Limited stable cooperative networks exist despite sporadic inter-institutional collaboration.

(2)Research teams led by Li Zhao, Wang Junhan, Guo Jianghao and Yin Zhihua feature large membership and extensive cooperation networks. Nevertheless, most research groups operate independently without tight inter-team connections, and a mature core author group has not yet formed in this field.

(3)Research hotspots concentrate on physical education, school physical education, physical teaching, sports training, sports industry and digital technology. The evolutionary trajectory of research hotspots is divided into three stages: the initial exploration stage focusing on early intelligent technology trials and basic cognitive research on sports learning; the practical application stage centered on systematic intelligent reform of physical education and technological breakthroughs in competitive and mass sports; the in-depth reflection stage

ISSN: 2710-0170

highlighting AI-enabled teacher professional development and multi-dimensional ethical deliberation over deep AI integration.

5.2. Future Research Prospect

(1)In-depth human-machine collaboration and professional development of physical education teachers

Existing studies mostly stay at theoretical discussion and status analysis of teachers' role transformation and digital literacy. Future research should conduct empirical studies on human-AI collaborative teaching modes, exploring how teachers utilize AI to diagnose student movements and generate personalized learning plans while retaining teachers' dominant position in physical education. Priority should be given to constructing training systems and evaluation indicators for teachers' digital literacy, implementing experimental and action research to reveal internal mechanisms and long-term effects of AI empowering teachers' professional growth.

(2)Research and development of vertical large sports models

Current sports AI technologies are mostly simple adaptations of general algorithms lacking deep modeling of motor skill formation rules and adolescent physical fitness characteristics. Future sports science researchers and AI enterprises should strengthen cross-industry cooperation to develop vertical large models tailored for school physical education. Integrated with multi-modal data including computer vision, wearable sensor signals and physiological and psychological indicators, vertical sports large models can realize real-time motion technical evaluation, intelligent exercise load regulation and automatic generation of personalized sports programs, supporting more precise and scientific school physical education.

(3)Governance system construction addressing ethical risks of AI-enabled school physical education

Scholars have begun to identify ethical hidden dangers including privacy violations from data leakage, ambiguous liability under algorithm black boxes and weakened teacher-student emotional communication. Future research should not only identify potential ethical risks but also construct operable governance systems, focusing on algorithm power audit mechanisms, standardized data anonymization protocols and ethical boundaries of human-machine interaction in school sports scenarios. Special attention should be paid to the irreplaceable value of embodied experience and emotional interaction in sports learning. Intelligent systems for schools should adhere to embodied-friendly design principles and clarify auxiliary boundaries of AI. Furthermore, interdisciplinary research communities integrating sports science, computer science, ethics and law should be established, alongside university-government-primary and secondary school (U-G-S) collaborative empirical research networks, to provide academic support for national guidelines on AI application in physical education.

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