International Journal of Education and Humanities
ISSN: 2770-6702 | Vol. 21, No. 1, 2025

How Digital Technology Empowers Sports Teaching and Research Activities

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Abstract: Integrating digital technology into sports teaching and research activities can significantly enhance teaching efficiency, optimize the content, forms, and resources of sports pedagogy, and promote the modernization of physical education. This study employs the literature review method to conduct research. The findings reveal that traditional teaching and research activities suffer from issues such as monotonous content, uneven resource distribution, operational challenges for teachers, and regional disparities. Digital technology can address these problems, including low efficiency and uneven resource allocation in conventional sports teaching and research.

Keywords: Sports Teaching and Research Activities, Digital Technology, Resource Sharing.

1. Introduction

The widespread application of digital technologies such as artificial intelligence and big data is transforming traditional education and teaching models. Digital technology has become a new driving force for the transformation of physical education teaching and research in the new era. It provides innovative technological breakthroughs to address complex challenges in the education sector and, as a core driver of educational reform, is reshaping the logical framework of teaching practices. The deep integration of intelligent tools into the physical education teaching and research system can reconstruct traditional teaching models, promote the transformation and upgrading of sports skill training, health management, and teaching evaluation systems toward precision and personalization, thereby advancing physical education teaching and research.

2. How Can Digital Technology Empower Sports Teaching and Research Activities

2.1. Research Status on Digital Technology Empowering Sports Teaching and Research Activities

2.1.1. Current International Research Status on Digital Technology Empowering Sports Teaching and Research Activities

Research on technology-enabled teacher professional development in foreign countries began relatively early. Although the specific term "sports teaching research" is not widely used, their studies and practices related to "teacher learning communities" offer valuable insights for China.

2.1.2. Current Domestic Research Status on Digital Technology Empowering Sports Teaching and Research Activities

Chinese scholars acknowledge that traditional sports teaching-research activities remain a crucial mechanism for promoting physical education teachers' professional development. However, with the advancement of national initiatives such as the "Education Informatization 2.0 Action Plan" and the strategy for "Digital Transformation in Education," researchers have begun exploring innovative models including "internet-plus teaching research" and "intelligent teaching research" (Zhu Zhiting, 2018; Yin Zhihua et al., 2020). [1,2].These studies have established a preliminary theoretical framework and developmental direction for empowering sports teaching-research activities through digital technologies.

2.2. Practical Challenges of Empowering Sports Teaching and Research Activities through Digital Technology

This study identifies several practical challenges in current sports teaching-research activities, including inefficient documentation of teaching discussions, low productivity in thematic exchanges and program improvements, as well as difficulties in inter-school collaborative analysis, cross-regional examination assessment, and underutilization of resource analytics. These issues can be effectively addressed through digital approaches, such as innovating the organizational models of teaching research and developing dedicated platforms for sharing educational resources.These issues can be addressed by forming a digital-intelligence physical education teaching research community and developing digital-intelligence physical education teaching research capabilities, among other approaches[3].

2.2.1. Policy Documents on Empowering Sports Teaching and Research Activities through Digital Technology

In recent years, numerous policy documents have emphasized the importance of the digital transformation of teaching research. For example, the Compulsory Education Physical Education and Health Curriculum Standards (2022 Edition) call for a "core competencies" oriented approach, requiring teaching research to focus on structured skill instruction. This provides a solid policy foundation for the digitalization and informatization of sports teaching research.This study aims to enhance the effectiveness of physical education and health teaching research by exploring how digital technologies such as artificial intelligence and big data analytics can innovate online teaching research models. Such models will break through the limitations of traditional

approaches by enabling real-time sharing and updating of teaching resources through digital platforms, while using intelligent algorithms to mine and analyze teaching data, thereby providing a scientific basis for sports teaching research.

To address current challenges in sports teaching research-such as inefficient documentation of teaching discussions, low productivity in thematic exchanges and program improvements, difficulties in inter-school collaborative analysis, cross-regional examination assessment, and underutilization of resource analytics-this study proposes digital solutions. These include innovating the organizational models of teaching research and developing dedicated platforms for sharing educational resources.

2.3. Research Methods for Digital Technology-Empowered Sports Teaching and Research Activities

By collecting extensive literature, this research explores how digital technologies can be applied to sports teaching-research activities to inject new momentum into the development and innovation of physical education. It investigates whether the integration of digital technology with sports teaching-research is practically feasible, and aims to develop (informationalized sports teaching-research activity models) and a theoretical framework for the digital transformation of these activities. Through reviewing existing literature, the study also examines challenges such as uneven distribution of traditional teaching-research resources and low utilization rates of educational data.

2.4. Research Findings on Digital Technology-Empowered Sports Teaching-Research Activities

2.4.1. Digital Technology Empowers Sports Teaching and Research Activities to Address Monotonous Content

This study reveals that traditional teaching-research activities are predominantly organized offline at the school or district/county level, with a primary focus on demonstration lessons, lesson explanation, and lecture-style teaching. To address the issue of monotonous content, it proposes leveraging the advantages of the internet to bring together experts, scholars, and frontline physical education teachers for interactive exchanges. This approach aims to deeply interpret new curriculum standards, teaching philosophies, and pedagogical methods, thereby bridging the gap between policy/educational reform concepts and the understanding of practicing teachers. Additionally, digital technology can be used to construct sports scenarios, breaking through the limitations of traditional venues and equipment, and enhancing classroom efficiency.

2.4.2. Digital Technology Empowerment of Sports Teaching-Research Activities Exhibits Content Bias

This study identifies a significant content bias in current sports teaching and research activities, leading to uneven resource distribution. For example, many ordinary schools tend to prioritize test-oriented content (such as physical education for secondary school entrance examinations), while the development of fitness guidance tools lags behind. To address this issue, the strategy adopted by Wuhan Economic and Technological Development Zone schools can serve as a valuable reference. They developed a "virtual dragon boat racing game," creating distinctive digital resources that integrate local cultural elements into physical education curricula.

2.4.3. Implementing Personalized Sports Teaching-Research Activities through Digital Technology

This study reveals that while urban teachers proficiently utilize data analysis platforms to design personalized lesson plans, rural teachers struggle with operating basic digital equipment due to insufficient training. To address this disparity, the "Ai Zhongzi" system implemented in Shaanxi province can serve as a model. This initiative enables resource-sharing of high-quality curricula and allows rural schools to synchronously participate in live teaching sessions led by prestigious institutions. By leveraging platforms such as Tencent Meeting, DingTalk, and specialized teaching-research platforms, cross-regional and inter-school collaborative lesson preparation, class observation/evaluation, and thematic seminars can be conducted. These approaches break spatiotemporal constraints and significantly expand the reach of high-quality teaching-research resources .

2.4.4. Regional Disparities in Digital Sports Teaching-Research Activities

The study further identifies significant regional imbalances in sports teaching-research activities. Schools in developed areas are equipped with advanced technologies such as augmented reality (AR) devices, while rural institutions still rely heavily on traditional sports equipment. To bridge this urban-rural gap, the promotion of lightweight and user-friendly tools-such as motion sensor bracelets for data tracking-can be effectively implemented to democratize access to digital resources.A "triple-teacher collaboration" model may be implemented, an "Internet + Sports" cloud platform established, and a "five-step closed-loop" process adopted to optimize teaching research[4]Online physical education teaching research activities can also be promoted[5].

3. Summary

Digital technology offers solutions to the challenges of low efficiency and uneven resource distribution in traditional sports teaching-research activities. By innovating content formats, developing digital resources, and building sharing platforms, it enhances teaching precision and resource utilization. To further improve technological adaptability, a smart sports ecosystem can be established through customized solutions tailored to regional teaching needs and equipment conditions, optimizing digital platform functionalities.To address regional disparities, mechanisms for inter-institutional support can be created, such as pairing urban flagship schools with rural schools to facilitate the shared use of smart devices. This study not only provides technical pathways to overcome inefficiencies and resource inequality in traditional teaching-research practices but also responds to the contemporary demand for cultivating "core competencies."[6] It supports the intelligent development of the integration of sports and education, ultimately contributing to the holistic development of individuals and the societal ideal of educational equity.To tackle the issue of monotonous content and forms in traditional teaching-research, the internet can be leveraged to bring together experts and teachers for interactive collaboration, while digital technology can be used to create virtual sports scenarios that overcome limitations in physical equipment.

For uneven resource allocation, locally relevant digital resources incorporating regional cultural elements can be developed. To address the training gaps among rural teachers, systems like the “Ai Zhongzi” platform can be promoted to share high-quality curriculum resources. Regional disparities can be mitigated through digital platforms that enable cross-regional resource sharing.

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