

Construction and Application of Smart Sports Teaching Models in Universities under Digital Transformation

Heng Xu

Zhejiang Normal University, Jinhua 321000, Zhejiang, China

Copyright: © 2026 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: Digital transformation has injected new vitality into the reform of university physical education, with smart sports teaching models emerging as a key direction for promoting high-quality development in collegiate sports education. Current university sports teaching faces challenges such as rigid instructional frameworks, insufficient personalized guidance, and inadequate data-driven management, making it difficult to meet the talent cultivation demands of the digital era. Grounded in the context of digital transformation, this study analyzes existing issues in university sports education and explores pathways for constructing smart sports teaching models through four dimensions: innovation in teaching philosophies, integration of teaching resources, design of instructional models, and improvement of evaluation systems. Specific application strategies are elaborated to leverage digital technology advantages, enhance the effectiveness of university sports education, and cultivate students' lifelong sports awareness and comprehensive athletic literacy.

Keywords: Digital transformation; Higher education institutions; Smart sports education; Teaching models; Physical literacy

Online publication: May 14, 2026

1. Introduction

Digital transformation represents the core trend in educational modernization, driving pedagogical practices toward intelligent, personalized, and diversified approaches. As a vital component of quality education, university sports programs bear the dual mission of enhancing students' physical fitness, developing athletic skills, and fostering lifelong sports engagement. The smart sports education model leverages digital technologies including big data analytics, artificial intelligence, and IoT to overcome traditional spatial-temporal constraints in physical education, achieving precise instructional delivery, customized learning guidance, and digitalized management systems. However, most universities still adhere to conventional teaching paradigms, failing to fully harness the educational potential of digital technologies. This results

in suboptimal teaching quality and student learning experiences. Consequently, establishing a smart sports education framework aligned with digital transformation and exploring its implementation pathways have become critical priorities for advancing physical education reform in higher education institutions.

2. Existing challenges in university physical education teaching amid digital transformation

Under the digital transformation era, university physical education instruction continues to face significant challenges that fail to meet the demands of intelligent teaching development. Some educators exhibit outdated teaching philosophies and lack digital pedagogical awareness, resulting in superficial integration of smart sports technologies into teaching practices. Teaching models remain rigidly structured around standardized group instruction, neglecting individual student differences and lacking personalized teaching approaches, which undermines student engagement. Teaching resources remain limited, with delayed development of digital resources and insufficient systematic integration, hindering efficient resource sharing and seamless online-offline integration ^[1]. Evaluation mechanisms also demonstrate biases, relying predominantly on summative assessments without digital technology support. This approach fails to comprehensively reflect learning outcomes and provides inadequate scientific data for instructional improvement.

3. Pathways for constructing smart sports teaching models in higher education institutions amid digital transformation

3.1. Innovating teaching concepts and establishing smart sports pedagogy

Universities should align with digital transformation trends by guiding physical education teachers to adopt a smart sports teaching philosophy characterized by “technology empowerment, student-centeredness, and competency-oriented approaches.” Through specialized training programs, teaching seminars, and external exchanges, educators can enhance their digital teaching capabilities, master the operation of smart sports equipment and platforms, and learn to utilize big data and artificial intelligence technologies for learning analytics and instructional design. This initiative aims to transform teachers from mere “knowledge transmitters” into “learning facilitators and personalized mentors,” integrating digital thinking throughout the teaching process to achieve deep integration of technology and pedagogy.

3.2. Integration of teaching resources and development of a smart sports resource platform

Leveraging digital technologies, this initiative consolidates high-quality sports teaching resources from both on-campus and external sources to establish a university-level smart sports education platform integrating resource sharing, online learning, virtual training, and interactive communication. The platform features instructional videos for fundamental sports skills, virtual simulation training courses for various sports disciplines, sports health knowledge question banks, live sports event broadcasts with analysis, and connects with data from campus smart venues and motion monitoring devices to achieve seamless integration between teaching resources and sports metrics. It provides students with comprehensive support for online self-directed learning and offline practical training, effectively overcoming the temporal and spatial constraints inherent in physical education instruction.

3.3. Designing diverse teaching models to achieve personalized precision education

Establish an intelligent sports education model integrating online-offline integration and in-class–out-of-class coordination to deliver personalized precision instruction. In the online component, students autonomously learn sports knowledge through smart sports platforms, watch instructional videos, and complete online exercises. The platform generates personalized learning recommendations and training plans based on students' learning data and athletic foundations ^[2]. During classroom sessions, teachers utilize smart motion monitoring devices to collect real-time exercise data, provide precise training guidance tailored to individual performance, promptly correct movement deviations, and employ group-based teaching methods and scenario-based instruction to enhance classroom interaction and engagement. For extracurricular activities, the smart sports platform and campus sports facilities encourage students to engage in self-directed training, club activities, and sports competitions, ensuring seamless integration between in-class and out-of-class education while fostering students' autonomous athletic capabilities.

3.4. Enhancing the evaluation system by establishing a digitalized comprehensive assessment framework

To replace traditional evaluation models, we will develop an intelligent sports evaluation system powered by digital technology. This system integrates process and outcome assessments across multiple dimensions, covering physical fitness, athletic skills, learning progress, exercise habits, and sports literacy. The evaluation combines formative and summative assessments, utilizing smart sports platforms and motion-tracking devices to collect students' online learning data, classroom training metrics, and extracurricular activity records, enabling comprehensive tracking of the learning journey. The evaluation process incorporates teacher assessments, student self-evaluations, and peer reviews to ensure objectivity and comprehensiveness. Furthermore, big data analytics will be employed to optimize teaching strategies and provide personalized guidance for students.

4. Application strategies for smart sports teaching models in universities under digital transformation

4.1. Advancing smart venue development to strengthen hardware infrastructure

Universities should intensify investments in smart sports facilities, aligning with digital education requirements. This involves equipping venues with professional hardware such as intelligent motion monitoring devices, virtual simulation training systems, and smart refereeing systems, while establishing integrated smart management platforms to enable digital scheduling and intelligent management of sports fields, equipment, and devices. Through smart devices, core data including heart rate, exercise intensity, and movement accuracy can be collected in real-time and with precision during student workouts. Data-driven analysis provides scientific support for tiered classroom instruction and personalized extracurricular training planning, ensuring targeted teaching guidance, enhanced training effectiveness, and real-time risk monitoring to safeguard student safety.

4.2. Strengthening faculty development and enhancing digital teaching competencies

Higher education institutions should establish a systematic training framework for physical education teachers' digital teaching capabilities. Aligning with practical needs in smart sports education, regular

specialized workshops should be organized covering smart sports technology operations, instructional platform utilization, and sports data analysis. Industry experts and technical specialists should be invited to conduct offline lectures and online seminars to address digital teaching gaps^[3]. Simultaneously, educators are encouraged to conduct research and explore innovative reforms in smart sports education based on teaching practices. By integrating digital technologies with the unique characteristics of various sports disciplines, institutions can promote teaching through research and enhance quality through practice. This approach aims to gradually build a multidisciplinary faculty team that combines solid professional sports teaching expertise with robust digital teaching competencies.

4.3. Enhancing digital literacy development and promoting self-directed exercise

In smart sports education programs, emphasis is placed on cultivating students' digital literacy in sports, guiding them to skillfully utilize smart sports platforms and equipment for self-directed learning and training. Through initiatives such as offering digital literacy courses and organizing online sports activities, students learn to leverage platforms for sports knowledge research, training plan formulation, and performance data analysis. This approach fosters students' awareness and capabilities in autonomous exercise management, ultimately promoting the development of lifelong sports habits.

5. Conclusion

Digital transformation has created new opportunities for reforming physical education teaching in higher education institutions. The development and application of smart sports teaching models represent an inevitable choice for physical education to adapt to the digital era. Current challenges in university sports education—including outdated teaching philosophies, rigid instructional models, limited resources, and one-dimensional evaluation systems—have hindered both teaching quality improvement and students' physical literacy development. By innovating teaching concepts, integrating smart educational resources, designing personalized precision teaching models, and establishing data-driven comprehensive evaluation systems, coupled with implementing smart sports facilities, faculty training programs, and digital literacy enhancement initiatives, we can effectively leverage digital technologies to achieve intelligent and personalized development in higher education physical education.

Developing a smart sports education model in higher education institutions is a systematic endeavor requiring coordinated efforts from universities, faculty, and students. Universities should strengthen strategic planning and increase resource allocation to provide solid support for smart sports education. Educators must proactively update teaching philosophies, enhance digital teaching competencies, and meticulously design instructional processes. Students should actively adapt to smart teaching methodologies while improving their digital literacy and autonomous exercise capabilities. Only through multi-stakeholder collaboration can this smart sports education model achieve tangible results, drive high-quality development in university physical education programs, and cultivate more well-rounded talents with excellent physical fitness, sports skills, and lifelong sports awareness.

Disclosure statement

The author declares no conflict of interest.

References

- [1] Liu X, 2026, Pathways and Challenges of Digital Transformation in College Swimming Education under the Background of Smart Sports. *Cultural and Sports Products & Technology*, (01): 177–180.
- [2] Sun Y, 2025, Research on Reform Paths of University Physical Education Teaching under the Concept of Smart Education. *Contemporary Sports Science and Technology*, 15(33): 55–58.
- [3] Fan Y, 2025, Research on the Construction of Smart Sports Service System in Higher Education Institutions. *Theoretical Research and Practice of Innovation and Entrepreneurship*, 8(18): 76–78.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.