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An Overview of Smart Sports in Teaching and Learning in Universities

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Abstract*—This paper focuses on the innovation elements of the smart cultivation of university physical education -- smart sports, university physical education service, smart sports resources, smart technology and application. This paper puts forward the role of sports smart in sports teaching in universities comprises of (1) adopting the smart sport education for teaching and learning in universities; (2) highlighting the importance of development and application of smart sports curriculum; (3) building a comprehensive smart sports service system.*

***Keywords*—** *Smart sports; smart sports curriculum;teaching and learning;service system.*

I. INTRODUCTION

University physical education is an indispensable part of school physical education. At present, the single and outdated physical education teaching content affect students 'interest in physical education, while the single physical education teaching mode in universities seriously affects the enthusiasm and initiative of students to participate in physical education classroom, which is not conducive to the development of school physical education, and is not conducive to the formation of students' lifelong physical education consciousness (Baca, A. et al., 2020). Under the call of "extensively carrying out national fitness activities and accelerating the construction of a strong sports country", the sports resources of universities are gradually brought into the category of national fitness public service system and facing great challenges, including: (1) the operation and management of sports facilities are difficult to coordinate; (2) the rising safety risks of sports activities; (3) the load and intensity of sports groups are difficult to monitor in real time; (4) the increase of site equipment maintenance costs(Zhu, 2023).

The arrival of high speed information shows the qualitative leap in the field of artificial intelligence and science and technology. The rapid advancement of information technology creates new potential for the development of smart sports service systems in universities and offers significant scientific and technological support for the growth of education informatization (Fuss, F. K., & Spettl, 2019).

"Smart sports" is a model of the integration of science and technology and sports. It is not "smart" in the traditional sense, but emphasizes the application of more "smart and witty" teaching methods to sports teaching, so as to boost the reform, development and upgrading of the sports service system (Wu, 2020). At the Fifth Plenary Session of the 19th CPC Central Committee, the Chinese government proposed that "we should take self-reliance and self-improvement in science and technology as the strategic support for national development, implement the strategy of rejuvenating the world's leading science and technology, the lives and health of the country, stimulate the vitality of science and technology, and improve the system and mechanism for scientific and technological innovation.

"Smart sports is the operation, development and construction of all kinds of sports projects on the basis of science and technology informatization. It is the key to build an smart information platform, which helps to realize the more convenient, efficient and accurate supply of sports services in universities (Yu & Lai, 2021). Compared with traditional physical education teaching, smart sports has the advantages of being more smart. For example, smart sports equipment can have its unique perceptual function, real-time dynamic monitoring and evaluation of the human body before, during and after exercise, to help sports people to establish a more systematic and scientific exercise plan or exercise prescription. The advent of the Internet era requires us to change our thinking and re-examine the existing service system of university sports with a new perspective of science and technology. In order to meet the growing personalized needs of the people, we should seize the science and technology in the Internet era, take science and technology as the guidance, boost the construction and development of the smart sports service system in universities, comprehensively promote the deep integration of "Internet + sports", and lay a good foundation for students to establish a lifelong sports awareness.

II. SMART SPORTS EDUCATION IN TEACHING AND LEARNING

With the rise of new teaching and learning methods such as "cloud education", "mobile learning", "ubiquitous learning" and "one-to-one digital learning", Smart education breaks through its fragmented and embedded dilemma, Relying on the Internet , cloud computing, big data processing, and wireless broadband network, Through the expansion of modern educational resources, Actively promote and implement the education and teaching reform, Gradually realize the network, digitalization and individuation of the modern education system, Success leads to innovation and change in education, Covering "school education concept, curriculum teaching structure and teaching mode, students' learning concept and learning methods, talent training mode innovation, teaching management and performance evaluation" and so on (Wang, 2023).

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Guided by the goal of openness, sharing, interaction and integration, it realizes a wider range of sports participation, more humanistic sports experience, more accurate health management and more three-dimensional sports communication through the innovative application of sports resources, which represents the innovative development direction of physical education service led by the Internet in the future.

Make full use of the mobile Internet, cloud computing, big data, Internet and other modern information technology, micro class, flip classroom, MOOC, private classes, course design, build support across network, cross-platform, across the terminal open mutual education service platform, use mobile learning tools pay more attention to students individual differences, pay more attention to the service content adaptation, highly information support students sports skills learning, sports interest cultivation, sports habits.

Such as Oregon and Southern California, independently develop online websites and Android mobile applications to develop commercial interests in their football team games (Marcelo, 2013). The Smart Health Program team at the University of Arizona has developed smart phones(NPA) as part of a physical education curriculum to promote and improve physical activity and healthy eating habits among adolescents by measuring eating behavior, physical activity assessment, etc. (Mosqueda & martinez, 2012). British scholar Mercer(2015) believes that experiments using wearable devices in education can self-follow their own learning process and promote statistical measures of learning variables. Take Chongqing University of Science and Technology as an example. During the epidemic in the first half of 2019, the university adopted online physical education. At present, the hardware facilities of network teaching are relatively perfect. During the epidemic, teachers used various online platforms such as university students' MOOC platforms, XueTong and other apps to provide distance teaching, family exercises, and submit them every Wednesday and Saturday.

III. Development and Application of Smart Sports Curriculum

3.1 Smart technology and application

(1) The Internet —— To improve the perception of physical education teaching activities. The Internet is based on two major technologies, sensors and electronic labels(Yang & Yu, 2015). By pasting RFID tags or sensors to physical education teaching equipment and sports equipment, so as to effectively monitor the working state of sports equipment or equipment and improve the use efficiency of sports equipment and equipment. For example, in the process of the national physical standard test for university students, by wearing special physical monitoring sensors for students, the temperature, pulse, heart rate and blood pressure data can be dynamically and continuously obtained, so as to achieve more convenient and accurate extraction of physical data.

(2) Big data—— Improve the smart of physical education management decision-making. In the process of promoting the smart of physical education, the massive data covers all kinds of learning, teaching, scientific research, management services, etc. Through the collation and analysis of the data, the evaluation of students' sports development is formed to provide data reference for students to better participate in sports(Li et al., 2021). Based on the scientific research of big data, universities predict the development trend of physical education teaching and research, so as to realize the scientific development of physical education service.

(3) Cloud computing —— Expand the sharing of physical education services. Students can enjoy various cloud resources such as sports skills learning and sports health guide anytime and anywhere through electronic bags and other terminals. Images, videos and data such as the learning process of related skills are uploaded and stored in the cloud, providing reliable data support for individual learning behavior and learning performance evaluation.

(4) The network —— realizes the connectivity of multiple terminals. As the basis of the comprehensive connectivity and seamless access of the smart system of physical education service in universities, the ubiquitous network enables students to enjoy high-quality physical education teaching and other multiple network services through multiple different networks, such as telecom network, mobile network, Internet network, and satellite network.

3.2 The importance of smart sports curriculum

Traditional physical education service attaches great importance to the completion of the core task of curriculum teaching, and the output to the extracurricular sports service system is not much. Through the support of modern information technology, the smart development of physical education service not only pays comprehensive attention to the individual sports performance of students in class, but also pays continuous attention to students 'interest in extracurricular sports and sports activity participation, making the development of students' sports health service more systematic and standardized.

3.2.1 Inspire students' interest in physical exercise

According to relevant surveys and studies, people's willingness to keep fit is greater than their actual participation. College students' participation in physical exercise is not only related to venue equipment and spare time, but also related to personal emotions and exercise atmosphere (Wang,2020). According to the previous exercise, students can not intuitively feel the effect of fitness or exercise to themselves. If this goes on for a long time, students will easily have the idea of giving up. Through some intelligent devices and data modeling analysis, some data can be intuitively displayed to students. Make students aware of their progress every day, so as to stimulate students' interest in exercise. In today's era of the development and popularization of the Internet and we-media, students can also send their own sports records and dynamics to social software. This can not only meet their social needs, but also influence their classmates to do fitness and physical exercise together, create a good exercise atmosphere, and even play a good role in urging themselves. To promote the healthy development of the majority of students in the new period, cultivate university students' sports

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culture literacy and lifelong sports habits, and then shape a healthy lifestyle, to realize the convenience, efficiency and precision of sports services in universities in the new period, new stage and new environment.

3.2.2 Achieve accurate promotion of physical exercise

Through the use of smart devices, students' sports data can be collected and analyzed, and then the analysis results are fed back to students, so that students can find their own sports items and exercise methods, so as to achieve scientific and accurate fitness. On the other hand, the school conducts real-time monitoring and statistical analysis of students' exercise load, exercise density and other sports data, realizes multi-dimensional digital teaching arrangement management, visualizes students' physical data, enables PE teachers to arrange teaching content and adjust teaching plans more scientifically and reasonably, and fully covers all types of students from PE classes and extracurricular activities organization forms. Promoting the development of school sports (Gao & Li,2019).

3.2.3 Make physical education digital

Classrooms improved on the basis of traditional classrooms, such as multimedia digital classrooms, enrich teachers' teaching methods and teaching means, so that physical education can be digitized. However, there is still a lack of unified planning, construction departments are independent, with multiple systems, unable to retain data. The combination of intelligent technology equipment and physical education classroom, on the one hand, makes the college physical education classroom to achieve digital, can use all kinds of resources, solve the problem of insufficient resources of famous teachers and so on. On the other hand, teachers can make exams and homework into databases through digital means, and students can conduct online exams according to their spare time, which can realize the purpose of course management and students' independent learning. Finally, the digitalization of physical education in colleges and universities is conducive to students' correct understanding of movement imagery, enabling students to have a complete and correct understanding of movement concepts in all aspects (Liu,2022).

IV. Building a Comprehensive Smart Sports Service System in Universities

4.1 Elements of smart sports service system

4.1.1 Smart Sports

"Smart sports" is built on the basis of "smart campus" subfunction module, with the Internet of things for technology, through all kinds of sensors, sensor network and radio frequency identification device for comprehensive cognition of school sports behavior, and the use of cloud computing and perception of information processing and analysis, the sports teaching, physical competition, physical health test, sports community, venue management, sports equipment management to make corresponding decision support(Zhu, 2023).

4.1.2 University sports service

On the basis of the concept of university sports services, the author by consulting Wuhan institute of sports humanities experts, and organize the consulting information, the definition of sports services in universities as: "through the existing teachers, stadiums, facilities and rules and regulations for students and other personnel to provide sports teaching, extracurricular sports, sports environment three aspects purposeful, organized and planned sports services". Lu (2003) wrote in the sociology of Sports: " university sports is an important part of physical education and university education in China, and it has the characteristics of education and humanities. The development of physical education service in universities plays a positive role in promoting the establishment and development of national education service and sports, improving the quality of physical education, enhancing the popularity of universities and universities, improving the quality of their education, and accelerating the development of industrialization and marketization of universities "(Chen & Liu, 2020).

4.1.3 Smart sports resources

Focusing on the current situation and development trend of smart sports resources, it mainly covers the application of smart sports equipment, smart stadium operation, smart sports service platform and other aspects. With the rapid popularization and development of Internet information technology, the enrichment of smart sports resources provides an important support for the smart of physical education services in universities(Li & Zhang, 2022).

Within the scope of universities, the innovation and exploration of smart sports resources are also constantly seeking breakthroughs.

(1) Online sports classroom. Yang and Dong (2002) proposed the application of dynamic network development technology (ASP) and background database to design the "online sports classroom" in universities.

(2) Sports information teaching reform. Dai (2017) proposed to carry out the construction of sports micro-course resources based on sharing, openness, teaching and security; Yang and Tang (2017) proposed to construct the SPOC teaching cloud platform with QQ, WeChat and Tencent video as the core.

(3) Smart sports platform. Based on NET technology, Southwest Jiaotong University has built a university sports information service and management platform, with a total of 18 sets of subsystems, including venue management and financial management (Wei & Liu, 2016). Qiu and Liu(2015) proposed that the construction of smart sports should establish a framework of four "comprehensive" (perception, control, intelligence, participation), three "support" (Internet of Things, cloud computing, big data), two "fusion" (data, platform) and one "application" (ubiquitous application).

(4) Mobile APP. By December 2019,500 universities, including Hubei University of Economics and Wuhan University of Technology, had successively implemented the "Trail Music Run" APP for pilot service.

4.2 The influence of smart sports service system in universities

The smart sports service system in universities has a profound influence on the future development of university sports teaching

(1) Promote the smart upgrading of sports venues and scientific management. smart devices are used to manage

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people entering and leaving the stadium, and a reasonable safety accountability system is formulated to effectively protect the safety of individuals and school property.
(2) Promote the smart upgrading of physical education classroom, and realize the cross and complement of online and offline teaching. The smart upgrading of physical education classroom can effectively integrate the teaching advantages of online and offline physical education, make physical education classroom more flexible and changeable, and also play a certain role in sharing teaching resources, promoting teacher-student communication and improving teaching effect.
(3) Promote the application of sports smart wearable devices to achieve smart sports monitoring and evaluation. In physical education class, smart wearable devices are used to conduct real-time dynamic monitoring and collection of students' exercise intensity and load in class. Then, through data sorting and analysis in the later stage, scientific evaluation of students' exercise effects in class is carried out, and at the same time, it lays a foundation for students to develop personalized training programs and reduce sports injuries.
(4) Promote the renewal of PE teachers' teaching concepts and keep pace with The Times. With the advent of the era of artificial intelligence, physical education teachers should adapt to the changes of The Times, constantly strengthen their own theoretical learning and practical operation ability of information technology, optimize their own knowledge system, and prepare themselves for the development of smart sports.

V. Discuss the development of Smart Sports in Universities

5.1 Optimize the smart environment and sports culture physical education service in universities

The establishment and optimization of the smart environment of university physical education service is the premise of the smart development of university physical education service(Gong & Liu,2022). Universities increase financial investment to support and guarantee the supply, maintenance and use of hardware and software related to the application of physical education information technology, and realize the upgrading of sports venues and teaching venues and various technical software; Actively advocate the cultivation and dissemination of smart sports culture in the school, and actively participate in the leadership of university sports work, staff, front-line teachers, and student groups to fully realize the convenience, efficiency, and precision of university sports education services(Murray, N. B. et al., 2020).

5.2 Developing smart curriculum and teaching innovation

Public physical education classroom teaching is the core of university physical education service(Li et al., 2023). Relying on the development and application of sports project smart curriculum resources, it is an important method to innovate the new model of smart sports teaching. Based on the existing open course, micro course, flipped class, MOOC, private course (SPOC) and other course forms, the innovative development and application of school-based curriculum resources for sports events are carried out.(Ye, 2018).

5.3 Building a smart sports service platform for universities to jointly build and share sports big data

Through the smart sports service platform in universities, the extension of in-class sports teaching can be realized and learning exchanges and sharing can be promoted. Organize extracurricular sports activities and competitions in a wider range, more convenient and more standardized, and enrich the campus sports and cultural life. In terms of content, it mainly includes campus sports information service, sports curriculum and score inquiry service, sports association management service, sports venue booking service, physical monitoring, scientific fitness and so on. In terms of functions, social platforms such as campus sports official wechat, QQ and Wechat are mainly used to integrate and penetrate and coexist and complement each other, creating an integrated and comprehensive campus sports mobile platform to realize multi-dimensional discussion and learning between students and teachers, and multi-channel communication and sharing between students and students. In terms of operation mode, appropriate introduction of social resources to carry out effective school-enterprise cooperation, and jointly commit to the continuous operation and management of university smart sports service platform(Nguyen & Le-Tien, 2021). Through school-enterprise cooperation to build, share and guarantee the sustainable operation of university sports intelligence service platform.

5.4 Building the smart management system of physical health

Centering on the national physical fitness testing work of university students, with the statistics, analysis and sorting of the actual physical fitness testing data of university students as the core, and with the in-class physical education course learning and extracurricular sports activity data of university students as the reference, the smart management system of physical health in universities is constructed to realize the sharing, flow and smart analysis of physical health information of students, and promote the self-improvement of health management level of university students(Chen & Yin, 2022). Through the physical health smart management system, the school understands the dynamic development of the physical health level of the whole school students, realizes the dynamic evaluation of the development and use of teachers' curriculum resources, and effectively evaluates the efficiency of students' physical activities in and out of class, providing an important reference for the strategic development of school physical education work.

VI. Conclusion and prospect

In the era of information intelligence, physical education teaching is no longer a single construction of teaching content, the creation of teaching activities, more is the use of smart teaching technology and teaching equipment, highlight the main learning status of students in the classroom, stimulate the subjective initiative of students to participate in learning. Follow-up studies should further strengthen the necessity and

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feasibility demonstration of smart physical education in universities, constantly improve and optimize the smart physical education teaching mode in universities, conduct in-depth and effective studies in the aspects of introducing social forces, improving school conditions, and enhancing curriculum experience, and actively explore new business forms and models of the integration of university sports and information technology. In order to provide theoretical reference for the improvement of smart physical education in universities.

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