

On the intelligent construction of sports information system in colleges and universities in the post-epidemic era

Jinlian Wang^a, Lili Wang, Hanqing Zhao

School of Beijing Jiaotong University, Beijing100044, China;

^abjtu_wangjl@163.com

Abstract. The traditional physical education teaching and management mode in colleges and universities can no longer meet and adapt to the needs of the new round of physical education reform with the increasing popularity of "smart campus" today. Reference to common standards of wisdom campus for state construction, build a set of classroom teaching in colleges and universities, physical testing, extracurricular exercise, sports competition, venue booking five campus sports information system of the business, to explore the development of intelligent tutorship, intelligent clock in extracurricular exercise, intelligent sports competitions, such as smart meter wisdom sports teaching management and service functions, Straightforward the working ideas, optimize the education model, and revitalize the campus resources, so as to realize the work requirements of "church, practice and often competition" for school sports under the teaching concept of "student-centered", comprehensively improve the quality of campus sports teaching and reshape the connotation of campus sports culture.

Keywords: Campus Sports Information System; Wisdom Sports; Extracurricular Exercise.

1. Introduction

At the beginning of the 20th century, with the development of computer technology and Internet, Chinese colleges and universities began to popularize the campus information construction based on educational administration system. At the beginning of the 20th century, with the development of computer technology and Internet, Chinese colleges and universities began to popularize the campus information construction based on educational administration system. Since the 18th National Congress of the Communist Party of China, informatization has become a national strategy, and Chinese educational informatization has ushered in a major historical development opportunity. The data in 2013 shows that the construction of information application systems in all colleges and universities has started, basically covering teaching, scientific research, management, logistics support and other aspects. The data in 2013 shows that the construction of information application systems in all colleges and universities has started, basically covering teaching, scientific research, management, logistics support and other aspects. Smart applications under new educational concepts such as flipped classroom and smart learning have successively become hotspots in modern education research and practice on campus. In 2018, the Ministry of Education issued the "Education Informatization 2.0 Action Plan", which further promoted the overall evolution of my country's education to a smart form. From the initial informatization construction of the campus to the development of intelligent comprehensive informatization, "smartization" has become a representative feature of the deepening reform of modern campus informatization.

Physical education has always been an indispensable and important part of higher education personnel training. Many departments of the state have issued policies year after year, and have more and more clear requirements for campus PE work. In 2020, the Central Committee of the Communist Party of China and the State Council jointly issued the "Opinions on Comprehensively Strengthening and Improving School PE Work in the New Era", requiring school physical education to implement "teaching, diligent practice, and regular competition" to achieve multi-dimensional comprehensive coverage in class, after class, inside and outside school. However, the slow development of campus PE informatization construction is a shortcoming of modern campus informatization construction. In the classroom teaching, extracurricular exercise, sports competition and physical fitness test which are four aspects of campus PE business work, usually, classroom teaching and physical examination

are independent information systems, data are incompatible and resources are not circulated; Extracurricular exercise and campus sports competition informatization "zero" construction, stay in the state of manual text, unable to implement efficient and convenient modern campus management. Due to the lack of effective supervision methods, most of the school's extracurricular exercise work has never been able to be specifically deployed. Various sports competitions on campus are in a state of loose self-organization. The school's physical fitness testing work only has evaluation without intervention, and follow-up services and management are seriously lacking. Physical education is less assisted by modern information-based educational technology, and the traditional teaching thinking of "teaching as the center" is widespread. When the pandemic suddenly came in 2020 and the teaching of all subjects was turned online, most school physical education classes were completely suspended because there were no conditions and preparations for online classes. The epidemic fully exposed the weak foundation of PE informatization in smart campuses.

Although Zhou Yong put forward the design concept of an intelligent sports teaching system based on Web architecture as early as 2002, and in 2005 Wei Yadong and others summarized the role and significance of using campus network to build a campus sports teaching platform, however, at present, the actual informatization construction of campus sports in China is still basically in the basic initial stage, and the application level is more in the initial stage. The vacant informatization construction foundation, the backward traditional management model, and the overworked teachers face the numerous aspects of PE work, and it is difficult to carry out the teaching reform in depth, and campus physical education can no longer meet and adapt to the new round of physical education reform. Promote the comprehensive construction of campus sports informatization in my country, build a central data system, realize data communication and sharing, in-depth development of intelligent management and service functions, straighten out work ideas, optimize education models, revitalize campus resources, and make up for this shortcoming in smart campuses, It is an imperative and urgent task.

2. Overview of the development of smart physical education

With the emergence of a new generation of information technologies such as mobile Internet, big data, and cloud computing, "wisdom sports", as the development direction of sports informatization, is becoming a model for the integration of sports and technology.

Since the preparation of the 2008 Beijing Olympic Games, domestic sports practitioners have a new level of understanding of the utilization of sports information resources. In 2010, Chen Xiaofeng put forward the value positioning of sports public service platform, and realized the functional concept and organizational operation mode similar to "service supermarket". In 2014, Hubei Sports Bureau was the first to launch the "Go Sports" national fitness public service platform, which mainly serves the booking of sports venues. In 2016, the outline of "Healthy China 2030" plan was issued, and national fitness gradually occupies an important position in the national top-level design, further promoting the integration and innovation of emerging technologies such as artificial intelligence, big data, Internet of Things, search engines and online services in the field of sports. Through the use of personal wearable intelligent sensing products, the laying of various data acquisition equipment in sports venues, as well as the information construction and intelligent transformation of various sports life or e-commerce trading platforms, news media and event platforms with mobile Internet as the main body, It has greatly improved the management and service level of competitive sports, sports industry, mass fitness, physical education and other sports fields, and changed the sports lifestyle of the people.

As long as they have sports software and mobile terminal equipment, individuals can obtain convenient sports services. As the development direction of sports informatization, "smart sports" is becoming a model for the integration of sports and technology. For example, with the development of TV media to Internet media and mobile Internet media, more and more people watch sports events through web pages and mobile APPs. In April 2019, the CBA finals were broadcast live in VR for

the first time, allowing many users to watch sports in the field. China's first running software with GPS positioning technology, Codong, uses intelligent technology to create an all-round sports ecosystem, "making sports no longer lonely", and has now developed into the world's largest sports social and event service platform with over 100 million users. During the epidemic in 2020, Keep, the largest online smart exercise platform in China, provided people with thousands of online videos of fitness exercises with a wealth of home exercise methods for people who were isolated at home, making a large number of sports and fitness enthusiasts turn to online and offline collaborative fitness.

3. Connotation and characteristics of campus intelligent sports system platform

A comprehensive service platform for campus sports that highlights the function of intelligent sports teaching. The main business of campus sports in colleges and universities, classroom teaching, physical fitness testing, extracurricular exercise, group competition, and venue reservations, are integrated into the information management system at the same time, and intelligent management transformation is carried out to reshape the functions of campus sports business. Use information technology to carry out all-round linkage and support for teachers and students' teaching and learning in and out of class, in and out of school, from teachers' class sign-in, courseware production, statistical homework, to guiding students to use fragmented time for self-exercise management, participating in every physical activity such as sports competitions is an essential tool for physical education teachers and students in every college and university.

Show the freshest campus sports culture platform. Various sports carried out on campus, through the platform's "communication", "sharing", "display" and other functions, in the form of news, notifications, push, related links, etc., are broadcast from the widest angle and the first time. On the platform, students can "take a photo" of their own exercise video, or enjoy a wonderful game in a certain sports competition on campus. It has rich forms, forms the unique sports culture of each college campus, and becomes a new platform for the inheritance and dissemination of campus sports culture.

Is the campus sports enthusiasts exchange learning platform? The teaching courseware videos of campus sports and sports competition results videos can be collected, classified and shared on the platform. Through the platform's "course selection", "club recruitment", "competition registration", "peer invitation", "consultation", "exchange" and other functions, the platform will be open to enthusiasts on an equal footing. Promote the personalized teaching interaction between teachers and students, increase the physical exercise atmosphere for enthusiasts, and promote students to form independent "wisdom exercise" mode.

The most comprehensive student "big health" data repository. Bringing together several major sports data resources such as sports classes, physical fitness tests, extracurricular exercises, sports competitions, and daily dynamics of campus students, and then integrating students' "physical examination records" and "mental health" data resources, a unique "big health" on campus can be established. The data resource library escorts students' scientific sports and healthy life.

4. Intelligent construction of college sports information system

4.1 System construction ideas

Campus sports information system construction depends on the wisdom of campus resource base and the current cloud computing, mobile Internet technology, with satisfying the needs of sports teachers and students' sports activities as the center, planning and design of each module content services, based on principles of resource sharing, equality and open, make sports resources own hematopoietic mechanisms, integration of online and offline sports resources, establish sustainable development of campus sports ecosystem.

4.2 System development methods and main implementation technologies

Referring to the General Framework of Smart Campus issued by Standardization Administration in 2018, the system development adopts national general standards. Iterative development method based on RUP and Springboot microservice architecture, functional separation, independent operation, testing during development, framework first and then supplement refinement, reduce project risk. In the JAVA development environment, jdk1. 7+ is equipped with eclipse3.7, which fully meets the implementation specification of servlet2.4+ deployed in j2ee1.4. The platform is based on the general service-oriented SOA architecture, using Apache CXF as the data integration and sharing method, which can be flexibly deployed and highly compatible. Using HTML5 network standards, front-end Nginx coupling back-end Mysql Web deployment, Tomcat7.0 as a Web application server, high load, scalability and good interaction, strong security. Network performance optimization technology, based on the browser/server structure mode, using GZIP compression technology, cookie browser caching technology, memcache\Redis caching technology, nginx+Tomcat server dynamic and static separation processing technology, support convenient multithreaded network delivery. The entrance is integrated into the smart campus platform to ensure timely response to large traffic.

4.3 Overall system framework

The construction of campus sports information system is mainly a process of collecting, integrating, mining and reapplying various sports data. The system platform can be functionally divided into five levels of architecture: portal entry, functional business, data, transmission and perception. Access rights to the corresponding to different operating different role and function area, the function of the mobile terminal into the simple operation interface, PC can be installed into the function of multi-level and backend configuration interface, the existing campus informatization infrastructure and application system, on the basis of through perception technology such as RFID, GPS, camera to collect data, mobile Internet technology for data transmission, Based on the intelligent application of various sports business, it realizes the identification, transmission, storage, processing and control of all kinds of sports information on campus, establishes the Campus sports Internet of Things and mobile learning network, and becomes the campus sports intelligent support platform aiming at adaptive and personalized user interaction. The overall framework of campus smart sports system is shown in Figure 1.

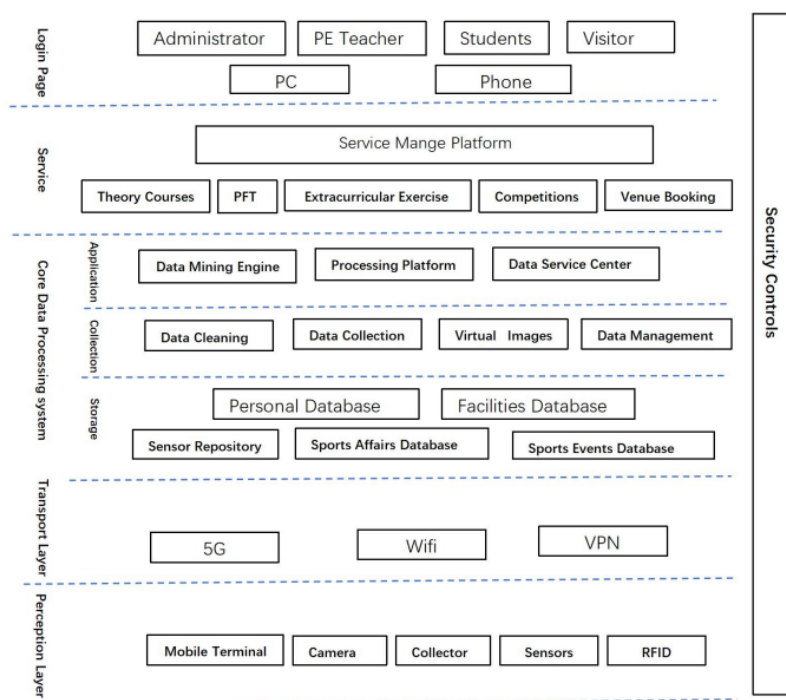


Fig.1 General Flowchart of Intelligent System in Campus Physical Education

In the portal entry layer, the server architecture design of adding wireless interfaces to PC and Web applications is adopted, and the Web application is used for PC access and the REST interface is added to the Web application for APP access to support mobile devices. At the functional business layer, five basic business management and services of campus sports are developed in parallel on the platform, including the offline and online teaching functions of teaching classrooms, the entry and statistics function of various results of physical tests, the function of punching cards for extracurricular exercises of each sports project, and the functions of various The functions of campus sports competition registration and score entry, and the reservation function of various campus activity venues, each part of the function can be added and refined, and can be deleted and reduced. The transport layer builds a private network to ensure the reliability, security, and stability of data transmission. The perception layer uses information collection equipment suitable for sports activities and sports venues. Different sports have different usage methods and specifications.

Data security comes from the stable operation of the system and the data traceability mechanism. From data collection, transmission to storage, a standardized operation system is established to ensure protection.

4.4 Standardized management process of campus sports business

At present, there is no unified standard norm for the campus smart sports system, and it is difficult to carry out unified campus sports resource management, resource release, and resource application. Therefore, this system platform needs to build a set of standard systems to deal with the basic business of sports. Realize the integration of various sports data resources on campus. First, merge the two major businesses of classroom teaching and physical fitness testing, which are separate systems, and then establish two major information systems for extracurricular exercise and sports competition through management procedures, and clarify the sports business data. The resource collection methods and standard requirements, the standardized management process of the four main businesses of campus sports are shown in Figure 2:

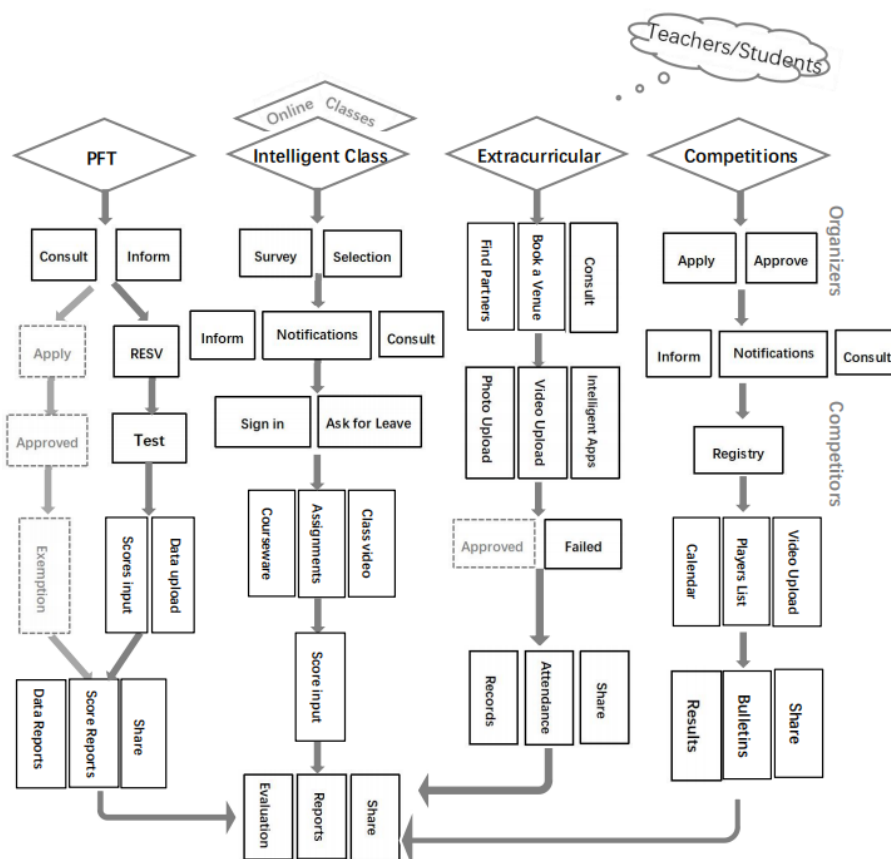


Fig.2 Standardized Management of Campus Sports Affairs Flowchart

It is guided by the goal of improving the physical health of students, comprehensively improving the quality of campus physical education, realizing classroom teaching, extracurricular exercise, sports competition, physical examination, comprehensive supervision and evaluation, and the whole process of interactive campus smart physical education teaching management and service system. Open smart sports classrooms, realize online sports live teaching, and simultaneously broadcast online at the same time as teaching in the venue, support video recording and video playback of classroom teaching. Teachers can make, share and save short video courseware, and upload, classify and count students' extracurricular exercises in the form of homework. The hardware of the original independent physical fitness test system is wirelessly connected with this system, so that the test data can be transmitted in real time, which can completely replace the functions of data recording, statistics and reporting of the original system. Extracurricular exercise is a new system. It utilizes the pictures and videos taken by students during extracurricular exercise combined with various positioning technologies of mobile phones to develop a real-time check-in method for extracurricular exercise of various sports items, form sports data resources for extracurricular exercise on the platform, classify statistics, and develop a platform Interactive function, enhance the interaction between teachers and students, students and students. Sports competition is a new system. The competitions at all levels of various sports events on campus can be realized through the platform, from organization, notification to registration and participation, results announcement, and news release. The competition order table is developed by project, and each project competition can be carried out through video capture equipment. Collection and classification of videos, sharing and display of resources of various sports events on the platform.

4.5 Intelligent function modules of the system

Through several major business processes, gather all campus sports resources, establish a campus sports resource library, use data analysis technology, explore and develop intelligent functional modules, analyze and reuse data, and provide comprehensive monitoring of students' sports activities during school. Exercise information and coaching advice to guide and urge students to establish good exercise habits.

4.5.1. Intelligent learning guide system

Before class, teachers systematically evaluate the students' initial sports conditions, arrange teaching methods and design teaching plans according to the initial conditions of students, and carry out targeted teaching in grades or groups. Students enter the system through a questionnaire survey and will be pushed the information matching the platform; With the accumulation of data on the platform, students can obtain personal physical fitness and sports status report, and have the guidance of suitable sports mode and information push; Also through consultation, communication, search, take the initiative to understand the relevant sports course introduction, campus sports activities and news, sports competition notice, sports learning materials, etc. Let the students with poor sports condition get special attention and help.

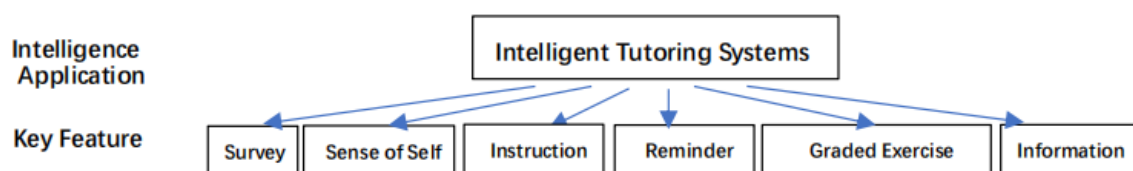


Fig.3 Intelligent Tutoring Systems (ITS)

4.5.2. Intelligent after-school exercise registration system

Using the mobile phone shooting function, face recognition technology, positioning technology, etc., to realize the recording and anti-cheating functions of students' extracurricular exercise, it can realize the functions of self-exercise check-in, timing, picture and video uploading and other functions

for all in-class sports. And bring together social, recording, sharing and other functions to make extracurricular exercise a part of students' campus life. Before exercising, you can make an appointment to find a partner. When exercising, the sign-in location can automatically match the group friends. After exercising, you can share it to the sign-in group and check the group friend's dynamics at any time. Record this function, write down your goals, compare your exercise files, and record the process of achieving your goals. When performing self-exercise with physical examination items, using smart items APP, such as sit-ups, recording action videos according to voice prompts, can give voice prompts for correct actions, generate scores, and diagnose errors and norms for actions.

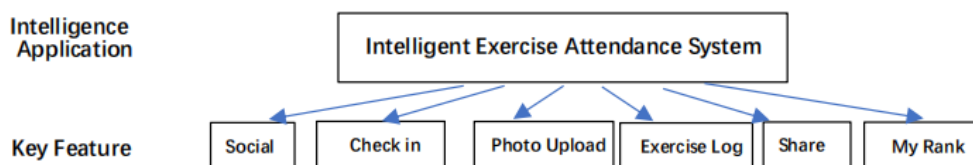


Fig.4 Intelligent Extracurricular Exercise Attendance System

4.5.3. Intelligent competition system

Students can initiate and organize sports competitions by themselves. Students can "register" to participate in the competition, and the system will generate "registration book", "order book" and "press release". The uploaded video of the competition can be "pushed" and "shared" to relevant students and teachers. All sports on campus at all levels, the range of sports contest can be initiated by any students, group organization, after review, push the related notification made by the students and teachers, register through the game information, video games wonderful game can be real-time or recorded in the form of share and save, the results of the competition will be displayed in the form of news and popularization.

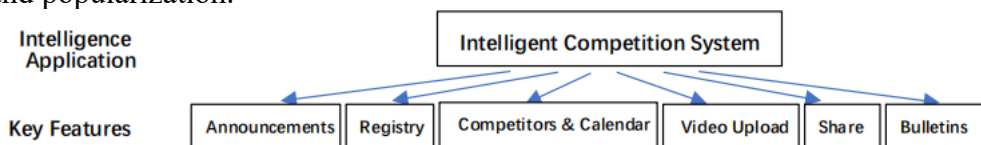


Fig.5 Intelligent Competition System

4.5.4. Intelligent evaluation system

Teachers conduct various sports tests for students, and then they can enter scores and generate evaluations; students can also monitor exercise load at the same time by wearing motion sensing equipment. The system integrates five data resources of classroom, physical examination, extracurricular exercise, sports competition, and daily dynamic data for comprehensive analysis. Each part has an exchange and consultation platform for teacher-student and student-student communication, which is an evaluation system for the whole process, immediate feedback, and teacher-student interaction.

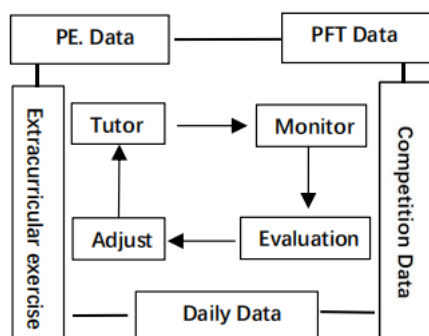


Fig.6 Intelligent Evaluation System

5. Conclusion

The wisdom of campus sports information system is to build a one-stop comprehensive management service platform for campus sports business, to create a simple and convenient campus sports teaching tool, and to build a rich and fresh sports resources library. The paperless office and power system, make the campus sports workers from the limitations of the traditional solution, make the students learn to use the discrete time dynamic, fully mobilize various resources development of campus sports, improve the conditions of sports teaching environment, "to learn as the center" the wisdom of the sports teaching way gradually rise, campus physical education teaching quality is improved, The sports culture is being reshaped on campus, and the vitality of campus sports is rejuvenating in the new era of reform and development.

With the promotion and construction of campus sports wisdom system, it will bring a series of changes and innovations to campus sports, promote school sports to improve work management efficiency and decision-making level, promote educational fairness, and make school sports keep pace with the development of ordinary colleges and universities in the future.

Acknowledgments

This project is supported by the Special Fund for Humanities and Social Sciences of Beijing JiaoTong University, Notation: 2021JBWZ005.

About author: Wang Jinlian, born in Beijing in 1964, is an associate professor at Beijing JiaoTong University. Research direction: Intelligent sports.

Reference

- [1] Huang Huairou. Online course development Guide. Higher Education Press. 2010(9)
- [2] Zhu Zhiting. New development of smart education: from flipped classroom to Smart Classroom and smart learning space[J]. Open Education Research. 2016,22(01):18-26+49.
- [3] Huang Meiyi. Construction of intelligent campus system based on education cloud[J]. Modern Educational Technology. 2013,23(02):109-114.
- [4] Smart campus overall framework[S]. GB/T 36342-2018,
- [5] Yang Xianmin. The development problem and breakthrough path of educational artificial intelligence[J]. Modern Distance Education Research. 2018(03):30-38.
- [6] Chen Qing. Research on the Construction of University Smart Campus System for Big Data[J]. Software Engineering. 2019,22(08):34-36.
- [7] Han Song. Thinking on constructing Smart Sports in China based on mobile Internet[J]. Sports Science Research. 2016,20(03):36-42.
- [8] Xie Yuhang. Research on the overall structure and key technologies of smart sports[J]. Contemporary Sports Technology. 2016,6(25):177-179.
- [9] Jiao Chengsheng. Analysis on application of smart APP mode in the development of Smart Sports in colleges and universities[J]. Sport Science and Technology. [2017,38(02):147-149.
- [10] Chen Jin. Smart sports platform construction scheme under the background of "Internet plus"[J]. Journal of Nanjing Sports Institute. 2017,16(03):125-130.
- [11] Zhang He. The practice of university SPORTS informationization construction based on "Internet +" mode[J]. Sport Science and Technology. 2018,39(04):158-160.
- [12] Li Bo. Analysis and Management mode construction of follow-up service of College students' physique test[J]. Journal of Guangzhou Sport University. 2019,39(02):119-122.
- [13] Gao Yajie. Discussion on wisdom teaching of physical education in colleges and universities under "Internet +"[J]. Journal of Hubei Normal University (Philosophy and Social Sciences) 2019,39(05):124-126.

- [14] Gao Song. Research on development trend of intelligent PHYSICAL education Teaching environment construction[J]. Journal of Guangzhou Sport University. 2019, 39(04): 121-124.
- [15] Wu Jian. The whole thinking and construction of Chinese school SPORTS intelligence system[J]. Journal of Sports Research. 2020, 34(03): 40-46+94.