



Intelligent Exploration of College Stadiums Under the Background of “Internet+”

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Abstract. With the continuous development and maturity of Internet technology, the concept of a “smart planet” “Internet+” has gradually matured, in which healthy China and smart sports play a vital role. After selecting the research direction, centering on the content direction, relevant materials are inquired to study the reform direction of the project in recent years. By searching, analyzing, and summarizing related research, this paper summarizes the definition, principle, origin, development, characteristics of virtual simulation technology and the research status of this technology in the field of college sports. This paper fully exploits network resources, builds an intelligent framework for college stadiums, and uses intelligent means to innovate in teaching processes, teaching methods, performance evaluation, venue use, and sports monitoring. The study concluded that, the construction of smart stadiums and smart sports classrooms is a beneficial exploration of the intelligent reform of college stadiums.

Keywords: “Internet+” · college stadiums · deep integration

1 Introduction

The “Catalogue of Sports Stadiums and Facilities in Colleges and Universities” issued by the Ministry of Education clearly stipulates that the construction of college stadiums includes places and necessary device facilities that meet the basic requirements of teaching and research. The scientific management of college stadiums is particularly important for effectively guaranteeing physical education and improving the physical quality of college students. At present, there are prominent contradictions in the actual management of sports stadiums in colleges [1]. On the one hand, venue resources are lacking, popular stadiums are difficult to preserve, and the data is chaotic. On the other hand, the utilization rate of some stadiums is low, and idle equipment causes great waste. On-site facilities have problems such as a low degree of intelligence, a low degree of openness and sharing, and a low degree of scientific management.

The impact of COVID-19 on teaching in 2019 has accelerated the growth of online education. Most theoretical courses have gradually changed their teaching modes. Online live broadcast platforms and MOOC courses complement theoretical courses well. Teachers have accumulated a certain amount of online teaching experience based on their own course characteristics [2]. However, due to the specialty of the curriculum

and the particularity of the guarantee, the teaching guarantee tasks based on the college stadiums have not been carried out effectively. In the spring of 2022, COVID-19 made a comeback. Combined with the previous prevention and control experience, the government quickly took measures such as suspension of classes, community silence, physical isolation, and reduction of social contact [3]. In the spring of 2022, the new crown epidemic came again. Combining the previous prevention and control experience, the government quickly took measures such as school suspension, community silence, physical zoning, and limiting social contact. However, how to deal with the physical isolation of campus and the isolation of teachers and students at home? How to deeply optimize and reconstruct physical education teaching on the basis of online and offline integrated teaching, how to realize scientific and intelligent management of colleges, and explore the scientific path of combining venue management with informatization and intelligence have become particularly important [4].

2 Research Methods and Objects

The research object is the informatization construction and application status of college stadiums. The research methods are literature methods and expert interview methods, through information resources such as CNKI and Chongqing VIP, we reviewed relevant literature on the theme of “university sports venue management”, “intelligent management platform” and “Internet plus”, Interview with university sports venue management departments and university informatization experts, and combined with the problems and special attributes of university sports venue management, to analyzes the problems to be solved in this study, and lays a certain theoretical foundation for this study.

3 Misunderstandings in the Application of Informatization in College Stadiums

To promote students to actively participate in physical exercise, develop the habit of regular exercise, and improve students’ self-care ability and physical health, college stadiums are the most basic environmental support. In the context of the prevention and outbreak of the epidemic, many venues, such as badminton courts and sports fields, have become nucleic acid monitoring points, temporary personnel placement points, or storage sites for epidemic prevention materials, in addition to ensuring normal teaching tasks [5]. However, colleges and universities also face many problems in the management of various venues and the application of information technology.

3.1 Low Level of Intelligent Management of Stadiums

Relevant data show that, at present, colleges and universities do not have dedicated sports venue information websites. It usually appears as an affiliated page of the teaching and research support department or an independent website module [6]. The publicity of the events in the venue also adopts the method of posting posters and distributing brochures, which makes the publicity of the events less influential and time-consuming. Although

the Internet of Things (IoT) technology and informatization applications have been applied to teaching, logistics and other management in colleges and universities, they have not been widely used in the management of stadiums. At present, the management of sports venues in colleges and universities is mainly based on human management. In addition, most managers are held by logistical staff or temporary workers, lacking professional management knowledge [7]. The lack of effective cooperation among various departments has brought difficulties and burdens to the management of stadiums. There is not enough understanding of software applications as the key to the construction. At present, college sports venues pay attention to the construction of hardware facilities, making the information service belongs to the original extensive type.

3.2 Unclear Intelligent Thinking

Many managers limit the intelligence of stadiums to the intelligence of management equipment or the informatization of physical education equipment. For example, there are many LED electronic displays, accessible check-in equipment, and physical fitness testing equipment in stadiums, but all kinds of data are collected independently, and there is no data connection and sharing. In teaching, for example, using VR technology to build a virtual simulation environment and using virtual reality technology to carry out physical education can replace taekwondo, weight-bearing obstacles, and other sports that have their own training risks [8]. However, it must be recognized that these virtual simulation environments cannot achieve the same conditions as reality. When wearing this bulky gear, individuals have less control over their bodies, potentially resulting in movement distortions. Now, physical education in colleges and universities has begun to actively explore the transition to “Internet+ education”. The offline teaching originally carried out in stadiums has also begun to actively try various online teaching, but offline teaching has not effectively changed the physical health status of college students. Most of the students suffered from poor strength quality during the isolation period due to a lack of exercise equipment and lack of supervision and good exercise habits [9].

3.3 Lack of Intelligent Software Management

The level of information management of sports venues in colleges and universities mainly depends on the intelligence of the management software. At present, there are problems such as imperfect intelligent platform construction, imperfect software and hardware facilities, and a lack of professional talent resources. The main function of college sports venues is to meet the main purposes of teaching, scientific research, teacher-student competition, large-scale conferences, and daily training of various sports teams. The daily management of sports venues in colleges and universities is complicated. It is necessary to abide by the relevant regulations of the venue management and make corresponding adjustments in special circumstances. Physical education classroom teaching, physical fitness assessment, extracurricular sports monitoring, venue management platforms and other data are relatively independent, lack of teaching and training standards cannot support an organic and unified physical education curriculum. In the daily support services of venues, the current information technology has not achieved a good connection between on-site services and user needs, and the information generated by venue users

has not been effectively analyzed and integrated. As a result, it is impossible to accurately promote resource information and demand services [10].

4 Construction of Intelligent Framework for College Sport Venues

4.1 The Application Framework of Intelligent in Colleges' Physical Education

The promotion of online teaching provides a platform and opportunity for the exploration and application of information-based teaching. Online teaching has irreplaceable advantages. It has relative advantages in breaking through time and space constraints, virtual teaching and reading digital resources. Teachers and students can combine these advantages in teaching and learning, such as strengthening the sports process, carrying out sports injury research, performing full-cycle fitness monitoring, establishing and improving the large curriculum concept system for physical education teaching, and optimizing teaching results [11]. In 2021, the Ministry of Education of China issued the "Notice on the Pilot Construction of the Virtual Teaching and Research Offices", opening a new chapter in the construction of grassroots teaching organizations based on the Internet. Physical education has the characteristics of combining reality with reality, changeable locations, and dispersing personnel, which conforms to the construction principles of cross-integration and dynamic construction of virtual teaching and research offices. Therefore, the exploration of new physical education teaching models should be supported by the conditions of virtual teaching and research offices, which supports the full life cycle before, during, and after class, and is supported by a comprehensive evaluation system [12].

- Remote online teaching. In remote teaching, the teaching videos can carefully analyze sports technical movements, such as golf, martial arts, sailing, and ball sports. Students can quickly become familiar with and master the movements. Space and time constraints can be broken through to watch or replay slowly. In confrontation training, one can simulate the opponent through VR technology, simulate the opponent's moves and routines, improve the probability of winning the actual combat, and at the same time avoid the possible damage in the combat movement. When students are at home, they can also strengthen their physical exercise and improve their physical fitness through online video, VR sports and other methods.
- Online interactive innovation. During the epidemic prevention and control period, online physical education can adopt the teaching methods of virtual reality, MOOC + SPOC, recording and live broadcast. In addition to disseminating and promoting knowledge internalization, students' independent thinking and exercise ability should be stimulated through multi-channel, multi-dimensional and multi-threading. On the basis of watching sports action videos and the teachers' on-site explanation of the operation, students fully understand the learning objectives, exercise steps and precautions. Under the guidance of teachers, students carry out activities such as action learning, exploration and research, group presentations, etc., to fully mobilize students' autonomy and enthusiasm.

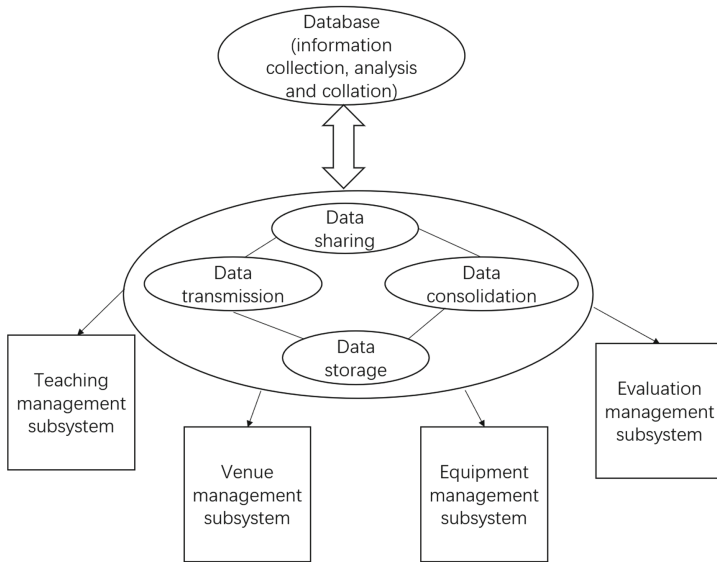


Fig. 1. The overall framework of data analysis

- Physical fitness monitoring assessment. Under the background of “Internet+”, the evaluation of physical education teaching and learning effect has shifted from physical examination to the online evaluation. The information-based and intelligent physical education teaching evaluation should overcome the defects of traditional experimental teaching that emphasizes results more than process, emphasizes theory more than practice, emphasizes examination more than feedback, and should pay more attention to the interaction and monitoring of the entire online process, such as teaching innovation, teaching atmosphere, students’ usual and classroom performance. The new physical education evaluation system transforms single scoring and supervision assessment into student and teacher portrait evaluation, by collecting various data in the entire teaching process, such as building a student physical fitness model and sports database based on big data collection and cleaning technology, [13] (Fig. 1).

4.2 The Overall Framework of Sports Venue Management System Under B/S Architecture

This research adopts B/S system architecture method. The system’s some data processing functions in B/S architecture are transferred from the client-side to the server. Client implementation is simple and convenient with simple system expansion; The client is generally maintenance-free, with low cost and convenient maintenance; The internal structure is easy to operate and has a friendly interface with high data security and good traceability. In the venue management system, there are many types of users and the use level of computers is quite different. Therefore, the information management system based on B/S architecture is more suitable for the needs of the college sports venue management system (Fig. 2).

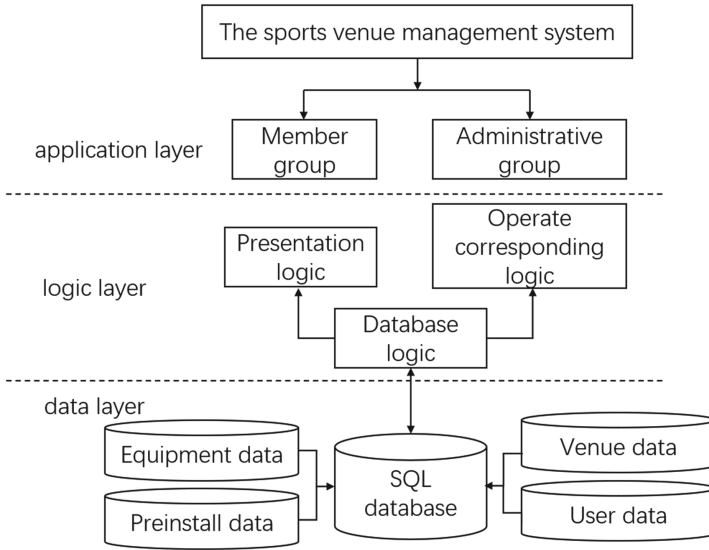


Fig. 2. The overall framework of sports venue management system under B/S architecture

- Database design. It is based on the realization of system functions, including database abstract concept design, data operation logic design, database physical structure design and database link design. Taking the database link design as an example, the database link design is the premise and basis for realizing the system data access. The ADO.NET class library can be used to realize interactive access to system data. ADO.NET provides various public methods based on data exchange and interconnection and forms different class libraries named Data Providers. The database link implementation code is as follows:

```

<connectionStrings>
  <add name="AchieveAssessSystemConnectionString1"
    connectionString="Data Source=. \ZJW;
    Initial Catalog=AchieveAssessSystem;
    Persist Security Info=True;User ID=sa;
    MultipleActiveResultSets=False;Packet Size=4096;
    Application Name=&quot;
    Microsoft SQL Server Management Studio&quot;;"
    providerName="System.Data.SqlClient"/>
</connectionStrings>
  
```

- System safety and reliability design. Data security is controlled by setting the permissions of system users, and double encryption design is adopted in the database design process. Data encryption management is a security encryption management that encrypts fixed data to prevent malicious system visitors from modifying data by obtaining system accounts. The system administrator maintains the whole system, such as recording the login and data operation of the management system user, modifying the password, database backup and other operations. The system user permission setting code is as follows:

```

<html>
<head>
<meta http-equiv="Content-Type" content="text/html; charset=gb2312">
<title> administrator login</title>
function MM_go To URL.arguments; document.MM_return Value=false;
for(i=0; i<(args.length-1); i+=2) eval(args[i]+"'.location=' "+args[i+1]+
""");
}
dim admin_name,admin_psw,rs_admin
admin_name=request.Form("admin_name")
admin_psw=request.Form("admin_psw")
Set rs_admin = Server.Create Object("ADODB.Recordset")
sql = "SELECT * FROM admin where admin_name='"& admin_name
&""&"and admin_psw='"&admin_psw&"""
rs_admin.Open sql,gym_conn,3,2
if rs_admin.eof or rs_admin.bof then
    'the administrator name does not match the password, prompting the adminis-
trator to set the error.....
    response.Redirect("adminerr.asp")
response.End()
else' administrator setup succeeded.....
session("admin_name")=rs_admin("admin_name")
response.Redirect("administrator.asp")
rs_admin.close
end if

```

4.3 The Application Framework of Informatization of Sports Venues in Colleges

With the continuous maturity of information technology, it is an important subject and task to carry out information transformation of existing stadiums. The most basic advantage of intelligent stadiums lies in the transmission and sharing of information. For example, the lighting control system, LED electronic screen, live screen, and management platform system all need to collect real-time information about the venue. Through network technology, storage, processing, and analysis are performed. In the context of the prevention and control of the epidemic, many college sports venues have temporarily become nucleic acid testing points, temporary resettlement points, or storage points for epidemic prevention materials. At this time, it is necessary to give full play to the role of the grid management platform of the stadiums, strengthen the inspection of open points, grasp the on-site operation and busy and idle statuses in time, respond quickly, and provide emergency support measures.

- Intelligent management of stadiums. IoT technology plays an important role in the intelligent management of stadiums. A platform for intelligent management and information sharing of stadiums can be built through RFID technology, wireless network technology, and big data management. The access control system monitors and feeds back the flow of people in the stadium in real-time to prevent safety accidents caused by overcrowding. The intelligent lighting system adjusts the venue lighting facilities according to the number of venues and the illuminance changes fed back by the access control system, reducing personnel troubleshooting and saving venue management and operation costs. Detailed information and project arrangements will be released promptly on the computer webpage or mobile apps. After logging in, personnel can grasp the arrangement and usage of each venue in real-time, and then adjust their activities and project selection, and choose free venues to participate in sports activities [14].
- Intelligent management of equipment. In terms of sports venues and facilities, we can consider introducing a variety of advanced intelligent sports equipment to attract more users to the stadium and build information-based stadiums in the “intelligent hardware+ app” model to realize sports stadium modernization. Using intelligent facilities, combined with user information collection, different sports scenes can be built in limited venues, creating multi-functional venues and improving the overall performance of the venues. Wearable devices can record detailed monitoring data, and then through the display, results and field rankings can be transmitted in real-time. Such intelligent value-added services can greatly improve the enthusiasm of students in sports. While improving the efficiency of site utilization, it also makes exercise no longer boring, promotes students’ exercise, and forms a virtuous circle [15] (Fig. 3).

5 Conclusion

Under the background of “Internet +”, the intellectualization of college sports venues is a new teaching guarantee model, which reflects the necessity and urgency of the combined utilization of network and sports venue resources and the application of the Internet + model to sports venue resource planning. Only by leveraging informatization

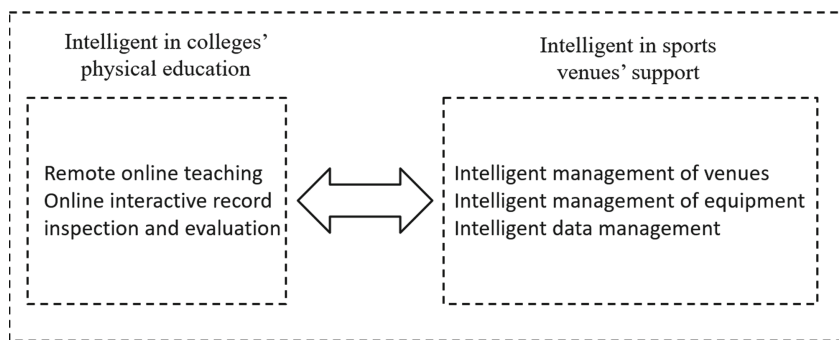


Fig. 3. The intelligent application framework of college stadiums

and intelligence and deeply integrating physical education courses with information technology can we promote the overall development of physical education in colleges and comprehensively improve the physical and mental health of students.

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References

1. Li Ruizhen. Research on Development and Countermeasures of Intelligent Sports in Public Sports Service System[J]. Sports,2017 (9):148-149.
2. Chen Dongmei Research on Intelligent Physical Education Teaching Scheme Based on 5G + VR Technology[J]. Industrial Innovation Research,2020 (14):171-172.
3. LiangZhiYuan. 5G + VR technology in the background of creating guest education in the vocational teaching attempt_Take the mold specialty as an example[J]. Science and Technology Economic Journal,2020,28 (30):187 + 186.
4. Wang Yali, Shi Chongyan. A Probe into the Development of School Physical Education in the Age of the Internet of Things[J]. Journal of Nanjing Institute of Physical Education (Natural Science Edition),2010,9 (2):128-130.
5. Yang Shuangyan and Zhang Hongmei. Research on the Informatization Development of School Physical Education Based on the Age of Internet of Things[J]. Heilongjiang Higher Education Research,2014 (4):73-75.
6. Liu Qiang, Cui Li, Chen Haiming. Key Technologies and Applications of the Internet of Things[J]. Computer Science,2010,37 (6):1-4.
7. Liu Yi, Li Hua. Thoughts on the Integration of Sports APP and National Fitness under the Background of "Internet +"[J]. World of Sport (Academic Edition),2019 (6):35.
8. Cai Xiaofei, Xie Yongli. The Informatization Reform of Physical Education in Colleges and Universities under the Background of "Internet +"[J]. Journal of Yancheng Normal University (Humanities and Social Sciences Edition),2018 (38):120.
9. Li Yang. The realistic predicament and management countermeasure of the development of sports in intelligent community in China[J]. Sports Culture Guide,2019 (6):40-45.

10. Wei Honglei, Liu Xu. Research on Informatization Management of Sports Venues in Colleges and Universities under the Influence of Institutional Barriers[J]. Contemporary Sports Science and Technology,2016,6 (24):113-114.
11. Liu Jie, Wang Qingyang, Lin Yilin. Mobile VR Application in 5G Network[J]. Telecommunications Science,2018,34 (10):143-149.
12. Zeng Xiaosong, Chen Bin, Li Wang, Wang Zhong. Research on Informatization Management of Sports Venues in Colleges and Universities: An Example of Informatization Management of Sports Venues in Shenzhen University[J]. Chinese School Physical Education,2013 (02):80-81.
13. Chen Jin. Under the background of “Internet +”, the construction scheme of intelligent sports platform[J]. Journal of Nanjing Institute of Physical Education (Natural Science Edition),2017 (16):126-129.
14. Han Xue, Wei Yingying, Jiang Yaxiu. The Design and Application of Intelligent Physical Education in Colleges and Universities[J]. Heilongjiang Science,2019 (10):70-71.
15. Shi Yanyan, Zhang Huimin. A Preliminary Study on the Entrance of Intelligent Physical Education into College Physical Education Classroom[J]. School Sports,2017 (30):110-111.

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