

Retraction

Retracted: Online Big Data Physical Education Classroom Based on Monitoring Network and Artificial Intelligence

Security and Communication Networks

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

In addition, our investigation has also shown that one or more of the following human-subject reporting requirements has not been met in this article: ethical approval by an Institutional Review Board (IRB) committee or equivalent, patient/participant consent to participate, and/or agreement to publish patient/participant details (where relevant).

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

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- [1] Y. Zhang and Y. Wang, "Online Big Data Physical Education Classroom Based on Monitoring Network and Artificial Intelligence," *Security and Communication Networks*, vol. 2022, Article ID 3643799, 7 pages, 2022.

Research Article

Online Big Data Physical Education Classroom Based on Monitoring Network and Artificial Intelligence

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The new ecology of monitoring network and artificial intelligence (AI) has injected new vitality into traditional education and brought new opportunities for the development of education. We implemented the online big data (BD) physical education classroom based on monitoring network and AI, as well as the integrated teaching practice of health data inside and outside the physical education classroom, built a practice model integrating data collection, data analysis, and data application, and explored its practical effectiveness using the literature method and mathematical analysis method. The results show that the practice can achieve data management of physical education courses, promote the improvement of students' physical health, achieve the purpose of real-time monitoring of students' independent exercise status, and achieve the goal of getting students out of the dormitory and into the playground.

1. Introduction

At present, the main basis for the construction and implementation of university physical education in China is the "Outline of Teaching Guidelines for Physical Education Courses in National Ordinary Higher Education Institutions" promulgated by the Ministry of Education, in which the nature, objectives, contents, methods, and evaluation of university physical education courses are clearly explained [1, 2]. However, the university physical education curriculum is confronted with the problem that college students' physical fitness levels are still declining and there are no data on extracurricular physical education. Through a series of policies and documents, we can find that monitoring networks and AI are changing the traditional teaching mode and will certainly promote the restructuring of the university physical education system, promote the computerization of

university physical education courses, and thus solve the dilemma faced by university physical education [3]. The integration of physical education classroom teaching and extracurricular physical activities is both an inevitable trend in the reform of university physical education in the new era and an inevitable choice for the effective achievement of school physical education goals [4], [5].

At present, BD technology has penetrated into various fields of economy, society, and culture and has a great impact on various industries [6]. Physical education in higher education is special in that it is closely related to social development and knowledge production. Promoting changes in physical education with BD as a grip is an important way to improve the quality of physical education [7]. Through literature analysis, it can be seen that there have been many studies on how BD technology can be applied to the field of physical education [8].

Canizo et al. [9] explored how to combine BD technology with physical education management system and analyzed the effectiveness of the application of physical education management system supported by BD technology [10]. In the field of practice, there is no shortage of practical cases of BD application in physical education curriculum teaching, employment [11], ideological and political education [12], monitoring and evaluation [13], and so on. For example, Nanjing University of Technology has applied data mining technology to innovate the management mechanism in four aspects of physical education enrollment, curriculum, teaching evaluation, and employment management [14].

At present, the scale of China's growth in physical education is developing rapidly and the number of students enrolled is growing rapidly, but the limited teaching resources, single teaching methods, poor communication generated by physical and temporal distance, and other unfavorable factors have posed unprecedented challenges to the teaching of physical education, and how to ensure the quality of physical education training has become an issue of concern to physical education educators [15]. In recent years, online courses represented by MOOC and mobile learning have been deeply integrated into physical education, providing a richer teaching tool and course content for the training in physical education. Online learning provides a new way of learning for those who are not convenient to attend face-to-face classroom teaching in physical education and provides the possibility of personalized choice for the independent arrangement of teaching time, free control of teaching progress, and independent exploration of learning depth in physical education [16]; online learning provides agricultural courses with the massive scientific research data needed for teaching, rich practical cases, and the possibility of getting close to the front line of agricultural production. As a result, more online teaching practices have emerged in the teaching of physical education. However, how to track, monitor, and analyse the quality of online teaching in physical education is still a new topic [17].

This paper attempts to analyse and explain how to apply the BD of the online teaching platform to analyse the quality of online teaching in physical education from a microscopic perspective through the case of an online course teaching. In our school, the practice of integrating health data within and outside the classroom has a higher positive impact on improving students' physical fitness levels.

The arrangement of the paper is as follows: Section 2 describes the analysis of the current state of quality monitoring in physical education classrooms; Section 3 collects the data model construction inside and outside the university physical education classroom; Section 4 analyzes the practical exploration inside and outside the classroom; Section 5 chooses the subjects and methods; Section 6 concludes the paper.

2. Analysis of the Current State of Quality Monitoring in Physical Education Classrooms

We know from literature analysis that current research on the quality of sports training focuses primarily on the

establishment of an education quality assurance system at the macrolevel, while researchers have focused more on classroom teaching and learning at the microlevel. The research on quality analysis at the microlevel of classroom teaching is relatively scarce [18], and the study on the use of flipped classrooms in the teaching of English for physical education and the analysis and evaluation of teaching through course learning portfolios is one of the few studies we have seen in this area.

In the practice of physical education management, physical education management departments usually manage the teaching of courses involved in the process of physical education training with the help of physical education academic management systems, which generally include functions such as course selection, scheduling, and grades and are characterized by a focus on data management of teaching arrangements and teaching results, but have little control over the teaching process. Rathore et al. [19] analyzed the application and effectiveness of the information system for monitoring and evaluating the quality of physical education courses at Dalian University of Technology, which requires manual filling in of data, partly from the evaluation of accompanying lecture records by physical education teaching supervisors and partly from the teaching order situation of assistant managers checking whether teachers attend and leave classes on time and whether there is any suspension or change of class location.

3. Data Model Construction inside and outside the University Physical Education Classroom

In the context of the era of BD, scientific research will pay more attention to discovering and predicting the trend of things and their inner laws [20]. The teaching of university physical education courses uses smart wearable devices as the means, interviews relevant experts, teachers, and students, and builds a university data collection, data analysis, and data application based on monitoring network and AI as a whole from the perspective of teaching needs and students' demands. The model of integrating health data inside and outside the physical education classroom is shown in Figure 1.

3.1. Data Collection. Data collection refers to the process of automatically collecting digital information from smart sensors, smart wearable devices, and units under test. In the context of BD, how to collect useful information from the huge amount of data is one of the key factors in the development of BD. BD is derived from all human behaviour, and it is not only a string of letters in a table but also includes text, voice, videos, photos, and other media. Both comprehensiveness and accuracy should be stressed when collecting data. The first problem of integrating health data inside and outside the university physical education classroom is the collection of data, which includes basic information on students' physical education, learning information, behavioral information, and skills information from which useful information can be filtered and used in

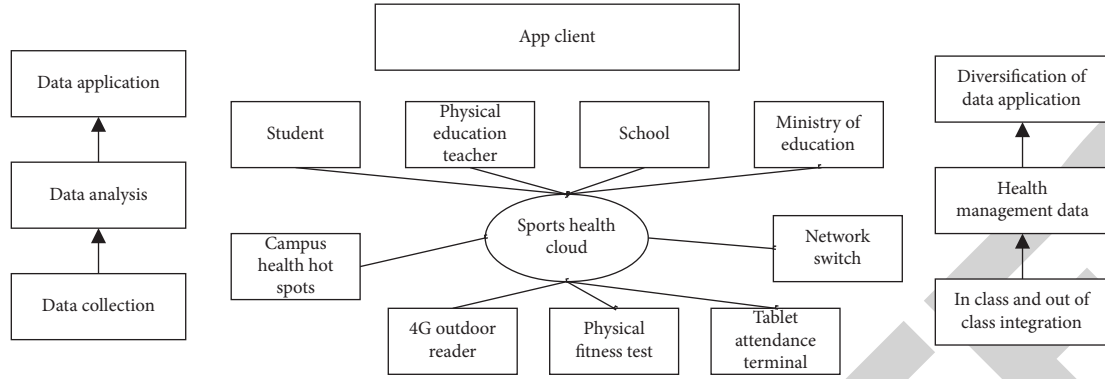


FIGURE 1: Data model of university physical education classes and beyond.

university physical education, which can provide a decision-making basis for education management, teaching and research, and practice.

3.2. Analysis of the Data. From the application of BD in sports, we can see that the analysis and value of sports BD analysis applied to university sports courses are yet to be tapped. The BD collected through smart wearable devices and other forms can only play the maximum efficacy of data after further storage, collation, and visualization. After data collection and formation of data sources through smart sports bracelets, BD analysis platforms are needed to further collate and analyse the data, and the construction of current BD analysis platforms is also a fundamental part of the construction and implementation of BD applications, with the main developers being traditional IT companies, Internet companies, and university research institutions.

3.3. Application of Data. The “beer nappy” example from Walmart, Google’s use of search hotspots to forecast cold and flu outbreaks, and Amazon’s use of user data to propose books and items are all good examples. The application of BD as a guide and the application of BD as a leader are the primary elements of current technological innovation and development of BD, as can be seen from these exemplary cases. This is also the case with physical education, where the analysis of the data through the BD analysis platform yields certain results, which can be further applied in practice to achieve the positive development of promoting students to strengthen physical exercise.

4. Practical Exploration inside and outside the Classroom

4.1. Consumption Category Statistics. As shown in Table 1, the focus of this paper is on the characteristics that characterize “irrational consumption” in terms of consumption behaviour, so that the low spending power and the high spending on entertainment or beauty are more important characteristics. This is in line with the common perception of “irrational consumption.”

4.2. Consumption Time Statistics. The assessment of the timing of consumption provides more feedback on one aspect of the characteristics of consumption habits. Generally speaking, groups that concentrate their spending on holidays and weekends tend to have a stable work situation, which facilitates their ability to meet their financial obligations and repay their loans on time. As shown in Table 2, groups that concentrate their spending on long holidays tend to have a habit of travelling for holidays, and this group tends to have a better financial background and is usually less likely to be late in repaying their loans. Conversely, large purchases that occur at particular times (late at night) and on particular days (working days) are likely to be “special purchases” in an emergency situation or sporadic purchases by the “unemployed.” Whether it is “special consumption” in an emergency condition or sporadic consumption by the “unemployed,” when the consumption accounts for a large proportion of the total, it is reasonable to doubt their financial ability to support the repayment on time, so this aspect is logically related to financial credit and can be used as input layer for deep learning [21, 22].

4.3. Statistics on Consumption Habits. The user’s spending habits are a processed feature to better establish the target mapping, where the impulse consumption index is

$$\text{Im_con} = \frac{\text{con_con}}{\text{month}}, \quad (1)$$

where Im_con is the impulse consumption index, con_con refers to the number of consecutive consumptions, and month is the month. con_con is defined as consumption across 5 categories in a 1 d period. In general, a large amount of consumption across categories in a short period of time is often indicative of “impulsive consumption” in a certain consumer environment and stimulus. It is easy to assume that people who spend impulsively are more likely to be late with their payments or have poor financial literacy and behaviour. The Consumer Concentration Index is calculated as

$$\text{Fo_con} = \frac{\text{Lar_amon}}{\text{month}}, \quad (2)$$

TABLE 1: Statistics on consumption categories.

Feature category	Category description	Characteristic field	Number of fields (PCs.)
Amuse_info	Entertainment consumption	Consumption of K IV V, bars, bath centers, etc.	21.20
Daily shop_info	Daily commodity consumption	Food, furniture, toiletries, etc.	27.20
Large goods_info	Large commodity consumption	Automobile, housing, decoration, study abroad, etc.	25.00
General goods_info	Consumption of medium value goods	Mobile phones, computers, etc.	27.10
Life_info	Living consumption	Water, electricity, Internet, insurance, etc.	12.00
Medical_info	Healthcare consumption	Medicine, treatment, fitness, and other expenses	15.00
Educate_info	Educational consumption	Educational institutions, books, etc.	08.10
Decorate_info	Beauty and clothing consumption	Consumption of clothing, bags, and cosmetics	06.00
Travel_info	Travel consumption	Transportation, hotels, catering, etc.	18.20
Total			159.30

TABLE 2: Consumption time statistics.

Characteristic field	Field description	Number of fields (PCs.)
Month info	Month of consumption	1
Day info	Date of consumption (day of week)	1
Time info	Period of consumption (every 2 h)	1
Festival long info	Whether it is a holiday (long holiday >3 d)	1
Festival short info	Whether it is a holiday (short holiday <3 d)	1
Total		5

where $Fo - con$ is the consumption concentration index and $Lar - amon/month$ is the number of large consumptions in a month, where large consumption is defined as consumption exceeding 20% of the user's average monthly total consumption (monthly average consumption is the monthly average over a year).

As indicated in Table 3, the consumption distribution index relates to the concentration of consumption behaviour, i.e., a user who spends more than 60% of their total consumption in any two categories in a month is regarded to have spent a substantial amount of money one time.

5. Subjects and Methods

In this section, we discuss the study subjects of physical education. They show the self-directed exercise monitoring and collect students' location information through their sports bracelets.

5.1. Study Subjects. In this paper, we study the practice of integrating health data inside and outside the classroom in university physical education and take students of our university as the target of investigation using the sports bracelet and sports network management platform APP to collect and analyse students' health data inside and outside the classroom such as exercise steps, exercise track, exercise days, and physical fitness data [23, 24]. Through interviews with students, it was found that students are better at exercising on their own during the week due to various studies and activities, while at weekends, when they have plenty of time, they are not as good at exercising on their own due to a lack of awareness of physical activity and physical activity habits.

5.2. Self-Directed Exercise Monitoring. Figure 2 shows the number of exercise steps taken by students in our school.

As can be seen from Figure 2, the daily number of steps of independent exercise per capita outside the school during the period from March to the middle and early part of June in our school, the situation of after-school independent exercise from Monday to Friday is better than that of after-school independent exercise on weekends and holidays, and the relative peaks both appear on Mondays and Wednesdays, but the number of steps of after-school independent exercise significantly decreases from late June 2018. The valley value began to appear between Monday and Friday, and excluding the interference of students' pre-examination revision in late June, it can be basically inferred that students' semester independent exercise in our school shows a strong cyclical pattern of better intraweek than weekend, i.e., the pattern of better after-school independent exercise from Monday to Friday and worse independent exercise on weekends and holidays, thus reflecting the problem of students' lack of physical exercise habits.

In order to have a clearer understanding of students' exercise, our school has set up a positioning system on campus, which collects students' location information through their sports bracelets, and through the deployment of advanced 2.4 G UHF RFID signal interaction technology and readers built into the sports bracelets, we can achieve automatic class attendance and sign-in, as well as locate people entering and exiting key areas of the school and collect related data statistics. Figure 3 shows the number of times students visited the sports area throughout their independent exercise.

The total number of visits to the sports area each month shows that the total number of visits to the sports area in March was the lowest, and the number of visits to the sports area increased significantly in April, May, and June, indicating

TABLE 3: Statistics on consumption habits.

Characteristic field	Field description	Number of fields (PCs.)
Impulse consumption index*	Number of consecutive consumption/month	1
Consumption concentration index*	Number of consecutive consumption/month	1
Consumption distribution index*	Index representing consumption preference	1
Total		3

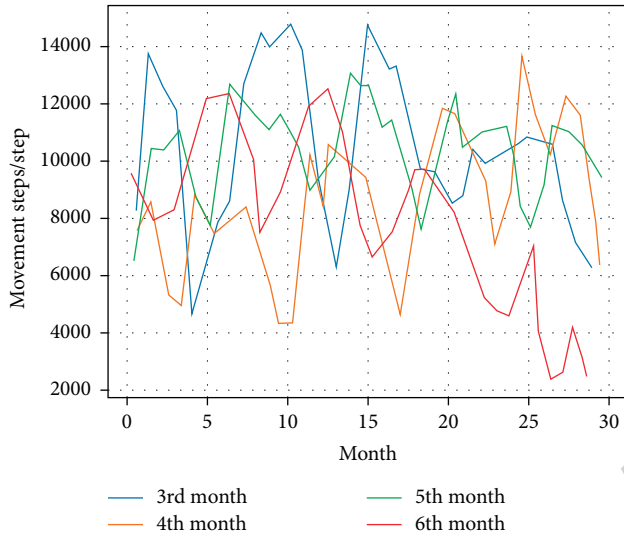


FIGURE 2: The number of steps taken by students for independent exercise.

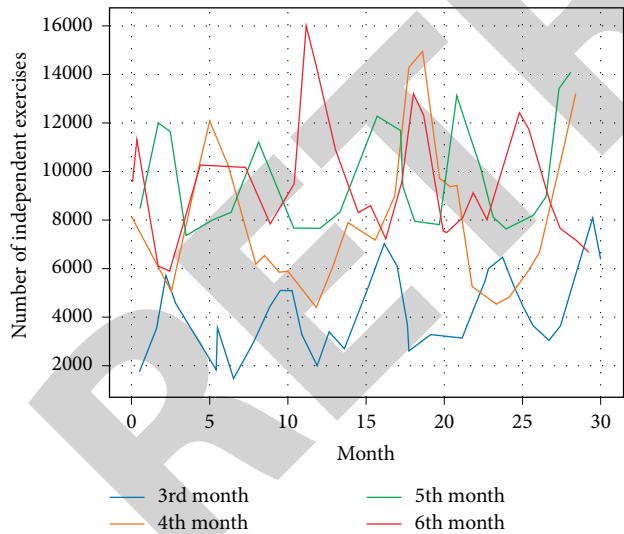


FIGURE 3: Map of the number of independent exercise visits to exercise areas by students.

that the time spent in the sports area by students after wearing the sports bracelet has increased significantly, and the analysis of the maximum and minimum values each month shows that between March and May, the highest number of visits occurred in the middle of the month and the lowest number of visits occurred in the first half of the month, but the maximum and minimum values in June were both in the second half of the month. This shows that the integration of physical

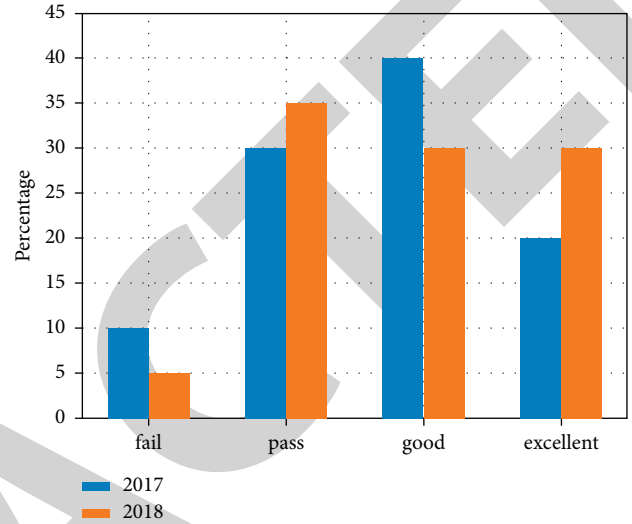


FIGURE 4: Comparison of overall fitness test scores in 2017 and 2018.

education and sports data based on monitoring networks and AI has achieved the goal of getting students out of the dormitory and into the playground. However, the trend of students' voluntary exercise steps at weekends shows a low level at weekends, which indicates that students spend more time in the exercise area at weekends, but do not do the corresponding voluntary exercise.

Traditional physical fitness tests are usually conducted by teachers using manual or visual methods, which are influenced by the subjectivity of the test taker and involve a lot of labour and cumbersome posttest entry. Our school has synchronized the physical fitness test with the sports bracelet, as shown in Figure 4, which shows a longitudinal comparison of the total results of our students' physical fitness test in 2017 and 2018.

As can be seen from Figure 4, by comparing the total physical fitness test results of our students in both years, we can see that the proportion of the total number of students passing, good and excellent, has increased in 2018, while the proportion of the total number of students failing has decreased, indicating that the overall physical fitness level of our students has increased. However, it is impossible to know whether the increase in physical fitness level is influenced by the application of smart bracelets and APPs in university physical education courses through the comparison of two years; therefore, this paper correlates the total physical fitness test scores of two years with their corresponding after-school independent exercise steps. Figure 5 shows that the correlation coefficient between the two is 0.79 in 2017 and 0.98 in 2018, indicating that they are significantly associated.

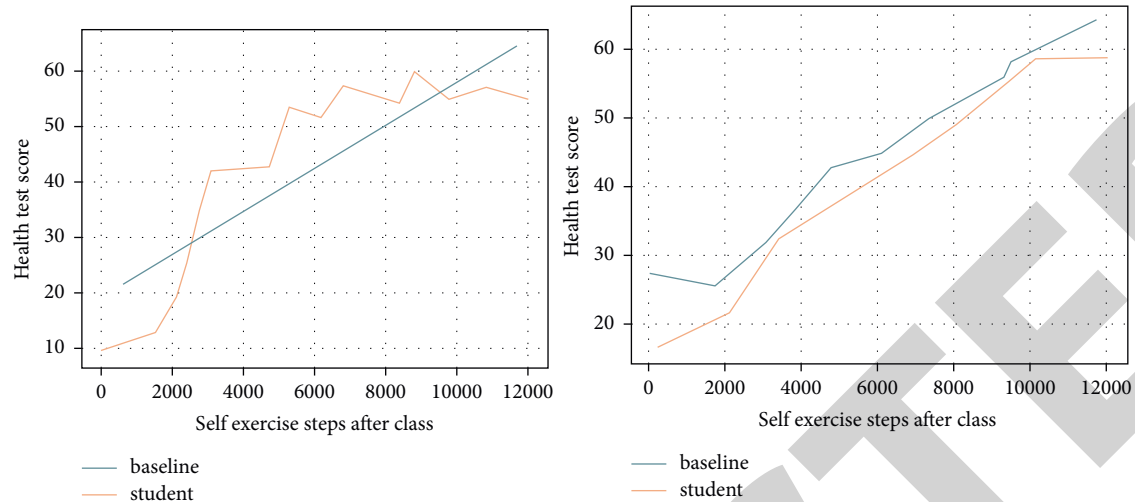


FIGURE 5: Relationship between physical fitness test scores and after-school independent exercise in 2017 and 2018.

This indicates that the number of steps of independent exercise after school has a significant impact on the total score of the physical fitness test and that the practice of integrating health data inside and outside the classroom has a greater positive impact on the improvement of students' physical fitness levels in our school.

6. Conclusions

The teaching practice of a university physical education curriculum based on a monitoring network and AI couples classroom teaching with students' independent exercise outside the classroom, resulting in a physical education curriculum that integrates classroom teaching, independent exercise outside the classroom, and students' physical health, meeting the development requirements of a large physical education curriculum. Compared with traditional university physical education, the integrated teaching practice based on monitoring network and AI of university physical education inside and outside the classroom health data has shown significant advantages in the information management of physical education courses, monitoring students' independent exercise and improving their physical health status.

Data Availability

The dataset used in this paper is available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest regarding this work.

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