

Research Article

Analysis on the Construction of Personalized Physical Education Teaching System Based on a Cloud Computing Platform

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Received 9 May 2020; Revised 10 August 2020; Accepted 27 August 2020; Published 19 September 2020

Academic Editor: Wei Wang

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The emergence of cloud computing, the change of education methods, and the requirements of lifelong education make the traditional teaching platform face great challenges. With the rapid development of network technology and computer technology, the speed of updating knowledge is accelerating day by day, and the way of education is gradually changing. Facing the informationization of education, our physical education teaching methods and means are still stuck in the traditional words and deeds, which obviously cannot meet the needs of the development of physical education and health curriculum. In terms of the overall development of sports, school sports is the cornerstone of the country's sports development. This research is based on cloud computing technology, breaks the framework of the traditional sports model, establishes a personalized sports teaching system according to the basic theory of physical education, and designs and discusses the future college sports model. The construction and application of digital teaching resources of physical education courses in colleges and universities can help solve the problems such as shortage of teachers and contradiction between learning and training. The construction of digital teaching resources of physical education courses in colleges and universities based on cloud computing can save costs and improve resource utilization efficiency.

1. Introduction

The education in the new century is mainly to strongly advocate and promote quality education, and the goal of education has also turned to cultivating students' innovative spirit and innovative ability [1]. With the continuous development and construction of the cloud platform and cloud hosting, the current education and teaching reform has ushered in a golden development period. In the development process of teaching in the information age, the learning methods are constantly reformed, and the learning carriers and platforms are constantly changing [2]. In developing China, sports has become a national strategy and an important strategy to promote the realization of the Chinese dream and complete the great rejuvenation of the Chinese nation [3]. Promoting the development of sports for all is the result of the progress of China's times and the inevitable choice for the development of world history. In the face of education

informatization, our physical education teaching methods and means still remain in the traditional words and deeds, which obviously cannot meet the needs of the development of physical education and health curriculum [4]. Under cloud hosting, the premise of teaching makes personal space construction continuously improved and also makes the function of cloud hosting more fully explored [5]. The teaching system is the key to cultivating students' talents and the main way to promote students to become pillars. In college teaching, the traditional teaching model has been strongly impacted by informatization, and the reform of the teaching model is imperative. At the same time, the organic combination of computer networks and college teaching is gradually becoming a new development trend.

The cloud space of physical education teaching in the new information age effectively makes up for the lack of teaching in our country and makes physical education keep pace with the development of the times, full of vitality and

vitality [6]. The rapid development of network technology and computer technology has accelerated the update of knowledge. In order to obtain more and more timely knowledge, the way of education has gradually changed [7]. Online education must be a kind of personalized teaching that meets the needs of individualized learning. Online courses must dynamically adjust the page structure according to the learner's interests, frequency of visits, and time to better meet the needs of learners [8]. With the development of information technology and the widespread application of cloud computing technology in the field of education, the construction of cloud computing has become a hot spot in the work of education informatization [8]. In the past, under the influence of traditional concepts in China's college physical education, the emphasis was placed on the standardization of movements as well as training intensity, making physical education in colleges and universities with certain mandatory specifics [9]. In this way, students do not like and pay attention to it, and it also brings difficulties to PE teachers in teaching courses. The traditional learning platform is a website based on a single hardware facility, which provides learning content through streaming media services and other technical means. The main disadvantages of this method are large investment, long cycle, high maintenance cost, poor scalability, and so on. In order to successfully construct a teaching mode that respects the individual differences of students, combines the individual characteristics of students, and earnestly implements the principle of teaching students according to their aptitude, college physical education teachers must completely change the old traditional teaching mode [10].

With the continuous development of information technology and computer networks, information in the network era has begun to grow by leaps and bounds [11]. Haipeng and others put forward that education cloud technology is to deploy innovative educational applications on the cloud platform through the integration of relevant educational information resources, so as to achieve seamless communication, interaction, resource sharing, and processing among education authorities, universities and educational institutions, and teachers and students [12]. Chen believes that cloud computing adopts service-oriented architecture, which can better support the personalized service of basic education resources. In the actual physical education classroom teaching, many physical education teachers cannot accurately grasp the profound connotation of individualized physical education in colleges and universities [13]. As far as the overall development of sports is concerned, school sports is the cornerstone of the national sports development. Jingrui proposed that the combination of cloud computing and curriculum, and the scientific management of it, can effectively combine various informal learning means and finally promote the development of personal lifelong learning in an all-round way [14]. Haoyue and Xiuqi mentioned in their research that with the help of cloud computing technology, different regions can share high-quality teaching resources and allocate educational projects according to regional characteristics, which can not only greatly promote the reform of the teaching mode but also realize the regional equalization

of educational resources as soon as possible [15]. This research is based on cloud computing technology, breaking the framework of the traditional sports model and, according to the basic theory of physical education, establishing a personalized physical education teaching system to design and discuss the future college sports model.

2. Feasibility of Cloud Computing-Assisted Physical Education

2.1. Changes Brought about by Cloud Computing-Assisted Physical Education. With the development of information technology and the wide application of cloud computing technology in the field of education, the construction of a sports teaching service platform focusing on cloud computing is a new hot spot in the in-depth development of school sports information. Cloud computing is an Internet-based, public participation supercomputing model [16]. That is, a large amount of information and processor resources stored on personal computers, mobile phones, and other devices are centralized and work together. The existing network teaching platform has insufficient storage compatibility and cannot implement teaching well across platforms. Faced with numerous digital devices and their complicated operating systems, most physical education teachers are afraid. The cloud platform can provide users with corresponding cloud services. The platform will put the written programs into the cloud and then feed back these information and resources when customers use cloud platform services. The storage performance of cloud hosting is very high, and the personal space behind it is a massive information repository based on cloud computing technology. The new personalized comprehensive teaching platform integrates the characteristics of virtualization, cluster teaching, and experiment; provides a unified solution; and has the characteristics of integration, high density, and multiplatform. Cloud computing, with its superscale, high scalability, high reliability, virtualization, on-demand distribution, cheapness, and versatility, enables ordinary users to enjoy the storage and computing capabilities of high-performance computers on computers with simple configuration, bringing great convenience to human life and work [17]. The "school sports cloud computing" model, which emerged from the application of cloud computing technology in sports teaching, will bring many new changes and development opportunities to sports teaching. At the university stage, students' independence and autonomy are more demanding, but students at this stage are often affected by less social experience. Their independence and autonomy often manifest themselves as arbitrary, sometimes contradictory, and often lead to a loss of self. It can be seen that students at this stage need teachers' active and correct guidance.

The biggest characteristic of cloud computing method should be embodied in personalization. Using the information obtained from cloud computing, materials to be learned in teaching resources should be selected and organized in a targeted way dynamically. Two hundred track and field athletes were selected as test samples for this experiment. The basic information of athletes is shown in Table 1.

TABLE 1: Basic information of athletes.

	Number of cases	Average height (cm)	Average weight (kg)	Average age
Male	100	180 ± 3.25	75.6 ± 4.52	22 ± 3.28
Female	100	165 ± 2.78	53 ± 3.64	22 ± 2.34

If physical education teachers in colleges and universities can personalize their physical education classes based on their own specialty and students' reality and rely on their own practical teaching experience, they will certainly form their own personalized classroom teaching style that students like and have their own characteristics [18]. Cloud computing-assisted physical education is to give full play to the advantages of computers and the Internet and effectively integrate excellent physical education teaching resources from various places and schools into the physical education teaching process to create an information-based teaching environment. The primary factor to promote the development of college students' sports personality lies first in the training objectives set by colleges and universities. The training objectives of personalized education can be divided into two points. First, students should meet the basic requirements of the objectives of college physical education. Second, according to the characteristics of different students' sports literacy, the designated training plan for teaching students is in accordance with their aptitude [19]. Cloud computing can realize the informatization without its infrastructure. Each unit does not need to build any facilities, as long as the network purchases the required sports teaching resources. The personalized online teaching assistant system based on cloud computing is the assistance and extension of classroom teaching, and it is a tool to help students consolidate and reduce the workload of teachers after class review. At present, the education models commonly used in higher education are unified and standardized. Students expect to meet the needs of sports skills and lifelong physical fitness in physical education.

2.2. Positioning, Content, and Technical Realization of Cloud Computing-Assisted Physical Education. The goal of a personalized learning system is to recommend the knowledge and information that students are interested in and want to learn according to their personal characteristics, their learning interests, and learning needs, so as to help learners to swim out of the vast ocean of information. With the continuous development of teaching cloud hosting, teaching curriculum resources have been better decomposed. Through the construction of teaching cloud hosting, the updating and arrangement of teaching resources have made great strides towards dynamic. Especially in the update and utilization of the Internet and multimedia teaching resources, the media resource base of physical education courses has been enriched to a great extent. The construction of cloud computing-assisted physical education and the application of resources will change the mode and method of traditional physical education teaching and realize the deep integration of information and physical education [20], so as to achieve

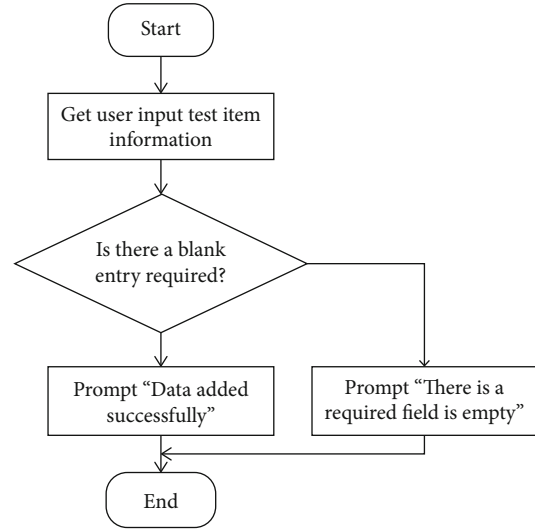


FIGURE 1: Program flow of new test items.

the purpose of improving teaching quality and efficiency and realize the "revolutionary influence" of informatization on school physical education. In the construction of cloud space, physical education teachers all over the world can upload some excellent multimedia resources to the education cloud, and teachers everywhere can download these multimedia resources from the education cloud at will. The communication between teachers and students is an important way to ensure that teachers master students' learning situation in time. Through the construction of cloud space, the communication of teaching becomes closer, and at the same time, the communication between teachers and students breaks the boundary, so as to realize the synchronous development of the communication between teachers and students inside and outside the school.

Sports test project management refers to the management of information related to sports test projects, which includes the following functional modules: the addition of sports test projects, the modification and deletion of sports test projects, and weight setting. The database tables involved in the implementation process mainly include test project information tables. Only detailed implementation instructions will be provided here for the addition of test items. The implementation process is shown in Figure 1.

The basic objectives of the course are determined according to the basic requirements of most students and refer to the objectives determined and worked hard for some students with special skills. The development goal is to continue to develop on the basis of realizing the basic goal. Based on the results of the first stage of work, the number of students who passed or failed was counted, as shown in Table 2.

In different stages of the proposed different guiding ideologies of physical education, these guiding ideologies have promoted the university sports theory to play a significant change. Table 3 shows the survey and statistics of the degree of the realization of physical education objectives in physical education teaching in colleges and universities.

TABLE 2: Statistics.

	Long-distance race	Dash	Long jump	High jump
Passing number	128	141	118	136
Number of failures	72	59	82	64

TABLE 3: Survey and statistics on the achievement of educational goals of physical education in ordinary colleges and universities.

Degree of realization	Fully realized	Partial realization	Not implemented
Number	72	89	39
Proportion (%)	36	44.5	19.5

There is a multi-index evaluation system composed of n evaluated objects u_1, u_2, \dots, u_n and m indicators x_1, x_2, \dots, x_m , and $x_{ij} = x_j(x_i)$ ($i = 1, 2, \dots, m$) is the observed value of the evaluated object u_i on the index x_j . The evaluation data matrix can be expressed as

$$A = [x_{ij}]_{n \times m} = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1m} \\ x_{21} & x_{22} & \cdots & x_{2m} \\ \cdots & \cdots & \cdots & \cdots \\ x_{n1} & x_{n2} & \cdots & x_{nm} \end{bmatrix}. \quad (1)$$

Among them, $m, n \geq 3$, the data in A is the preprocessed standardized data, and the physical education evaluation process is described as a general transformation:

$$y_i = f(x_{i1}, x_{i2}, \dots, x_{in}), \quad i \in N. \quad (2)$$

The script operation module analyzes and classifies the content of the event and determines what type of event it is. Modifying the code is inevitable, because we always have to correct errors, and requirements may change. A vertex without a predecessor vertex in the correlation graph of an interface component is called a starting vertex, and a vertex without a successor vertex in the correlation graph is called a final vertex. Figure 2 is an association diagram of interface components, where “v1” is the starting vertex and “v8” is the final vertex.

Automation users can create automation objects, access objects provided by the automation server, get or set object properties, or call object methods. The interaction between automation objects and automation users is shown in Figure 3.

Through the use of modern cloud computing technology, teaching management can be effectively improved, and the informatization development of teaching course management, education management, student management, and teacher management is realized, thus further improving the operational difficulty and convenience of teaching management. Before learning enterprise courses, the design concept

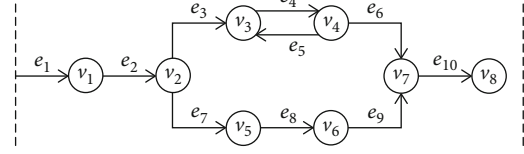


FIGURE 2: Interface component association.

of physical education courses can be first told to the learners, so that the students can effectively participate in their own course construction and have a very strong interest in learning physical education courses [21]. For example, Table 4 is a survey and statistics on the degree to which the physical education teaching in colleges and universities has achieved the educational objectives of physical education. Table 5 is a survey of students' satisfaction with school physical education.

Let a_{ij} and β_{ij} be the column dominance and row dominance, respectively, of the evaluated object u_i ($i \in N$) on the index x_j ($j \in M$) and satisfy

$$\begin{cases} a_{ij} = \frac{1}{n-1} \sum_{k \neq i} (x_{ij} - x_{kj}), & i \in N, j \in M, k \in N, \\ \beta_{ij} = \frac{1}{m-1} \sum_{p \neq i} (x_{ij} - x_{ip}), & i \in N, j \in M, p \in N. \end{cases} \quad (3)$$

If $\lambda_{ij} = \mu\alpha_{ij} + \eta\beta_{ij}$ ($i \in N, j \in M$), call λ_{ij} the autonomous superiority of the evaluated object u_i ($i \in N$) with respect to the index x_j ($j \in M$), where μ is the competitive target coefficient and η is the developmental target coefficient, $\mu, \eta \in [0, 1], \mu + \eta = 1$.

The column strength reflects the difference in strength between the j th index of the evaluated object and the other $n-1$ evaluated objects as a whole. The row advantage quantity reflects the overall advantage difference between the j th index of the evaluated object and the other $m-1$ indexes.

The column advantage α_{ij} ($i \in N, j \in M$) reflects the strength difference between the j th index of the evaluated object u_i and the other $n-1$ evaluated objects as a whole. The line dominance reverse β_{ij} reflects the overall dominance difference between the j th index of the evaluated object u_i and the other $m-1$ indicators.

Traditional online courses have the disadvantages of higher development costs and being too static, and once the content of traditional online courses is developed, it is difficult to change them. Now that the speed of people's knowledge update and the pace of life are getting faster and faster, there is an urgent need to support learners' personalized sports learning in online courses. In specific physical education teaching practice, if physical education teachers want to implement personalized teaching strategies, they must completely change the traditional teaching mode in the past [22]. The cloud computing system interface module mainly presents relevant content pages to users for different operations of different users and uses natural language processing, semantic query, cloud computing technology, etc.

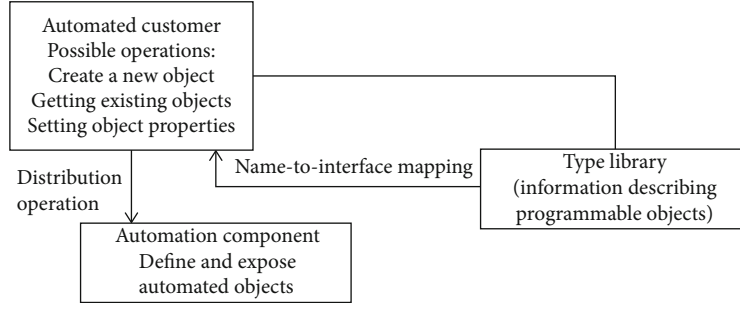


FIGURE 3: Interaction between automation users and automation components.

TABLE 4: Survey and statistics on the achievement of physical education goals in college physical education.

Degree of realization	Fully realized	Partial realization	Not implemented
Selected number	9	26	25
Proportion (%)	15	43.3	41.7

to provide an operation interface to realize human-computer interaction and realize the interaction between the user and the system.

3. Construction of the Personalized Physical Education Teaching System

Cloud computing provides a development environment as a service. Users can use middlemen's equipment to develop their own resources. Physical education teachers in colleges and universities can flexibly use the existing network platform for network teaching. Teaching students in accordance with their aptitude is an important part of modern educational philosophy. In China's traditional physical education, all students are educated by the same educational program, which will make the students' talents and potentials be ignored. University leaders and teachers must attach great importance to the current development of teaching resources and the construction of guarantee mechanisms and actively set up a special department for the construction of educational information cloud hosting to realize the good construction and development of educational resources in cloud hosting. Personalized physical education is based on the educational concept of teaching students in accordance with their aptitude. Different methods are selected for education and training of different students according to their characteristics. In doing so, it is more beneficial to the personal development of students [23]. The teacher platform mainly provides the management interface of the teaching resource database and teaching rule database, presenting the analysis information obtained by the personalized data analysis module. The student platform mainly presents teaching materials recommended by the information scheduling module for different students. The administrator platform mainly presents an interface for managing user information, user rights, and various resources.

Mastering sports skills is of course a necessary condition for students majoring in physical education, but under such conditions, only students majoring in physical education can be trained but not talents. This is one of the main problems in the training of physical education professionals in colleges and universities in China. Most PE teachers and students support the introduction of outward bound training in PE teaching, as shown in Table 6.

For any two evaluated objects $u'_i, u''_i (i', i'' \in N, i' \neq i'')$, let $\omega_j^*(i', i'')$ be a random variable that obeys a certain distribution on the interval $[\min(\omega_{i'j}, \omega_{i''j}), \max(\omega_{i'j}, \omega_{i''j})]$ and call $s(u'_i > u''_i)$ as the superiority of u'_i to u''_i as follows:

$$s(u'_i > u''_i) = p(f(u'_i) > f(u''_i)) + 0.5p(f(u'_i) = f(u''_i)). \quad (4)$$

In the formula, the aggregate function represents the event probability:

$$f(u'_i) = \sum_{j=1}^m \lambda_j^* \omega_j^*(i', i''), \quad (5)$$

$$f(u''_i) = \sum_{j=1}^m \lambda_j^* \omega_j^*(i', i''). \quad (6)$$

The merit matrix S of several evaluated objects can be obtained, and $S_{ij} = s(u_i, u_j)$ is as follows:

$$S = [s_{ij}]_{n \times n} = \begin{bmatrix} s_{11} & s_{12} & \cdots & s_{1n} \\ s_{21} & s_{22} & \cdots & s_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ s_{n1} & s_{n2} & \cdots & s_{nn} \end{bmatrix}. \quad (7)$$

The backwardness of practical teaching content is undoubtedly the main reason for the decline of practical teaching quality. Even students majoring in physical education, as future physical education teachers, are also responsible for the healthy growth of future children. Personalized services can be divided into service organization personalization and service content personalization according to different levels. Personalization of service organization means that the platform has a set of services to realize various

TABLE 5: Survey of students' satisfaction with school physical education.

Degree of satisfaction	Very satisfied	Satisfied	Commonly	Not very satisfied	Dissatisfied
Number	15	52	216	117	50
Proportion (%)	3.3	11.6	48	26	11.1

TABLE 6: Survey statistics on whether it is necessary to carry out outreach training in physical education.

Choice item	Number of students	Proportion (%)	Number of teachers	Proportion (%)
Very necessary	22	8.8	11	22
Be necessary	147	58.8	30	60
Commonly	65	26	6	12
Unnecessary	16	6.4	3	6

functions. Service composition can be realized on demand according to different roles, activities, customized contents, and permissions of users. Basic courses are mainly divided into theory and practice. The teaching of basic courses should be innovated in traditional physical education. The user data collection module is the basis for realizing personalization of the whole online teaching assistance system and is mainly responsible for collecting relevant information and data of users. The personalized resource service module of the body is based on the labeled basic education resource database, processes the service requests of users, and uses the technologies of data mining and intelligent push to deeply understand user needs and actively discover potential needs so as to better provide personalized services [24]. The personalized cloud computing analysis module uses different cloud computing algorithms to mine and analyze the information of the students' original database, and the obtained results are stored in the teaching rule base after being normalized, and the personalized information is transmitted to the information scheduling module.

In the actual curriculum reform practice process, we must always take students' physical fitness and physical quality as the main line of development and actively carry out physical education courses suitable for the needs of society and students. After the intensive training period, blood ALP data before and after experimental recovery are shown in Figure 4.

In the process of human body modeling and simulation, these structural characteristics of the human body, such as freedom of movement, should be fully considered. For the range of motion, the simulation is designed by imitating the structure of the human body, and the simulation can have the same degree of freedom as the human body and complete the same motion as the human body. Based on the analysis of human body structure and actual motion, it is necessary to create constraint pairs between rigid bodies in the human skeleton model to ensure that rigid bodies with relative motion in the model can perform motion simulation according to the real motion mode of the human body. The tension-velocity relationship of the model is shown in Figure 5.

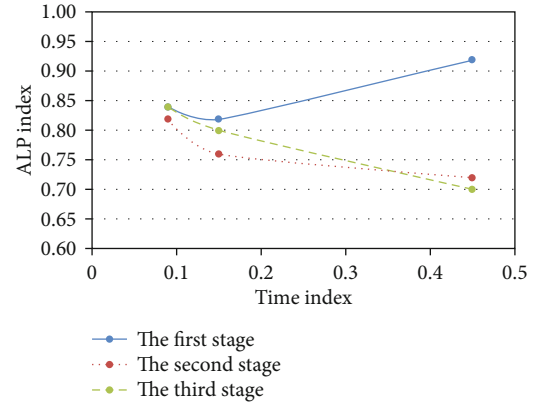


FIGURE 4: Blood ALP data.

The significance of developmental teaching evaluation lies in changing the old concepts, methods, and means of physical education teaching evaluation. The purpose of evaluation is to examine the students' situation comprehensively, stimulate their enthusiasm for learning, and promote their all-round development. It is also a powerful means for teachers to reflect on and improve their teaching. The students in the experimental group intervened from the beginning of training. Hemoglobin in the experimental group increased significantly. The maximum exercise capacity and anaerobic power of the experimental group increased significantly. During the intensive training period, the athletes in the experimental group are full of energy. The data index of anaerobic work before and after experimental recovery is shown in Figure 6.

From the perspective of competitive sports, the latest scientific and technological achievements will soon be transformed into concrete application on the sports field, thus bringing positive factors to create new sports results. From the point of view of school physical education, the curriculum, teaching objectives, teaching content system, teaching methods, assessment methods, and standards are also constantly influenced by contemporary pedagogy theories, showing a flexible development. Under the new situation of the PE teaching reform, the reform of PE teachers' teaching evaluation is urgent. Once there is no compulsory physical education, a considerable number of students will be isolated from physical education and their physical fitness will naturally decrease rapidly. The systematicness and necessity of teachers' selection of teaching contents within the prescribed class hours are inevitably guaranteed, which increases the randomness of teachers' teaching. In addition, schools at all levels seldom consider the main needs of students in the connection of physical education teaching.

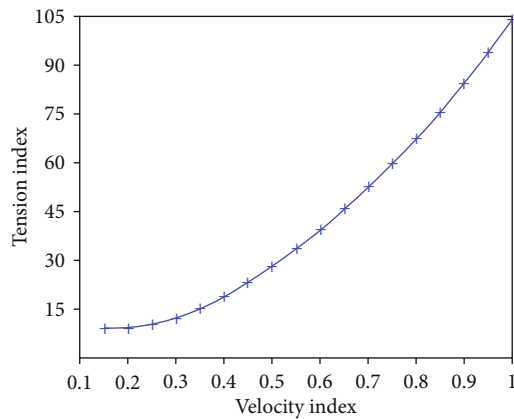


FIGURE 5: Tension and speed data.

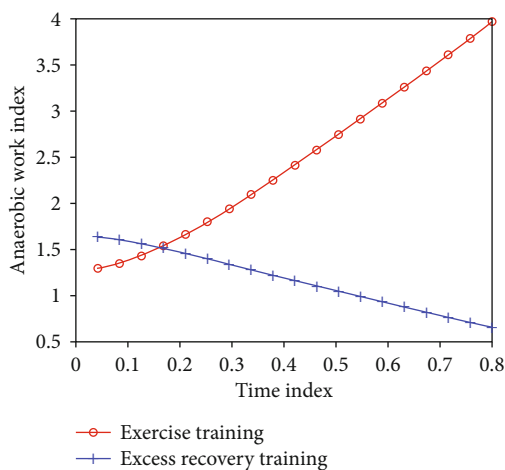


FIGURE 6: Anaerobic work data before and after experimental recovery.

The demand and problems of sports skills are the center, highlighting the cultivation of ability and quality. According to the imbalance of the overall level of students, different teaching plans of physical education courses are designed to maximize the teaching results. Physical education teachers' teaching viewpoints on students, curriculum, teaching materials, teaching methods, and other aspects will not only affect teachers' judgment and decisions in teaching activities but also affect teachers' teaching behaviors in teaching plans, teaching interactions, and teaching reflections [25]. The function of the information scheduling module is to transfer the corresponding learning contents from the knowledge base and the teaching resource base to the system interface module according to the rules obtained from the teaching rule base and the personalized data analysis module, so as to present personalized learning resources for different students and recommend corresponding exercises for students according to their weak links to strengthen and consolidate [26]. At present, there are quite a lot of learning resources in online physical education courses, including some very high-quality resources. However, these resources are effec-

tively integrated in the learning process of physical education courses, thus serving the learning of this course well. In physical education classroom teaching, physical education teachers should respect and understand each student's needs and personality differences and encourage and praise students' unique opinions and different requirements.

4. Conclusions

Nowadays, with the popularization of information technology, in the daily teaching activities of colleges and universities, the traditional classroom teaching mode alone can no longer meet the requirements of both teachers' teaching and students' learning, especially there are great differences in the learning ability, learning foundation, and efforts of different students in reality. Cloud computing, as a large-scale resource integration and storage technology, provides convenience for the development and utilization of digital teaching resources. The traditional classroom teaching mode ignores the personalized features of the learning process, and the reform of the teaching mode is imperative. The development of cloud hosting has a very important impact on the development of physical education in our country and has made outstanding contributions to the construction of a benign interactive environment and the innovative development of resources. At present, the traditional class teaching system is still widely used in college physical education, but with the development of the times, this class teaching system cannot meet the internal needs of the development of education. In the process of cloud space development, teaching methods and contents are constantly changing, and the communication between teachers and students and between colleges and universities is becoming increasingly close. Physical education teachers in colleges and universities should actively explore the influence of cloud computing on network teaching methods, increase the construction of digital teaching resources of physical education courses, strive to improve the construction quality and use effect of digital teaching resources of physical education courses, and speed up the process of informatization of physical education in colleges and universities.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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