

Research Article

Gang Liu and Hongbo Zhuang*

Evaluation model of multimedia-aided teaching effect of physical education course based on random forest algorithm

<https://doi.org/10.1515/jisys-2022-0041>

received June 23, 2021; accepted February 26, 2022

Abstract: The multimedia technology and computer technology supported by the development of modern science and technology provide an important platform for the development of college physical education teaching activities. To better play the role of network auxiliary teaching platform in college sports teaching and improve the effectiveness of college sports teaching, the construction method of multimedia auxiliary teaching effect evaluation model based on the random number forest algorithm is proposed. Through the specification of the random forest algorithm and the optimization of the teaching quality evaluation index, the auxiliary teaching level of the college physical education network is analyzed, and the evaluation of the multimedia auxiliary teaching effect of the physical education courses is completed. The experimental results verify the effectiveness of the evaluation model designed in this article, with a user satisfaction of 72%. Teachers and students can use the evaluation model to improve the teaching quality and teaching efficiency, improve the management work, and promote the scientific, standardization, and specialization of physical education teaching management in colleges and universities.

Keywords: random forest algorithm, physical education curriculum, auxiliary teaching, effect evaluation

1 Introduction

In recent years, China's higher education has developed rapidly. To improve the quality of teaching and promote the scientization, standardization, specialization, and institutionalization of university evaluation, a 5-year round evaluation system has been established and the evaluation institutions are directly involved in university education evaluation [1]. College physical education teaching evaluation is an important part of college education evaluation. The quality of college physical education teaching evaluation directly affects the effectiveness of college education evaluation. Compared with the development of educational evaluation in other disciplines, the development of physical education evaluation in China is relatively backward [2,3]. The teaching effect evaluation of physical education in China mainly includes two stages: physical education learning evaluation with technology and skills as the core and physical quality and ability as the core. In this period, physical education learning evaluation is only an embryonic form. The five-point system is mainly used to evaluate the technology and skills. The five-point system is scored by five teachers, removing the highest score and the lowest score, and then averaging the remaining scores as the final score. The five-point system provides a new evaluation basis for physical education teaching

* **Corresponding author: Hongbo Zhuang**, Institute of Medical Technology, Xiangtan Medicine and Health Vocational College, Xiangtan 411102, China, e-mail: zhuanghongbo01@163.com

Gang Liu: College of Physical Education, Hunan University of Science and Technology, Xiangtan 411201, China; DBA Candidate, International College, Kirk University, Bangkok 10220, Thailand

evaluation, but the research and attention to evaluation are not enough. With the development of science and technology, multimedia technology and computer technology provide an important platform for college physical education teaching activities. The traditional evaluation method of physical education teaching is difficult to evaluate the teaching effect of physical education courses assisted by multimedia, and some scholars have put forward new evaluation methods.

Literature [4] conducts comparative empirical research on badminton classroom teaching by literature data method, comparative experiment method, questionnaire survey method, mathematical statistics method, etc. The results show that the experimental class through multimedia-assisted teaching has significantly higher enthusiasm and participation in badminton teaching than the control class students who only use traditional teaching, the physical quality and badminton technology are significantly stronger than the control class students, and the experimental class exercises significantly more than the control class students. Teachers can use more multimedia-assisted teaching in badminton teaching. Literature [5] has designed a teaching effect evaluation system based on multimedia. The user can log on to the web application server through the multimedia client, select their required multimedia teaching course, and transmit the user instructions to the intermediate application layer. The Web application server will select the corresponding teaching information and feedback to the multimedia client at the data level according to the library of the user's needs. Finally, the multimedia client uses the multimedia practice teaching evaluation model based on the fuzzy comprehensive evaluation model to complete the teaching effect evaluation.

However, the above method's evaluation index is too general, leading to the teaching evaluation effect cannot meet the actual needs, in order to improve the effectiveness of college physical education evaluation, better play the role of network auxiliary teaching platform in college sports teaching, this article puts forward the multimedia auxiliary teaching model based on random forest effect evaluation algorithm. To establish a multi-level teaching evaluation index model oriented to the learning process; to comprehensively analyze and evaluate the level of college physical education teachers from five aspects: pre-class preparation, teaching content, basic skills, ability training, and teaching methods; take the students as the main body of the teaching evaluation, build the evaluation index system of sports and multimedia auxiliary teaching effect, the index system is divided into five first-level indicators: teaching attitude, teaching content, teacher quality and ability, teaching method and teaching effect; a judgment matrix was used to construct the evaluation index of the random forest algorithm, the index weights were calculated using the approximate power method. Complete the multimedia auxiliary teaching effect evaluation of physical education courses. The experimental results show that the effectiveness of the design evaluation model is recognized by teachers and students. Teachers and students can use the evaluation model for self-reflection, self-adjustment, and self-improvement, to improve the teaching quality and teaching efficiency, improve the management work, and promote the scientific, standardization, and specialization of school physical education management.

2 Evaluation model of multimedia-aided teaching effect in physical education

2.1 Index evaluation system of multimedia-assisted teaching in physical education

This article analyzes the need for the promotion of multimedia network teaching platform in college physical education, analyzes the application of related technologies, and introduces the use and planning of each module. Under the standard design criteria of multimedia network teaching platform, this article discusses the design criteria of multimedia network education platform for physical education subject and puts forward the evaluation method of multimedia-assisted teaching effect of physical education course [6]. There are many kinds of teaching evaluation, among which the evaluation oriented to the learning process

has the most direct and close relationship with classroom teaching. The evaluation of the learning process is the value judgment of students' learning process, including the analysis and evaluation of students' learning behavior, attitude, knowledge, and ability [7]. Multimedia classroom teaching consists of four elements: teachers, students, teaching courseware, and teaching platform, which are interrelated, influenced, and interdependent. According to the evaluation objectives, a multi-media teaching evaluation index model can be obtained by comprehensive analysis of the above four elements, as shown in Figure 1.

The network-assisted teaching platform in college physical education includes four basic modules: network registration, learning garden, teacher studio, and resource management. Among them, the online registration module is responsible for the daily learning registration and registration of students and teachers, and the learning garden is mainly to provide students with various learning resources to meet their needs [8]. In the network virtual room, students can learn according to their own needs without time and space constraints, which effectively improves their learning effectiveness. At the same time, teachers can also answer students' learning puzzles in the network virtual room to shorten the distance between themselves and students. The level and ability of college physical education teachers are one of the key factors to measure the quality of college physical education [9]. Based on the actual situation of colleges and universities, five aspects of content are set to comprehensively analyze and evaluate the level of college physical education teachers, which are pre-class preparation, teaching content, basic skills, ability training, and teaching methods. Based on the system theory analysis and mathematical statistics system, the evaluation is carried out, and then, the interactive web page is made by using Microsoft asp.net, Dreamweaver MX, and other software tools. The evaluation items can be divided into three types, namely student evaluation, teacher mutual evaluation, and self-evaluation. Each item is set with four levels of scoring standards, and the software system can automatically evaluate the average score [10]. The flow chart of the physical education teaching evaluation system is shown in Figure 2.

Using visual FoxPro6.0 database programming software as an important software tool for the comprehensive management system of physical education, we can comprehensively manage all the relevant contents of college physical education subjects, including sports venues, sports funds, sports equipment, system training, etc., to ensure the systematization and standardization of college physical education teaching [11]. All kinds of information processing abilities directly determine the overall quality of college physical education. Under the application system of the comprehensive management system of physical education teaching, the teaching equipment, teaching documents, and students' scores in college physical education teaching are comprehensively evaluated and analyzed and applied on the basis of comprehensive statistics [12–14]. By analyzing the preparation before class, the summary after class, and the teaching

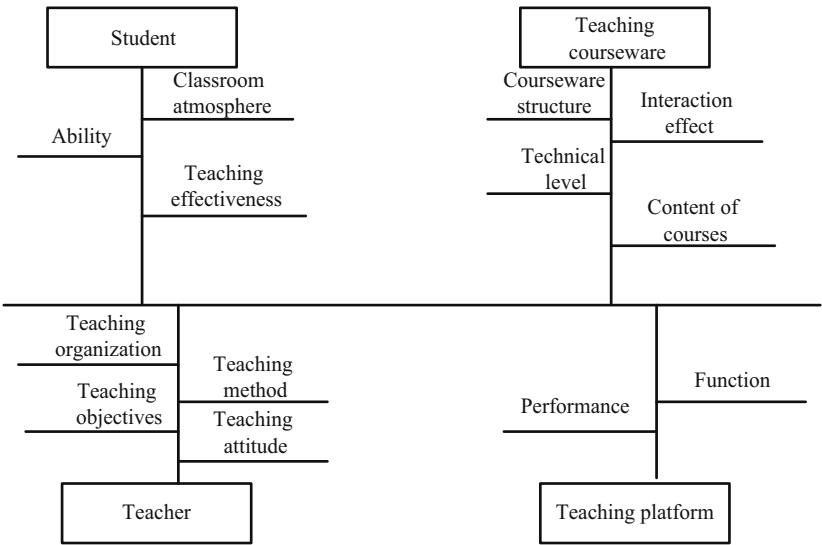


Figure 1: Evaluation index model of multimedia teaching.

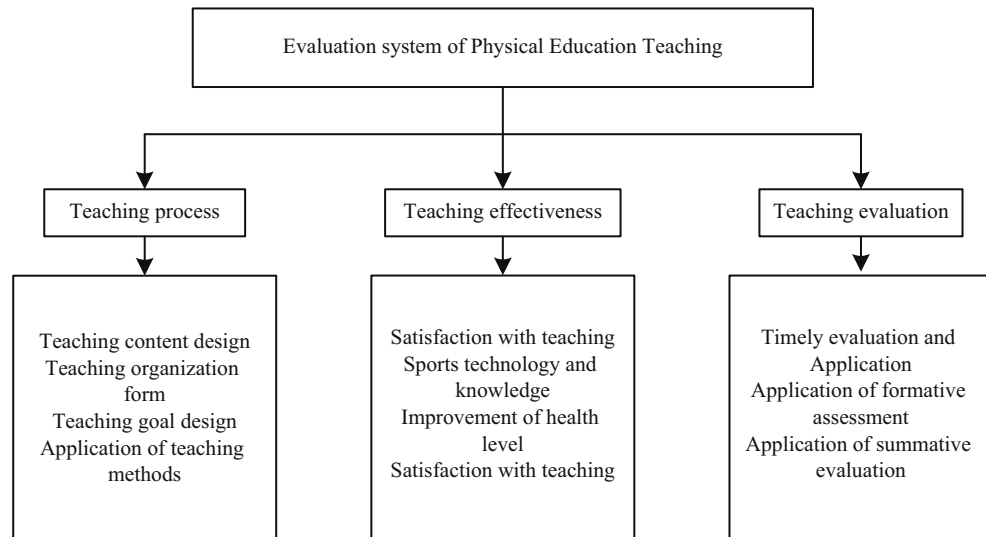


Figure 2: Process of physical education teaching evaluation system.

process, we can summarize the basic laws of college physical education. Under the effect of investigation methods, we can consider the problems from the perspective of students, comprehensively grasp the actual needs of students, make scientific analysis, and further clarify the design ideas of the College Physical Education Testing and management system [15]. The problems in the process of “teaching” and “learning” can be analyzed under the guidance of modern education theory, covering the development content, development object, specific objectives, etc., in the formulation of development strategies; it must be based on the actual situation of college physical education and the specific demands of students as the standard [16]. In addition, based on the trial effect, the software system is scientifically modified and adjusted, and a summary evaluation is made.

2.2 The criterion of evaluation index for the effect of multimedia-assisted teaching in physical education

Students are the main body of physical education teaching and the direct object of teachers’ teaching, so students should be the main body of teaching evaluation [17]. The index system is divided into five first-level indexes: teaching attitude, teaching content, teachers’ quality and ability, teaching methods, and teaching effect in Table 1. In each index, it is further divided into several second-level indexes.

The Peer Evaluation Index System (theory classes) is a teacher attendance system implemented at our school. Each teacher has a certain number of classes to complete each semester [18]. The purpose is to strengthen the mutual communication and learning between teachers, learn from each other, and promote the improvement of physical education teaching levels. Because teachers have a certain ability for analysis and induction, the evaluation index is the first-level index in Table 2.

The advantages and disadvantages of teaching quality are mainly reflected in teachers’ teaching attitude, teaching content, teaching method, and teaching effect. Teaching quality is a complex phenomenon affected by many factors, which needs a multi-level index system to reflect. Based on the investigation, the evaluation index system of teaching quality is determined, as shown in Table 3.

The purpose of physical education teaching evaluation in colleges and universities is to strengthen the macro-management of teaching work in colleges and universities, urge colleges and universities and their competent departments to pay more attention to undergraduate teaching work, increase investment in physical education teaching work, promote the basic construction of physical education teaching, deepen the reform of physical education teaching, and constantly improve the quality of physical education

Table 1: Evaluation index of physical education teaching quality

Serial number	Content	Evaluating indicator
1	Evaluation index of teaching attitude	Teaching responsibility Full preparation and proficiency in lecture content Observe teaching discipline The topic selection of the assignment is appropriate and the correction is serious
2	Evaluation index of teaching content	Patient and enthusiastic tutoring Correct point of view, clear concept Integrating theory with practice The content is rich and novel It is easy for students to understand The difficulty and depth are appropriate
3	Evaluation index of teachers' quality and ability	The language is vivid and concise Neat writing on the blackboard (beautiful courseware) Pay attention to the interaction between teachers and students, active classroom atmosphere, rigorous scholarship, a teacher Strict requirements and good guidance
4	Evaluation index of teaching method	The methods are various, vivid, and effective Teaching students in accordance with their aptitude and paying attention to inspiration Attach importance to the cultivation of students' innovative ability
5	Evaluation index of teaching effect	Students' understanding and mastery of knowledge Students' ability to solve problems After finishing the physical education course, the overall harvest

teaching and school running efficiency. The evaluation index system of higher physical education must take this as the starting point and end result to make the index system serve the purpose of evaluation [19]. The evaluation system itself has the characteristics of strong reality, guidance, and foresight. Therefore, the selection of the index system and the standard of evaluation grade should consider not only the actual situation of colleges and universities in China but also the requirements of national economic and social development, as well as the internal teaching quality assurance system of colleges and universities [20], as well as the external supervision system of the government, society, and students' parents on the quality of higher education, which can comprehensively reflect the comprehensive situation of the evaluated objects and grasp the main factors, to enhance the comprehensiveness and credibility of the evaluation.

2.3 The realization of multimedia-aided teaching effect evaluation of physical education course

The evaluation index system of physical education teaching quality is a specific regulation of the quality and quantity requirements of teachers' teaching activities. It is a collection of all factors to be considered in the evaluation of specific teaching activities, teaching objectives, and management objectives [21]. Because different evaluation subjects have a different understanding of the same evaluation project, to ensure the accuracy of the evaluation results, different evaluation subjects, namely students, peer teachers, and expert groups, need to develop different index systems. For different types of physical education courses, including theoretical courses, experimental courses, and physical education, the evaluation items are not the same but also to develop different index systems. Because the physical education teaching system exists as a unified whole, the process of developing students' intelligence, imparting and mastering "three basics," strengthening students' physique, and cultivating students' love for the motherland, abiding by discipline and communist moral quality, must be coordinated and unified in the physical education

Table 2: Evaluation index of the auxiliary effect of physical education teaching

Serial number	Content	Evaluating indicator
1	Student evaluation index system	Have enthusiasm for teaching work and teach seriously The explanation is clear and the demonstration action is accurate and standard The ability of organizing and solving problems in classroom teaching Teaching method and effect Be able to teach students in accordance with their aptitude and promote their personality development Pay attention to the cultivation of students' self-training and innovation ability It can improve students' physical and mental health and form lifelong sports consciousness
2	Student evaluation index system (experimental course)	Enthusiasm for teaching work, serious teaching attitude, stick to the post The lecture is brief and to the point, the key points are highlighted, and the demonstration operation is standardized Strict requirements for students, active guidance, patient answers Attach importance to the cultivation of students' practical ability and scientific style Be familiar with the content of the experiment and be able to answer students' questions in time Correct the experiment report seriously and timely It can stimulate students' enthusiasm and gain a lot from experiments
3	Evaluation index system of the teacher group	Observe the teaching discipline and stick to the post The lecture is brief and to the point, the key points are highlighted, and the demonstration operation is standardized Strict requirements for students, active guidance, patient answers The preparation before class is sufficient and the experiment content is arranged properly The students participated in the experiment actively and conscientiously without being late and leaving early

teaching system. In this system, teachers should not only impart physical education knowledge to students through various teaching methods and means but also follow the teaching rules to regulate the teaching system as a whole and make teaching and learning highly coordinated and unified through feedback information from students [22,23]. Then, the main factors of this complex system are teachers, students, teaching materials, teaching methods, and other subsystems. Therefore, the evaluation index system of physical education teaching quality should include four aspects: teachers, students, teaching materials, and teaching methods. Referring to the research results of teaching evaluation at home and abroad, a comprehensive evaluation index system including 2 levels and 19 indexes is established in Figure 3.

The random forest algorithm consists of different levels of decision trees, each with an evaluation result, and finally the classification regression of the evaluation results. The random forest algorithm was used to calculate the weight of each element based on the top-down decision tree hierarchy and to construct the index comparison judgment matrix based on the influence of each element on the quality of physical education teaching.

The weight of each element is calculated according to the hierarchy from top to bottom. First, calculate the four elements of the first level, A_1, A_2, \dots, A_m , and the synthetic weight of a_1, a_2, \dots, a_m . Then, calculate relative to the upper element A_k ($K = 1, 2, \dots, m$), the lower elements B_1, B_2, \dots, B_n , and the single weight of $b_1(k), b_2(k), \dots, b_n(k)$. Let the lower element associated with the upper element A_k be the first h elements B_1, B_2, \dots, B_n , first determine the relative importance of B_i element to B_j element b_{ij} . If B_i and B_j are considered to

Table 3: Calculation parameters of physical education teaching quality evaluation index

x_i	Teaching attitude (x_1)	Content of courses (x_2)	Teaching method (x_3)	Teaching effectiveness (x_4)
x_{11}	Lesson plan preparation (x_{11})	Content enrichment and rationality (x_{21})	The scientific nature of the method (x_{31})	Improve students' ability (x_{41})
x_{12}	Semester teaching plan (x_{12})	Cohesion of project content (x_{22})	Diversity of forms (x_{32})	Student test scores (x_{42})
x_{13}	After class and after class training on time (x_{13})	Applicability of supplementary content (x_{23})	Innovation of methods (x_{33})	Classroom teaching attraction (x_{43})

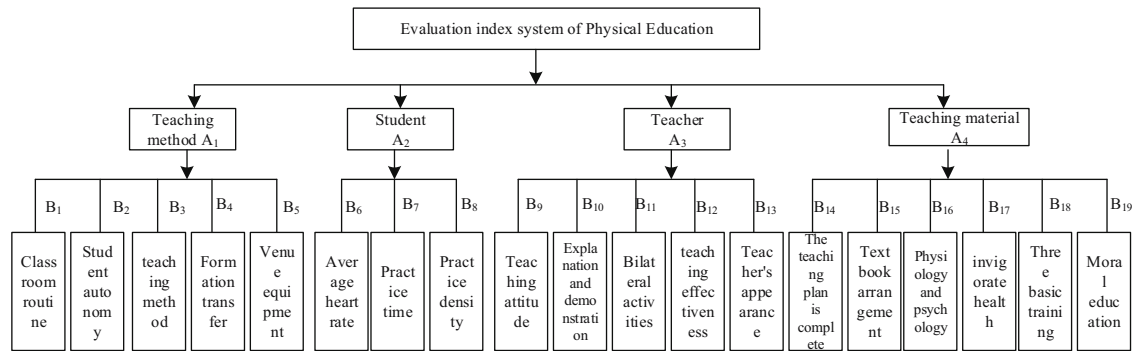


Figure 3: Teaching evaluation index system model.

be equally important, then take $b_{ij} = 1$ and $b_{ji} = 1$; if B_i is thought to be slightly more important than B_j , then take $b_{ij} = 3$ and $b_{ji} = 1/3$; if B_i is considered to be significantly more important than B_j , then take $b_{ij} = 5$ and $b_{ji} = 1/5$; if B_i is considered to be much more important than B_j , then take $b_{ij} = 7$ and $b_{ji} = 1/7$; and if B_i is considered to be absolutely important than B_j , then take $b_{ij} = 9$ and $b_{ji} = 1/9$. b_{ij} can also be set as the equivalent value of 2, 4, 6, and 8 according to the actual situation, and $b_{ij} = 9$ and $b_{ji} = 1/9$ can be set as 12, 14, 16, 18, or other more appropriate values. After determining b_{ij} , a pairwise comparison judgment matrix can be formed

$$(A_k - B) \begin{vmatrix} A_k & B_1 & B_2 & \cdots & B_h \\ B_1 & b_{11} & b_{12} & \cdots & b_{1h} \\ B_2 & b_{21} & b_{22} & \cdots & b_{2h} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ B_h & b_{h1} & b_{h2} & \cdots & b_{hh} \end{vmatrix} \quad (1)$$

Among them:

$$b_{ii} = 1, b_{ij} = b_{ji}^{-1}, h \leq 9. \quad (2)$$

For example, when calculating the weight of each element in the first level, the relative importance of each element can be set as 7, 5, 3, and 2 according to the degree of influence of each element on the teaching quality of physical education and the pairwise comparison judgment matrix can be set as:

$$(G - A) \begin{vmatrix} G & A_1 & A_2 & A_3 & A_4 \\ A_1 & 1 & 7/5 & 7/3 & 7/2 \\ A_2 & 5/7 & 1 & 5/3 & 5/2 \\ A_3 & 3/7 & 3/5 & 1 & 3/2 \\ A_4 & 2/7 & 2/5 & 2/3 & 1 \end{vmatrix} \quad (3)$$

The relative importance of other layers and the corresponding pairwise comparison judgment matrix can also be determined. The maximum eigenvalue and normalized eigenvector of the judgment matrix can be calculated by the power method or approximate power method. In this example, the maximum eigenvalue of $(g - a)$ obtained by the power method is $\lambda_{\max} = 4$, and the corresponding normalized eigenvector is $W = (0.44, 0.31, 0.19, 0.06)$. This is the single weight of the first-level elements A_1, A_2, A_3 , and A_4 , which is equal to their combined weight. It is further inferred that when A_k is independent of B_j elements. $B_j(k)$ is defined $a_s = 0$, and then the lower elements B_1, B_2 , under a single criterion A_k are obtained, the single weight of B_h is: $b_1(k), b_2(k), b_h(k)$. This determines first layer of the element under the A_4 second element $B_{14}, B_{15}, B_{16}, B_{17}, B_{18}$, the weight of B_{19} , power method is used to calculate the maximum eigenvalue $\lambda_{\max} = 6$, the standardization of the corresponding eigenvectors is: $W = (0.2857, 0.1904, 0.0952, 0.0476, 0.2381, 0.1429)$, lower level elements under the A_4 $B_{14}, B_{15}, B_{16}, B_{17}, B_{18}, B_{19}$ single weight can be as follows: 0.2857, 0.1904, 0.0952, 0.0476, 0.2381, 0.1429. Thus, the single weight of elements A_1, A_2, A_3 , and A_4 in the first layer is equal to their composite weight. In the second element $B_i (i = 1, 2, \dots, n)$, the weight of synthesis is as the following equation:

$$b_i = \sum_{k=1}^m a_k b_i^{(k)} \quad (i = 1, 2, \dots, n). \quad (4)$$

Then, the composite weight of B_1 can be calculated as the following equation:

$$B_1 = 0.3477 \times 0.44 + 0 \times 0.31 + 0 \times 0.19 + 0 \times 0.06 = 0.1530. \quad (5)$$

Whether the setting of the evaluation index system is scientific and comprehensive is very important to the evaluation results. At the same time, the selection of the weight coefficient of each index is also an important factor affecting the evaluation results. Therefore, in the formulation of the weight coefficient, not only the opinions of experts should be considered but also the opinions of all the evaluation subjects should be fully solicited. Moreover, reasonable amendments should be made based on the long-term evaluation, to make the selection of the weight coefficient more scientific and the final evaluation result more scientific. Based on the comparative study of existing indexes and weights, the weight of each index is determined in combination with the reality of Jingdezhen Ceramic Institute. Indicators and weights of students' evaluation of teaching values are presented in Table 4.

The indicators and weights of expert evaluation of teaching are further standardized, as shown in Table 5.

Finally, the indicators and weights of teachers' evaluation of teaching are standardized, as shown in Table 6.

Physical education is the last stage for students to accept physical education in school. It is the key period for students to master the basic knowledge and theory of physical education as well as the content, means, and methods of scientific physical exercise and to lay a foundation for lifelong physical exercise. Therefore, physical education in colleges and universities should focus on the cultivation of students' athletic ability and let them master the scientific knowledge of physical exercise, the body development in different periods of motor skill, make after graduation according to the geographical environment, the physical and mental situation, choose appropriate exercise contents, means, and methods, and become the sports knowledge, technology, promote the "national fitness movement," based on the multimedia auxiliary teaching, teachers actively guide students to learn actively, an evaluation of learning effect. In the

Table 4: Indicators and weights of students' evaluation of teaching values

Tier 1			Tier 2		
Serial number	Evaluating indicator	Weight	Serial number	Evaluating indicator	Weight
I	Teaching attitude	0.15	1	Teaching responsibility	0.2
			2	Full preparation and proficiency in lecture content	0.3
			3	Observe teaching discipline	0.2
			4	The topic selection of the assignment is appropriate and the correction is serious	0.2
			5	Patient and enthusiastic tutoring	0.1
II	Content of courses	0.35	1	Correct point of view, clear concept	0.3
			2	Integrating theory with practice	0.2
			3	The content is rich and novel	0.2
			4	It is easy for students to understand	0.2
			5	The difficulty and depth are appropriate	0.1
III	Quality and ability of Teachers	0.25	1	The language is vivid and concise	0.2
			2	Neat writing on the blackboard (beautiful courseware)	0.2
			3	Attach importance to the interaction between teachers and students, active classroom atmosphere	0.2
			4	Rigorous scholarship, a model for others	0.2
			5	Strict requirements and good guidance	0.2

Table 5: Expert evaluation index and weight coefficient

Serial number	Evaluating indicator	Weight
1	Teaching conscientiously and responsibly, focusing on teaching and educating people	0.2
2	Clear organization, rigorous theory, strong logicity, and outstanding key points	0.15
3	The teaching methods are various and flexible, paying attention to heuristic teaching and teaching students in accordance with their aptitude	0.15
4	Pay attention to the dialogue between teachers and students, active classroom atmosphere	0.1
5	Attach importance to the combination of theory and practice and cultivate students' ability to analyze and solve problems	0.15
6	Strict requirements for students, high attendance rate, high attendance rate, students reflect good teaching effect	0.1
7	Pay attention to the art of teaching, articulate, fluent Mandarin, moderate frequency, neat writing on the blackboard	0.15

Table 6: Teacher evaluation index and weight coefficient

Serial number	Evaluating indicator	Weight
1	The proficiency of teaching materials and the emphasis on lectures	0.2
2	Language expression ability and effect	0.15
3	Can we pay attention to updating the teaching content	0.1
4	Classroom discipline and students' attendance	0.1
5	Can the teaching method adapt to the teaching content	0.15
6	Teaching attitude	0.1
7	Scientific accuracy of knowledge	0.15

practice of the professional physical education teaching model, students should be encouraged to cooperate closely as much as possible to achieve common progress and, at the same time, make full use of multimedia technology, in the physical education teaching effect evaluation, highly summarize the text-related content, and extract the core key points, which can not only effectively assist teachers to complete the teaching task but also can deepen the impression of students. Under this premise, students can organize group practice, through the way of mutual help, which constantly deepens the impression of students on sports learning and their understanding of the central intention. Through these things, teachers form an electronic no-class schedule, and able to arrange some students appropriate learning tasks, has a unique effect, in the whole teaching process, to evaluate is indispensable link, the multimedia auxiliary method as a mature information technology, lay a good foundation for teaching evaluation, provides reference for teachers to effectively grasp the teaching schedule. To effectively improve the quality of professional teaching, it is necessary to carry out the assessment of teaching activities in an all-around way, which is based on the teachers' full grasp of the learning progress. In the evaluation of multimedia-assisted physical education teaching, teachers can use a variety of ways to grasp the learning feedback of students to know them well. Give full play to the relevant means of multimedia technology, summarize and analyze the survey results, and draw a single list. At the same time, students' self-evaluation is also an important sign. Teachers can make full use of multimedia means, grasp students' psychological changes in learning, adjust the teaching progress and content in time, and play an important role in the evaluation.

3 Experimental results

Through sample studies, questionnaires and other means, and the questionnaire analysis and understanding of different forms. To understand the profound significance of the evaluation practice of

Understanding the significance of the foundations of university physics teaching evaluation practices from various perspectives, analyze the existing problems, conduct countermeasure research, and provide feasible policy reference. Collect a large amount of literature information by consulting China Journal Net, Wanfang database, and relevant books. The objective of the study is observed comprehensively, and the content of the observation is the profound significance of the evaluation practice of physical education teaching in colleges and universities in China. In this study, the PE teaching administrators, PE teachers, and students of colleges and universities in developed and undeveloped regions were taken as the research objects to understand the situation of the evaluation practice of PE teaching in colleges and universities in China through questionnaires. A total of 100 questionnaires were sent out and 96 effective questionnaires were collected with a recovery rate of 96%. Statistical software SPSS11.5 was used to analyze the data collected in the research process, and software such as Excel2003 was used for processing and statistics on the computer. There were four satisfaction options in the questionnaire: very satisfied, satisfied, general, and unsatisfied. Using the literature [4,5] methods as comparative methods, the survey data were statistically collated and analyzed and further summarized the satisfaction of the three methods. The specific survey findings are shown in Figure 4.

As we can see from Figure 4, compared with the literature [4,5] methods, the proportion of students evaluated as very satisfactory and satisfactory reached 72%, while the other two methods' satisfactory options were lower than 60%.

According to the results of Figure 4, the understanding results of different respondents on the important role of college sports evaluation are summarized in Figure 5.

Based on the level of understanding of college athletics assessment, different survey subjects realized that the evaluation of college sports evaluation played an important role in the evaluation of college sports

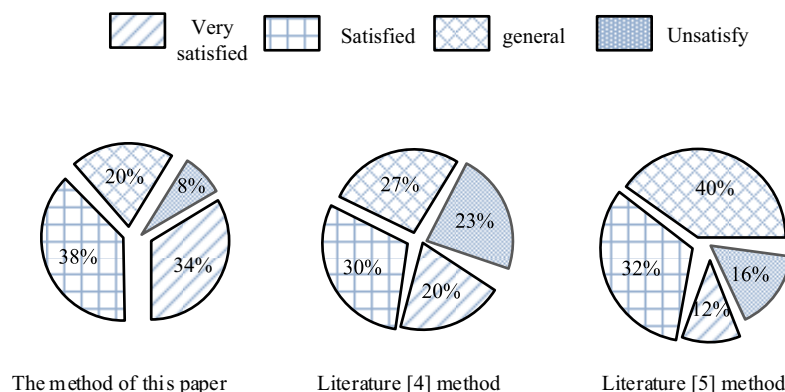


Figure 4: Assisted teaching satisfaction.

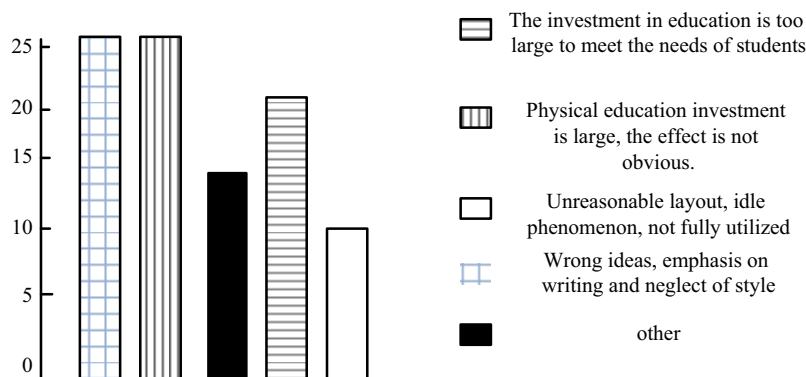


Figure 5: Teaching evaluation effect.

evaluation. The evaluation of college physical education teaching can effectively promote the improvement of college teaching quality and improve the scientific nature of college physical education teaching to promote the scientific construction, standardization, specialization, and institutionalization of school sports management, which is conducive to the overall development of college education.

4 Discussion

According to Figures 4 and 5, compared with the existing research results of the literature [4] method and the literature [5] method, this method has higher user satisfaction and its effectiveness has been recognized by teachers and students. This is because this method adds the evaluation of the multimedia teaching evaluation index system in the process of model learning, constructs the evaluation matrix of the teaching effect evaluation index by using a random forest algorithm, and calculates the index weight to make the evaluation more effective and guide the teaching effect.

5 Conclusion

The physical education teaching evaluation is the basic means for colleges and universities to enhance the motivation and vitality of running schools and to carry out self-examination, self-adjustment, and self-perfection. Evaluation can be based on the level of education management and staff training as well as basic specifications and standards, and requirements, through a comprehensive, systematic evaluation objects to evaluation diagnosis, identify the qualified and unqualified, certain advantages and grades and find the shortcomings and deficiencies to improve the teaching quality of education, improve school conditions, enhance the teaching efficiency, and improve the management work. Teaching evaluation has the functions of identification, diagnosis, feedback, communication, guidance, motivation, supervision, and decision-making. Therefore, its position and function are irreplaceable by the traditional teaching management mode.

Acknowledgments: This article was supported by the Research Project of Teaching Reform in Colleges and Universities of Hunan Province: Online and Offline Hybrid Teaching Reform and Practice of Sport Science of Human Body Courses Based on MOOC Platform (No. HNJG-2020-0512).

Conflict of interest: The authors state no conflict of interest.

Topics: Online and offline hybrid teaching reform and practice.

References

- [1] Harisha CR. Pharmacognostical and pharmaceutical evaluation of brihat saindhavadi taila in the management of Amavata W.S.R. to rheumatoid arthritis. *Multimed Syst.* 2020;7(5):1003–11.
- [2] Hou SK, Liu YR, Li CY, Qin PX. Dynamic prediction of rock mass classification in the tunnel construction process based on random forest algorithm and TBM in situ operation parameters. *IOP Conf Ser Earth Environ Sci.* 2020;570(5):052056.
- [3] Tang L, Cai F, Ouyang Y. Applying a nonparametric random forest algorithm to assess the credit risk of the energy industry in China. *Technol Forecast Soc Change.* 2019;144:563–72.
- [4] Huang B, Wang YH. Empirical study on the teaching effectiveness of multimedia assisted badminton. *Sport Sci Technol.* 2019;40(1):141–2.

- [5] Liu LN. An evaluation system of ideological and political practice teaching based on multimedia. *Microcomput Appl.* 2021;37(7):52–5.
- [6] Zhang X, Shi W. Research about the university teaching performance evaluation under the data envelopment method. *Cognit Syst Res.* 2019;56:108–15.
- [7] Veale CGL, Jeena V, Sithebe S. Prioritizing the development of experimental skills and scientific reasoning: A model for authentic evaluation of laboratory performance in large organic chemistry classes. *J Chem Educ.* 2020;97(6):675–80.
- [8] Maison M, Alrizal A, Wardana RW, Natalia U. The feasibility of electrostatic teaching material: Oriented to conceptual understanding. *J Phys Conf Ser.* 2021;1731(1):012067.
- [9] Lino A, Rocha A, Sizo A. Virtual teaching and learning environments: automatic evaluation with artificial neural networks. *Clust Comput.* 2017;22(3):7217–27.
- [10] Wu X, Zhou Y, Xing H. Studies on the evaluation of college classroom teaching quality based on SVM multiclass classification algorithm. *J Phys: Con Ser.* 2021;1735(1):012011.
- [11] Lyu Y, Yang X, Yao J. Comprehensive evaluation and analysis of teaching and research performance of art majors. *Int J Emerg Technol Learn.* 2020;15(20):241–54.
- [12] Li J. A random dynamic search algorithm research. *J Comput Methods Sci Eng.* 2019;19(3):659–72.
- [13] Frank JJ, Poulakos AG, Tornero-Velez R, Xue J. Systematic review and meta-analyses of lead (Pb) concentrations in environmental media (soil, dust, water, food, and air) reported in the United States from 1996 to 2016. *Sci Total Environ.* 2019;694:133489.
- [14] Cui Y, Chen K, Chen T. Design of millisecond IP network USB hub for remote experiment education. *J Comput Methods Sci Eng.* 2020;20(4):1245–64.
- [15] Kanth R, Skön JP, Toppinen A, Lehtomäki K, Laakso MJ, Heikkonen J. Innovative and efficient teaching methodology for digital communication systems using an e-learning platform. *J Commun.* 2019;14(8):689–95.
- [16] Cvetković BN, Gligorijević M, Petković D, Jović S, Milovančević M, Nikolić V. Evaluation of information and communication technology sector in the teaching process and strategic collaboration between universities and industry. *Comput Appl Eng Educ.* 2019;27(3):653–62.
- [17] Abbessi W, Nabli F. General approach for video traffic: From modeling to optimization. *Multimed Syst.* 2019;25(3):177–93.
- [18] Su Z. A multi-parameter joint warning mechanism for physical condition monitoring system in physical education. *Recent Pat Eng.* 2020;14(1):113–9.
- [19] Wang J, Hoondert R, Thunnissen NW, van de Meent D, Hendriks AJ. Chemical fate of persistent organic pollutants in the arctic: Evaluation of simplebox. *Sci Total Environ.* 2020;720:137579.
- [20] Miguel CV, Moreira C, Alves MA, Campos JBLM, Glassey J, Schaer E, et al. Developing a framework for assessing teaching effectiveness in higher education. *Educ Chem Eng.* 2019;29(10):21–8.
- [21] Li W, Fan Y, Xu Q. Teaching-learning-based optimization enhanced with multiobjective sorting based and cooperative learning. *IEEE Access.* 2020;8:65923–37.
- [22] Park W, Korres G, Moonesinghe T, Eid M. Investigating haptic guidance methods for teaching children handwriting skills. *IEEE Trans Haptics.* 2019;12(4):461–9.
- [23] Gu Y, Shen H, Bai G, Wang T, Liu X. QoI-aware incentive for multimedia crowdsensing enabled learning system. *Multimed Syst.* 2020;26(1):3–16.