Evaluation Method of Physical Education Teaching Quality in Higher Vocational Colleges Using Mobile Teaching Terminal

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Abstract. At present, there is a problem of single subject and mode in the evaluation of physical education teaching quality in higher vocational colleges, which affects the accuracy of the evaluation results. In order to improve the accuracy of teaching quality evaluation results, this paper proposes an evaluation method of physical education teaching quality in Higer Vocational Colleges by using mobile teaching terminal. Analyze the application strategy of mobile teaching terminal in physical education teaching; Collect physical education teaching data based on mobile teaching terminal; Design the teaching quality evaluation index system; Determine the index weight and build the quality evaluation model; The comprehensive evaluation of physical education teaching quality in higher vocational colleges is realized through the qualitative index fuzzy quantitative method. The test results show that the higher vocational physical education teaching quality evaluation method using mobile teaching terminal proposed in this paper has high detection rate and accuracy, so the evaluation results are more effective.

Keywords: Mobile teaching terminal · Higher vocational colleges · Physical education · Teaching quality · Evaluation method · Index system

1 Introduction

Teaching is the starting point and central link of all school education activities. As main implementers for school physical education, physical education teachers are responsible for imparting students' physical education knowledge and skills, cultivating students' good quality and improving the quality of school education. The core sports literacy of young students has risen to the height of national strategy. In order to develop teenagers' core literacy, the state endowed the potential and innovative teaching mode. Physical evaluation is the physical education teaching process. Therefore, through the evaluation system, we can put forward feedback about teachers' teaching situation, so as to improve teachers' teaching ability and promote the improvement of school education quality. This not only provides policy guarantee for the smooth development of specialized teaching reform. Teachers' professional development has always been the focus of educational

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reform. It is a process from immature to mature for teachers as professionals to develop from novice teachers to expert teachers [1]. There are serious deviations in this model, which is one of the factors lagging behind the reform. The evaluation for teachers' teaching ability is very cumbersome, and considering the particularity, the evaluation work for it is very difficult, so build a relatively scientific and system. By constructing ability, we diagnose teachers' teaching ability scientifically and reasonably, improve teaching ability and promote the specialization [2]. The teaching ability is the focus of development and the core ability of effective teaching. If you want to improve professional ability, you must have higher teaching ability as support. Driven by mobile teaching terminal, the evaluation results can reflect the real teaching resultsphysical education. This can not only promote relevant teachers to adopt correct values when engaging in teaching activities, but also urge relevant teachers to continuously improve their quality, so as to judge their teaching activities relatively fairly, and finally help the overall physical education management and fundamentally improve teachers' teaching ability. In order to improve the evaluation effect of teaching and assist the physical education teaching, this paper puts forward a method of higher vocational physical education teaching quality evaluation by using mobile teaching terminal, so as to promote the implementation of higher vocational physical education teaching evaluation, and also hopes to provide reference for relevant research.

2 Evaluation Method of Higher Vocational Physical Education Teaching Quality Using Mobile Teaching Terminal

2.1 Application Analysis of Mobile Teaching Terminal in Physical Education

School education cultivate people with all-round development. Based on practical level, the ability of such teachers should be defined. The ability can be divided into two parts, mainly aiming at the cognitive and operational abilities produced in the specific teaching. Digital learning resources rely on various storage technologies and database technologies, which can realize the storage of massive learning resources, so that students can choose suitable learning resources from massive learning resources. Cognitive ability means that teachers of related disciplines need to make a basic judgment on the abilities of students from their own understanding of the established teaching outline and plan, and then have an overall judgment. Teachers' cognitive ability is helpful to help students master the required sports skills and sports knowledge, and shape students' good ideology and morality. On the one hand, it has greater autonomy in choosing learning resources; On the other hand, for students, they can understand the knowledge points more thoroughly through sufficient data. Operational ability refers to the ability of teachers of this kind of discipline to constantly deal with various problems in their specific teaching work. The sports learning based on mobile terminal frees teachers from the busy demonstration actions, and can interact with students on some key knowledge of sports learning at any time, and discuss some more profound sports theories and tactics with students. Clarifying the characteristics and connotation of sports specialized teaching can not only make more people know and contact specialized teaching, but also form a joint force to promote the development of specialized teaching [3]. Teachers' operational

ability is helpful to develop students' physical fitness and cultivate students' healthy sports behavior. Teachers pass on their training experience to the students through the course. Students receive these teachings and build their own knowledge system, so as to avoid injury during training and to enhance their physical fitness. The physical training system based on mobile terminals is shown in Fig. 1.

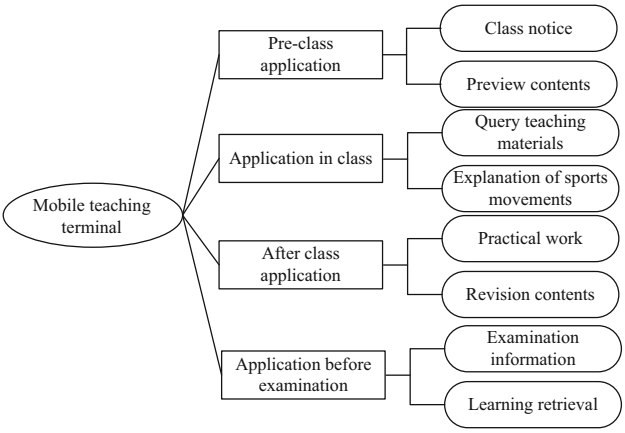

Fig. 1. The physical training system

In new and old curriculum standards, although there are four different characteristics in the physical education curriculum, there are some changes in the specific content, changing the fitness of the former to the selectivity of the latter. Teachers can observe their own defects in action through video, correct them in time, and avoid inaccurate actions in the courseware as much as possible. Students can grasp the essentials of an action accurately through action freeze frame, and draw inferences from one instance through careful analysis. The practical content in the new version covers the practicality and fitness of the old version, and complements the selectivity. The selectivity mainly focuses on students to cultivate different sports specialties based on their own physical quality, and form the habit of regular exercise at the same time. Students' learning experience can also be spread among students through data sharing to help other students in the group learn.

2.2 Collect Physical Education Teaching Data Based on Mobile Teaching Terminal

Mobile terminal equipment has strong flexibility and can be carried around at any time, so mobile terminal has become a necessary basic tool for mobile learning. The mobile teaching terminals have function of student measurement of learning situation. The data stored of the student evaluation is as few as millions of thousands of pieces, as many as tens of millions of pieces. These data are still rising sharply, and the amount of data is unimaginable. No matter where learners do, they can choose and obtain the knowledge content they need through the equipment they carry. Mobile teaching terminal can help

the rapid improvement of physical education teachers' teaching ability, so as to achieve the most fundamental purpose to continuously improve the horizontal of talent training. In process for mobile learning, users can realize rapid and efficient communication, synchronous sharing of resources and information, and even face-to-face interaction through various networked ways. In addition, the communication, assessment and evaluation between teachers and students can also be more diversified.

There are inevitably some abnormal data in the sports teaching data collected by the mobile teaching terminal. Through the analysis of the initial data, it is found that there are many noise data in the data, which are mainly divided into noise caused by subjective factors and noise caused by objective factors. If not handled, it will affect the judgment of teachers' current teaching situation. Clean physical education teaching information and remove the strange information from the sample set, so as to ensure the effectiveness and authenticity of the evaluation. The subjective factors mainly include: students have a certain perfunctory psychology towards the teaching evaluation activity itself; Each student has different evaluation criteria for teachers; Students may maliciously slander individual teachers in the process of teaching evaluation. Objective factors include: different course assessment methods, students' different attitudes towards their teaching evaluation and so on. The information was classified based on the similarity, and then the abnormal elements in the teaching evaluation were eliminated. The similarity of all attribute dimensions in the sample set was calculated, and the samples were divided according to the similarity calculation results for each attribute value. The equation for the similarity of the sample is as follows:

$$\gamma(\varphi, \vartheta) = \frac{\sum_{x=1}^{a} [(\varphi_x - u_1)(\vartheta_x - u_2)]}{\sqrt{\sum_{x=1}^{a} (\varphi_x - u_1)^2} \sqrt{\sum_{x=1}^{a} (\vartheta_x - u_2)^2}} \tag{1}$$

In formula (1), φ, ϑ represent two dimension attributes; γ represents similarity; x, a represent the serial number and total number of sample data respectively; φ_x and ϑ_x represent the sample data of two dimension attributes respectively; u_1 and u_2 represent the average value of the value range of the two dimensions[4, 5].

Select the nearest point as the category of the data. After this visit, all samples are divided into the category. In order to eliminate the difference of evaluation scale of different individuals, the data are standardized, and the data are scaled and mapped to the [0,1] interval. The mapping method is as follows:

$$\varphi_x' = \frac{\varphi_x - m_1}{m_2 - m_1} \tag{2}$$

In formula (2), φ_x' represents the corresponding value of the standardized sample data; m_1 and m_2 are the minimum and maximum values of sample data respectively.

According to the standardized data, the data are merged according to the method of calculating the average value of each column, so that the teaching evaluation data of each PE teacher becomes a piece of data [6, 7]. Teachers can identify, develop, accumulate and use physical education curriculum resources. Similarly, it itself is the most

basic resource condition. The professional teachers themselves is an important physical education curriculum resource. Continuously surpass in development and utilization of physical education curriculum resources, and have achieved regeneration and created curriculum resources beyond their own value. The real significance and value of these data stored in mobile teaching terminals lies in timely understanding and mastering the overall state of teachers' teaching work through its analysis and mining, and giving supervising and guiding teaching, enhancing teachers' internal driving force of teaching, purposeful training, targeted management and so on.

2.3 Design the Evaluation Index System of Physical Education Teaching Quality in Higher Vocational Colleges

Teachers' ability should be improved, and the evaluation can truly reflect the realization of students' learning objectives of the curriculum. The focus of evaluating the learning of the curriculum is the formation of the core quality of the discipline, the related problems in real life, whether students develop healthy habits in real life, and the attitude and ability[8, 9]. When choosing the evaluation content, we should refer to the new curriculum standard, evaluate PE teachers reasonably and scientifically, and clarify the direction of teachers' professional development. When evaluating PE teachers, we should consider their past and future, so as to fully mobilize the enthusiasm of teachers.

At present, concomitant evaluation is an evaluation system that combines summative evaluation with process evaluation, and pays equal attention to both result and process. Higher vocational physical education takes initiative, teachers' will, teachers' thinking and teachers' professional ethics are all important factors that restrict students' learning. Let physical education teachers actively participate in the evaluation work from inside to outside, so that they can continuously improve their teaching ability according to the results of evaluation [10, 11]. Whether teachers pay close attention to students' personality development, whether students master effective learning methods, whether students acquire knowledge, develop ability and have positive emotional experience are the standards to measure the quality of teaching effect. The primary index are shown in Table 1.

The selected indicators and formulated standards should have scientific basis, and the technical evaluation method of evaluation should also be scientific. The design scheme, collected information, results and treatment of related matters should not lack reliability, so as to ensure that it is effective [12]. The diversity of evaluation content is the diversity of content. For example, sports theoretical knowledge and physical fitness, but also evaluate learning attitude, learning ability, progress of sports skills and so on.

2.4 Construction of Higher Vocational Physical Education Teaching Quality Evaluation Model

The evaluation system is composed of multiple complex indexes, so the evaluation index system is more complex. This can make the evaluation index more objective and accurate. Weight refers to comparing and measuring the importance in overall things in a certain quantitative form. The change of weight value is directly related to the evaluation results. Before starting the construction, we need to calculate the sum and average of the

Table 1. Evaluation Index System

Secondary index	Symbol	Tertiary indicators	Symbol
Teaching preparation	A1	Reasonable preparation of teaching documents	B1
		Site equipment is fully prepared	B2
		Choose teaching methods	B3
		Classroom content design	B4
Teaching implementation	A2	Create a teaching environment	B5
		The course progress is reasonable	B6
		The teaching content is novel	B7
		Action demonstration is accurate	B8
Teaching guidance	A3	Teaching concept	B9
		Teaching attitude	B10
		Teaching coordination ability	B11
		Teaching strain ability	B12
Teaching result	A4	Students master sports skills	B13
		Good communication between teachers and students	B14
		Improve students' physical literacy	B15
		Spread the scientific fitness knowledge	B16

importance scores of various experts on the indicators at all levels, and then compare the scores of the two indicators, so as to find out the difference in the importance of each indicator. The judgment matrix is:

$$W = \begin{Bmatrix} 1 * p * q \\ \frac{1}{p*1*r} \\ \frac{r*p}{q*1} \end{Bmatrix} \tag{3}$$

In formula (3), W represents the judgment matrix; p, q and r are the importance degree of each element in the same level with respect to a certain criterion in the previous level. Calculate the n-th root of the product of each row, normalize the vector, and obtain the characteristic vector, that is, the weight of each index.

$$F = \frac{\sqrt[n]{W}}{\sum_{n} \sqrt[n]{W}} \tag{4}$$

In formula (4), F represents the eigenvector; n represents the number of rows of the judgment matrix.

Carry out a sequence test and basic satisfaction consistency test on the feature vector, and the test shows that the weight is acceptable. When CR < 0.1, it can be considered

that the evaluation is completely consistent, and calculated coefficient can more perfect mapping the relative importance index, otherwise the matrix must be readjusted to make it completely consistent [13]. According to the value of the expert opinions and the indicators, the weight sum of the overall evaluation system is calculated, and each weight index is ranked. The higher the ranking is, the more important it is, and the score increases accordingly. Then, the teaching level is vaguely and comprehensively evaluated, and the model is shown in Fig. 2.

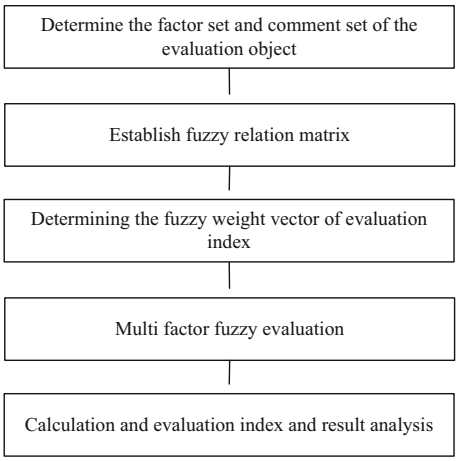

Fig. 2. Evaluation Model

For each student, the evaluation system users can get enough scoring elements and scoring attributes to make a comprehensive evaluation of the teaching level. The evaluator may make a collection of various general evaluation result elements for the evaluation object, that is, the comprehensive evaluation result of physical education teachers' teaching quality in higher vocational colleges. Then, through the unified quantitative processing of each factor, the evaluation set of each index constitutes a general evaluation matrix. The fuzzy evaluation comprehensive result vector can be obtained by calculating in the way of fuzzy operation and normalizing the results. So far, the design of higher vocational physical education teaching quality evaluation method using mobile teaching terminal has been completed.

3 Experimental Study

3.1 Experimental Preparation

Collect the PE teaching data in this paper from mobile teaching terminal. Using the method of the above parameters, the weight of the scoring indicators at all levels is calculated. The preparation results are detailed in Table 2.

It can be seen from Table 2 that the "Action demonstration is accurate" weight index is the highest. The data of Table 2 was inserted into the higher vocational physical education quality were analyzed.

Table 2. Index weight coefficient

Secondary index symbol	Weight	Tertiary indicators symbol	Weight
A1	0.1563	B1	0.0527
		B2	0.0423
		B3	0.0751
		B4	0.0872
A2	0.3121	B5	0.0815
		B6	0.0818
		B7	0.0864
		B8	0.0995
A3	0.2275	B9	0.0527
		B10	0.0536
		B11	0.0492
		B12	0.0473
A4	0.3041	B13	0.0517
		B14	0.0528
		B15	0.0415
		B16	0.0447

3.2 Results and Analysis

Verifing the higher vocational method using teaching terminal, the detection rate and accuracy ability of evaluation method. The test samples are divided into three levels: 1000, 5000 and 10000. The teaching quality is evaluated, and evaluation method are calculated. The test results are also compared with the two conventional methods. The comparison results are shown in Tables 3, 4, 5.

In the test with a sample number of 1000, the detection rate of the higher vocational physical education quality evaluation method using the mobile teaching terminal was 0.7753, which was improved by 0.1120 and 0.1349 compared with the neural network-based and SVM-based evaluation method.

In the test with a sample number of 5000, the detection rate of higher vocational physical education quality evaluation method using mobile teaching terminal was 0.7254, which improved 0.0989 and 0.1302 compared with the neural network based and SVM based evaluation method.

In the test with 10000 samples, the detection rate of higher vocational physical education method using teaching terminal is 0.6858, which is 0.1048 and 0.1191 higher than other methods. From the index of detection rate, the performance of this paper is better than the comparative physical education teaching evaluation method. Then, three method was evaluated as the precision index. The precision comparison results of the evaluation methods are shown in Tables 6, 7, 8.

Table 3. Comparison results of detection rate of 1000 samples

Test times	The method of the article	Traditional method 1	Traditional method 2
1	0.7954	0.6849	0.6244
2	0.7847	0.6713	0.6477
3	0.7781	0.6804	0.6716
4	0.7528	0.6588	0.6183
5	0.7612	0.6496	0.6555
6	0.7856	0.6761	0.6268
7	0.7965	0.6854	0.6037
8	0.7530	0.6670	0.6621
9	0.7825	0.6212	0.6552
10	0.7628	0.6383	0.6385

Table 4. Comparof detection rates for 5000 samples

Test times	The method of the article	Traditional method 1	Traditional method 2
1	0.7104	0.6552	0.6021
2	0.7247	0.6384	0.5983
3	0.7411	0.6148	0.5954
4	0.7188	0.6211	0.5883
5	0.7055	0.6025	0.5863
6	0.6926	0.6502	0.5972
7	0.7463	0.6266	0.6044
8	0.7389	0.6333	0.5997
9	0.7322	0.6157	0.5926
10	0.7434	0.6074	0.5872

In the test with a sample number of 1000, the precision rate for the evaluation method using the teaching terminal was 0.8206, which was improved by 0.0570 and 0.0852 compared with the neural network-based and SVM-based evaluation method.

In the test with a sample number of 5000, the precision rate for the method using the teaching terminal was 0.7505, which was improved by 0.0677 and 0.1032 compared with the neural network-based and SVM-based evaluation method.

In the test with 10000 samples, the precision rate for method using teaching terminal is 0.7021, which is 0.0900 and 0.1296 higher than other methods. However, the paper method is basically not affected by the increase of samples, and still maintains a high precision, while the accuracy of other methods is reduced.

Table 5. Comparison of detection rates for the 10000 samples

Test times	The method of the article	Traditional method 1	Traditional method 2
1	0.6649	0.5842	0.5569
2	0.6786	0.5786	0.5448
3	0.6852	0.5958	0.5687
4	0.6964	0.5667	0.5824
5	0.6952	0.5833	0.5855
6	0.6957	0.5820	0.5636
7	0.6975	0.5954	0.5773
8	0.6712	0.5777	0.5615
9	0.6823	0.5816	0.5608
10	0.6908	0.5642	0.5651

Table 6. Precision rates of the 1,000 samples

Test times	The method of the article	Traditional method 1	Traditional method 2
1	0.8143	0.7466	0.7262
2	0.8210	0.7505	0.7384
3	0.8054	0.7678	0.7457
4	0.8285	0.7844	0.7548
5	0.8368	0.7717	0.7676
6	0.8132	0.7621	0.7123
7	0.8256	0.7465	0.7235
8	0.8027	0.7532	0.7352
9	0.8372	0.7856	0.7044
10	0.8214	0.7678	0.7461

Based on comprehensive detection rate and accuracy rate indicators, method using mobile teaching terminal proposed in this paper has better evaluation effect and has positive significance in theory and practice. Through this evaluation, strengthen the construction of physical education teachers, strengthen management, ensure the quality of physical education and teaching, and promote the professional development of physical education teachers.

Table 7. Precision rates of the 5,000 samples

Test times	The method of the article	Traditional method 1	Traditional method 2
1	0.7543	0.6926	0.6453
2	0.7782	0.6848	0.6506
3	0.7664	0.6873	0.6643
4	0.7437	0.6694	0.6782
5	0.7258	0.6715	0.6223
6	0.7776	0.6757	0.6303
7	0.7518	0.6921	0.6657
8	0.7352	0.6984	0.6572
9	0.7423	0.6861	0.6414
10	0.7293	0.6701	0.6181

Table 8. Precision rates of the 10000 samples

Test times	The method of the article	Traditional method 1	Traditional method 2
1	0.6842	0.6327	0.5762
2	0.6974	0.6151	0.5805
3	0.6888	0.6048	0.5647
4	0.7156	0.5976	0.5738
5	0.7003	0.6259	0.5652
6	0.7225	0.5914	0.5719
7	0.7161	0.5804	0.5827
8	0.7337	0.6309	0.5595
9	0.6852	0.6258	0.5673
10	0.6773	0.6165	0.5832

4 Conclusion

This paper puts forward an evaluation method of physical education teaching quality in Higher Vocational Colleges by using mobile teaching terminal. This method innovatively collects data of mobile terminals; Design the evaluation system; Build the quality evaluation model; The comprehensive evaluation of teaching quality is realized through the qualitative index fuzzy quantitative method. The test results illustrate that this method can basically reflect all elements. When using this system to evaluate, we can not only consider the specific situation of the evaluator, such as the identity of the evaluator and the resources that the evaluator can control, but also consider the specific situation of the evaluated party, such as the scale of the evaluated party and the number of students.

According to the above situation, we should reasonably decompose the evaluation system and use the corresponding evaluation forms to make the evaluation activities faster, objective and effective.

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