Evaluation Method of Teaching Quality of Adolescent Health Physical Education Based on Mobile Education Technology

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Abstract. At present, when the teaching quality evaluation methods of adolescent health physical education courses encounter large-scale data, the evaluation speed is slow, In order to solve this problem, a teaching quality evaluation method of adolescent health physical education based on mobile education technology is proposed. Vector, evaluation of potential user's demand, evaluation of student's physical activity quality, vector of potential user's demand, evaluation of student's physical activity quality, estimation of potential user's demand, evaluation of student's physical activity quality, evaluation of potential user's demand, evaluation of student's physical activity quality. Experimental results: the average evaluation speed of the adolescent health physical education teaching quality evaluation method in this paper and the other two evaluation methods are 9.884 s, 16.184 s and 16.489 s respectively, which shows that the performance of the adolescent health physical education teaching quality evaluation method is more perfect after fully combining the mobile education technology.

Keywords: Mobile education · Teenagers · Health physical education curriculum · Teaching practice · Physical activity · Teaching quality evaluation

1 Introduction

Teaching quality evaluation is directly related to the quality of talent training [1, 2]. The traditional teaching quality evaluation in China mainly includes expert evaluation, peer evaluation and leadership evaluation. The teaching quality of adolescent physical education is a multidimensional and dynamic concept, which has the characteristics of society and the times. There are different evaluation standards for teaching quality according to the surrounding humanistic environment, facilities and equipment conditions of sports venues, teachers and teaching subjects. With the development of higher education in China, the main role of teenagers has become increasingly prominent. As

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a new evaluation method, teenagers' evaluation has attracted more and more attention. Therefore, the evaluation of physical education teaching quality cannot be judged from the traditional perspective, but from the perspective of development according to the needs of society [3, 4]. From the main research results, teaching quality evaluation plays a very important role in teaching theory research. Many scholars have done a lot of research work on teaching quality evaluation in Colleges and universities and achieved a series of research results. The teaching quality evaluation system should be the unity of adaptability, multidimensional and development. At present, most schools do not have a teaching quality evaluation form specifically for physical education courses. There may be physical education teaching quality evaluation form, but the satisfaction evaluation of teenagers is ignored, resulting in the evaluation results can not truly reflect the learning experience of teenagers. At the same time, due to the large amount of data involved in the evaluation, many research methods have a slow evaluation speed in the process of evaluation, which affects the efficiency of evaluation. Combined with the current situation of social development and the characteristics of teenagers' behavior, previous relevant research results, as well as the opinions and suggestions of experts, scholars and front-line teachers, this paper makes an all-round discussion on the connotation and standards of teaching quality. This study intends to evaluate the quality of physical education teaching from the aspect of teenagers' learning satisfaction. Studying the teaching quality from the aspect of teenagers' learning satisfaction can not only enable teenagers to express the physical education learning experience of the whole learning process, reflect the degree of fit between learning expectations and learning results, but also explore the loyalty of teenagers' physical education learning. The purpose of reconstructing the scientific evaluation system of teaching quality of youth physical education curriculum is to put forward the evaluation standards of physical education teaching suitable for social development from the perspectives of objectivity, comprehensiveness, reality, simplicity and operability. Overcome the problems existing in the previous expert evaluation, such as the obvious improvement of teachers' teaching quality when experts listen to classes, and the non objective evaluation factors such as human evaluation caused by peer evaluation. This study has certain reference significance for promoting the scientific development of physical education teaching quality evaluation. It has certain theoretical value for enriching and perfecting the evaluation system of college physical education teaching quality, effectively guiding physical education teaching practice, improving and improving physical education teaching quality, and finally realizing the training goal of physical education curriculum. The main aspects of the research are: first, the main body of teaching quality evaluation; Second, the content of teaching quality evaluation; The third is the method of teaching quality evaluation; Fourth, the system of teaching quality evaluation.

2 Evaluation Method of Teaching Quality of Adolescent Health Physical Education Based on Mobile Education Technology

In order to enhance the educational effect of adolescent health physical education curriculum and promote the improvement of teachers' teaching quality, this paper designs a teaching quality evaluation method of adolescent health physical education curriculum

based on mobile education technology. The following is the flow of the teaching quality evaluation method of adolescent health physical education (Fig. 1).

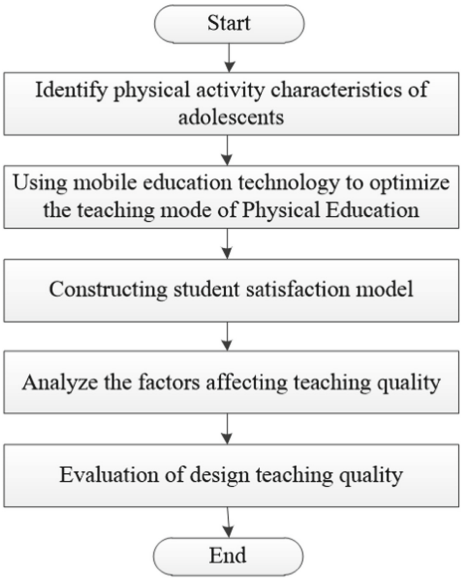

Fig. 1. Flow of teaching quality evaluation method of adolescent health physical education

2.1 Identify Physical Activity Characteristics of Adolescents

The definition of physical activity must be distinguished from physical exercise. Health education is a public health strategy and a professional field of public medicine. With the progress of society and the development of medical research and practice, it has been given new connotation. Physical exercise is the lower concept of physical activity, which refers to planned, structured and repetitive physical activities, in order to improve or maintain one or more physical abilities. Adolescent healthy physical activities cover five levels, as shown in Fig. 2.

As can be seen from Fig. 2, the main constituent elements of teenagers' healthy physical activities include: health policy, health education (health curriculum teaching, health activities, health consultation), physical exercise habits, school health services and so on. The World Health Organization believes that health education refers to making people pay attention to their health and know how to maintain their health and seek appropriate help when necessary. Motion sensor is a kind of mechanical or electronic device, which can specify the sensor in a certain part of the body and measure physical activity by sensing the movement or acceleration of limbs or trunk [5]. Health education is a purposeful, planned, targeted and evaluated educational activity through the school according to certain social requirements, conditions and norms. Common motion sensors are pedometer and accelerometer. The core of the accelerometer is the

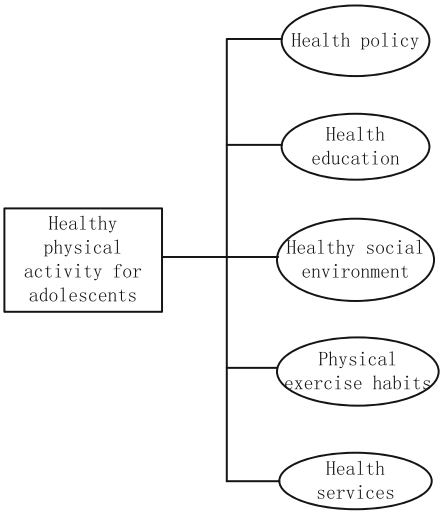

Fig. 2. Main components of healthy physical activities of adolescents

piezoelectric sensor composed of piezoelectric elements and vibrating body, which can sense the acceleration in motion. Health education is to disseminate health knowledge to individuals or groups through planned and organized systematic education activities, to establish healthy awareness and promote people's resources to adopt healthy and healthy behaviors and healthy lifestyles, so as to eliminate or reduce the risk factors of health, reduce incidence rate, mortality rate, promote health and improve the quality of life. The different understanding of the concept of health education makes the practice of health education in China reflected in two levels: one is the public health education carried out by public medical professionals, and the other is the student health education from the perspective of school. Then it acts on the piezoelectric element to generate an electrical signal. After computer processing, the acceleration count is obtained, and then the energy consumption is calculated. Based on the concept of health promotion, the concept of school health promotion focusing on student groups came into being. Adhering to the concept of health promotion refers to the education, policy environment and practice of promoting health. School health promotion originates from school health education, which emphasizes providing students with complete and positive experience and knowledge structure, creating a safe and healthy learning environment, providing appropriate health services, seeking extensive participation of families and communities, and jointly promoting students' health. In addition, the principle of pedometer is that the vertical acceleration generated during walking deflects the horizontal spring lever inside the pedometer, connects the closed circuit, measures the steps, calculates the walking distance according to the stride, and then calculates the energy consumption value. Pedometer method can effectively evaluate children's physical activity level, which is not affected by age, gender, height, waist circumference and body mass index. It is simple to operate and cheap. It is suitable for large sample size population survey. Adolescent health education and health promotion cannot replace each other. Health

promotion pays more attention to seeking cooperation from the aspects of education, social and cultural background, environment, policy and so on.

2.2 Mobile Educational Technology to Optimize the Teaching Mode of Physical Education

Mobile education technology is the combination of mobile computing and digital learning. It includes learning resources at any time and anywhere, strong search ability, rich interaction, strong support for effective learning and performance-based evaluation. The key technology used in mobile education is mobile communication technology, which makes it different from digital learning. Mobile education is a new type of interactive digital learning method and activity that can provide learners at any time and anywhere with the help of mobile communication technology and mobile education terminal equipment. It is digital learning through information devices such as handheld computer, personal digital assistant or mobile phone. There are many restrictive factors in the setting of physical education curriculum, such as the limitation of discipline progression and students' acceptance ability, as well as the allocation of class hours in the overall teaching plan and so on. As we all know, in the teaching system, the factors that have the greatest impact on the teaching quality are teachers, students and managers. Therefore, the participants should also include these three parts. Different evaluators have different positions and different degrees of contact and observation. However, the main purpose of physical education curriculum is to develop students' sports skills and cultivate basic sports ability. First, more teaching objectives can be achieved on the premise of ensuring the development of students' full sports ability, We should not ignore the essential purpose in order to simply pursue extensive exploration. Such abandoning the basics and discarding the details is of no benefit to the improvement of teaching quality. The reference value of the evaluation results is also different. The evaluation of teaching quality by school expert group often focuses on the good classroom teaching order, the organization of teaching content and the advantages and disadvantages of teaching methods. This evaluation plays a direct role in promoting teachers to improve the quality of lesson preparation and lectures. Mobile education means that relying on the relatively mature wireless mobile network, Internet and multimedia technology, students and teachers can realize interactive teaching activities more conveniently and flexibly by using mobile devices (such as mobile phones). Mobile education features are shown in Fig. 3.

As can be seen from Fig. 3, mobile education is characterized by mobility, real-time, contextual relevance, interactivity and personalization. Mobile education depends on the development of digital learning. It is a special way of digital learning. As a new concept, it must be different from the traditional way of learning, otherwise it will lose its own significance. From the perspective of educational technology development, the definition of mobile education can take into account both broad and narrow orientations. Secondly, mobile education is digital learning based on portable mobile education terminal equipment. The transmission of learning content and knowledge depends on mobile communication technology, which can meet the needs of people to learn anytime and anywhere. Then, mobile education should realize the two-way effective interaction between teaching and learning, and carry out teaching and learning conveniently and flexibly. Therefore, on the premise of ensuring the full development of sports technology,

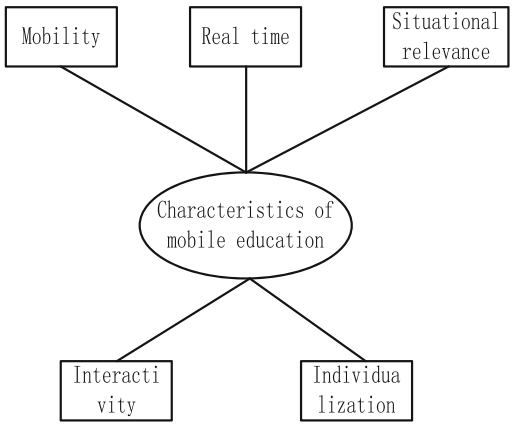

Fig. 3. Characteristics of mobile education

we should pursue diversified development. The setting of physical education teaching subjects is an important factor to improve the teaching quality. The scientific and reasonable setting of subjects can not only effectively develop students' sports skills, but also teach a variety of sports projects, broaden students' vision and develop sports thinking, which is the continuous pursuit of physical education curriculum system. Based on their own teaching experience and knowledge of the subject, we have a rational analysis of the teaching methods and means used by the teachers, the teaching attitude, the scientific nature and the advanced nature of the teaching contents. The goal of physical education teaching fully shows the curriculum designer's understanding of the value and orientation of physical education curriculum and the understanding of physical education teaching. It is the concretization of the purpose of school education in curriculum teaching. Moreover, the evaluation of teaching quality among peers is conducive to mutual learning between teachers and the construction of a good teaching style. Therefore, it is conducive to improving teaching quality. The broad concept of mobile education can take the literal meaning, that is, learners' learning activities in non-fixed places and non-fixed time with some media tools and equipment. In the narrow sense, mobile education refers to learners' learning activities in non-fixed places and non-fixed time with digital media tools and equipment based on mobile computing, mobile communication and mobile Internet technology. Finally, it needs special attention that mobile education occurs anytime, anywhere. It is an informal way of learning. The learning time is intermittent and the learning content is "fragmented". In other words, understanding mobile education from the literal meaning of mobile education is a broad understanding. Understanding mobile education from the perspective of the emergence and development of mobile education terms is a narrow understanding. Due to the new curriculum reform, most physical education colleges and universities begin to pay attention to the cultivation of innovative spirit and practical ability. Student evaluation should be an important part of the whole teaching quality evaluation system. They are the direct feelings of teachers' teaching, have the most comprehensive contact and understanding of teachers' teaching status and effect, and can reflect students' basic needs and teachers' teaching situation.

Therefore, students' scores should occupy a certain proportion in the teaching quality evaluation system [6, 7]. The ultimate goal of physical education major is to guide school sports activities, and school sports activities are mainly the teaching of sports technology. The main task of physical education teachers is to explain the sports technology of normal schools. Only after deeply understanding a sport can teachers realize the key parts and learning difficulties of this sport.

2.3 Constructing Student Satisfaction Model

This paper defines student satisfaction as: generally refers to a psychological feeling of happiness, pleasure or disappointment generated by students in the process of comparing the results of their educational services with their expectations. In terms of content setting, try to meet the individual needs of students. In short, it is the activities that students are interested in. We should make students' interests dominant and make physical education teaching universal. Only when a student's desire or desire has been fulfilled can he feel satisfied or satisfied. In the process of model construction, matrix decomposition technology is introduced, which is a technology for dimension reduction. This technology can decompose the original matrix into the product of two or more matrices, and is often used to fill some sparse matrices. Finally, the user potential feature vector and the project potential feature vector are used for inner product, so as to combine the user and the project. Then the expression formula of user vector is:

$$H = \beta\left(\frac{\alpha^F}{F}\right) \tag{1}$$

In formula (1), β represents the user's potential feature vector, F represents the project's potential feature vector, and α represents the relevance between the user and the project, which is generally expressed in the user's score on the project or the compliance of the project with the user's preference. Through the physical education teaching of students' interested projects, teachers can skillfully master one or two favorite sports skills and form sports behaviors that are not easy to change. At the same time, the user's score on the unknown item is also expressed by the inner product of the user's potential feature vector and the item's potential feature vector, so as to fill the sparse matrix:

$$D = \sum\left(\frac{1-\varepsilon}{E}\right)^{\delta} \tag{2}$$

In formula (2), E represents the regular term coefficient, ε represents the activation function of the output layer, and δ represents the connection weight. Student satisfaction refers to the degree of satisfaction of students, that is, the degree to which students' actual feelings of receiving educational services are compared with their expectations. For example, why should we teach badminton, why should we teach roller skating, how much positive effect and value it has on them, and whether students have such needs? Therefore, we should consider the teaching contents and corresponding teaching methods from the interests, specialties and needs of students, which cannot be imposed on students. The application of customer satisfaction theory in the construction of educational service quality is the inevitable choice for colleges and universities to achieve

student satisfaction and improve social reputation and recognition under the condition of market economy. The fierce market competition requires colleges and universities to use customer satisfaction theory to analyze and judge the satisfaction of educational service and enhance the recognition of students. Taking the student satisfaction of teenagers as the input sample, the corresponding hidden layer and output layer are defined as:

$$L_{in} = \frac{\sum |h - r|}{K} \tag{3}$$

$$L_{out} = \frac{\sum |r - 1|}{K} \times \sqrt{h} \tag{4}$$

In formula (3–4), h represents the weight, r represents the probability that the output category is 1, and K represents the weight of the full connection layer. In schools, teachers' teaching methods greatly affect students' learning methods and enthusiasm, but only teachers' continuous improvement in teaching methods and teaching methods can fully mobilize students' enthusiasm for learning and enable students to study independently and freely instead of passively. The connotation and significance of customer satisfaction has an important reference for student satisfaction, and provides a strong theoretical support for the research on practical teaching satisfaction of master of physical education. Teaching is composed of two parts, one is teaching and the other is learning. It is a two-way activity. Teachers play the main role of "teaching" in the process of teaching and learning, while students play the main role of "learning" in the process of teaching and learning. The two sides complement and cooperate with each other, so that the activities of "teaching" and "learning" can be carried out orderly and smoothly, and a good teaching environment can be formed in the teaching process. On the basis of formulas (1)–(4), the expression formula of students' interest is obtained:

$$T = h\left(K\begin{bmatrix} M^{\eta} \\ N^{\gamma} \end{bmatrix}\right)^{-1} \tag{5}$$

In formula (5), M represents the user word vector, N represents the course word vector, η represents the length of potential feature vector, and γ represents the length of input information. Practical teaching satisfaction evaluation expresses the students' evaluation of the service quality of practical teaching in higher education. It not only helps colleges and universities find problems, but also has the function of problem diagnosis, helps colleges and universities reasonably allocate educational resources and improve the service quality of practical teaching. Moreover, good and beautiful action demonstration can not only enable students to correctly understand the action itself, but also indirectly stimulate students' interest in learning, create a good learning atmosphere and increase students' learning motivation. Therefore, the basic technology of physical education is not only the direct manifestation of physical education teaching quality, but also directly related to the teaching level of school physical education and the realization of physical education teaching objectives. Teachers' teaching skills directly affect students' learning attitude. Teaching teachers can make appropriate adjustments according to the situation of teaching students, so as to teach students according to their aptitude, so that every student can learn what they have learned from teachers' teaching skills and make a breakthrough in students' majors.

2.4 Design Teaching Quality Evaluation Method

Teaching quality is the fundamental guarantee to achieve teaching objectives and complete teaching tasks. As the logical starting point of this study, teaching quality is also the basic premise of constructing the teaching quality evaluation of public physical education courses [8]. As an internal psychological component and a long-term intermediate variable between social stimulation and individual behavior, teaching attitude plays a preparatory role in teaching behavior, which affects the quality of teaching. According to the definition of the concept of teaching quality, the teaching process is the main factor affecting the quality of teaching, because the consistency between students' learning results and teaching objectives is directly related to the teaching process. Although teaching attitude can not completely determine the quality of teaching behavior and teaching quality, it has a great impact. Moreover, teachers' teaching attitude also affects the level of teaching efficiency. Every component and link of the teaching process may become relevant factors affecting the teaching quality. Objective factors may become factors affecting teaching quality, but subjective factors really play a key role. Teachers with real ability and level will not be affected by the objective environment and conditions of teaching. If teachers have a positive teaching attitude, they will take the initiative to increase the time for lesson preparation, widely involve all kinds of knowledge, and form a relatively complete knowledge structure. Try to meet the requirements of students with strong thirst for knowledge and wide interests, so as to win the trust of students, establish the prestige of physical education teachers, enhance the attraction and influence on students, and improve students' interest in learning. Therefore, from the perspective of subjective factors affecting teaching quality and taking each component of the teaching process as the object, the elements affecting teaching quality can be divided into the following points, as shown in Fig. 4.

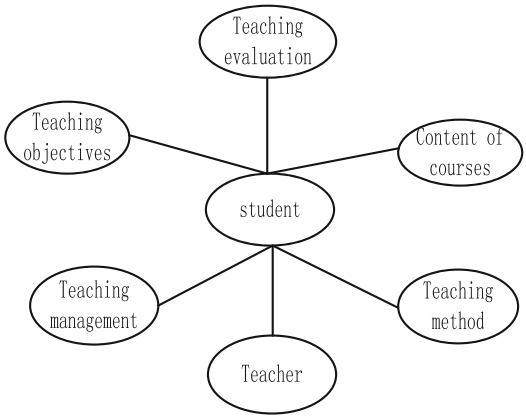

Fig. 4. Factors affecting teaching quality

As can be seen from Fig. 4, the factors affecting teaching quality include: teaching objectives, teaching contents, teaching evaluation, teaching management, teaching methods, teachers and students. These seven elements basically cover all the links that

affect the subjective factors of teaching quality. Teaching objectives are the fundamental elements that affect the teaching quality. In terms of skill objectives, if the teaching objectives are set too high, which are inconsistent with the physical education basis of the teaching subject, and the students can't achieve it with any effort, the gap between the teaching effect and the teaching objectives will be insurmountable, the teachers will feel frustrated, the students may lose their confidence in learning, and the teaching quality will never reach the preset standard. So as to improve the teaching quality and strengthen teachers' student-centered awareness in the teaching process. The teaching content is the basis of the course, which determines the knowledge, skills and abilities of the talents trained by the specialty, and is also the premise and basis of teaching quality evaluation [9–11]. The choice of teaching content directly affects the initiative of College Students' sports skill learning. College students have active thinking and are easy to accept new things. They are the vanguard of leading social fashion. Conversely, social fashion sports are also the object they pursue. Teaching methods and means are one of the factors affecting teaching quality. Physical education teaching content refers to the knowledge of physical health care and various sports actions selected to achieve the goal of physical education teaching. It is the fundamental guarantee to achieve the goal of physical education teaching. Teaching methods and means are an important part of the teaching process. Appropriate teaching methods and means can improve teaching efficiency. Inappropriate teaching methods and means may get twice the result with half the effort. The organization and management of teaching is the most important guarantee to improve the quality of teaching. There is no doubt that the main body of the teaching content of the technical course of physical education is always the study of sports technology. As graduates of technical courses of physical education, they should not only have excellent physical education technology, but also have excellent physical education teaching ability. In other words, we should not only know technology, but also teach technology.

3 Experimental Study

3.1 Experimental Preparation

Resource Description Framework RDF, which is a recommendation standard based on XML syntax representation, is now used by more and more researchers. Because the server-side code of this platform is developed in Java, JDK should be used to provide developers with runtime and public basic class library. Its purpose is to establish a general resource description framework for a variety of metadata and promote the sharing, exchange and reuse of various resources. In addition, because PC terminals need to interact through a web browser, they need to provide a stable web server. Using Tomcat server to assume the role of web server can well meet the deployment of web applications based on Java. It is an open source and flexible plug-in integrated development environment. RDF uses XML to describe resources and express the content of learning resources and the relationship between resources. It is a real universal resource description technology. By adding corresponding web development plug-ins and Android application development plug-ins, the selection of platform tools is greatly simplified, so as to improve the efficiency of platform coding development. Because red5 server is based on RTMP

protocol, it can well support the research scheme of mobile platform in this subject. The media elements contained in mobile learning resources mainly include text, graphics and images, audio, video and animation. According to the different combinations and presentation forms of these media elements, common mobile learning resources can be divided into SMS, MMS, e-book, web page, wechat, online course, educational game and other types. Nginx server has the advantages of lightweight, good concurrency and less system resources. It can support the response of up to 50000 concurrent connections, and can well support the server of web applications.

3.2 Experimental Result

In order to verify the effectiveness of the teaching quality evaluation method of the designed adolescent health physical education curriculum, an experimental test was carried out. The adolescent health physical education course of a junior high school in one semester was selected as the evaluation object. Among them, there were 6 teachers who taught the adolescent health physical education course. A total of 36 classes participated in the adolescent health physical education course in the whole semester. On average, each class received 32 adolescent health physical education courses in this semester. After statistics, 32000 pieces of data are obtained, 20000 pieces of effective data are retained as test data after removing redundant data, and they are divided into three data scales, namely 5000, 1000 and 2000. The teaching quality evaluation method of adolescent health physical education based on audio synchronization technology, the teaching quality evaluation method of adolescent health physical education based on data mining and the teaching quality evaluation method of adolescent health physical education in this paper are selected for experimental comparison. The evaluation speeds of the three methods are tested under different data scales. The experimental results are shown in Tables 1, 2 and 3.

From Table 1, it can be concluded that the average evaluation speed of the teaching quality evaluation method of adolescent health physical education in this paper is 3.157; The average evaluation speed of the teaching quality evaluation method of adolescent health physical education based on audio synchronization technology is 6.089; The average evaluation speed of the teaching quality evaluation method of adolescent health physical education based on audio synchronization technology is 5.760.

From Table 2, it can be concluded that the average evaluation speed of the teaching quality evaluation method of adolescent health physical education in this paper is 9.422; The average evaluation speed of the teaching quality evaluation method of adolescent health physical education based on audio synchronization technology is 14.628; The average evaluation speed of the teaching quality evaluation method of adolescent health physical education based on audio synchronization technology is 14.928.

From Table 3, it can be concluded that the average evaluation speed of the teaching quality evaluation method of adolescent health physical education in this paper is 15.050; The average evaluation speed of the teaching quality evaluation method of adolescent health physical education based on audio synchronization technology is 24.769; The average evaluation speed of the teaching quality evaluation method of adolescent health physical education based on audio synchronization technology is 25.576.

Table 1. Data scale 500 evaluation speed (s)

Number of experiments	Evaluation method of teaching quality of adolescent health physical education based on audio synchronization technology	Evaluation method of teaching quality of adolescent health physical education based on Data Mining	The evaluation method of teaching quality of adolescent health physical education course in this paper
1	5.615	5.366	3.221
2	6.315	6.293	3.154
3	5.948	5.784	3.058
4	6.215	5.884	3.569
5	5.976	6.546	3.211
6	6.355	4.917	3.025
7	5.941	5.628	2.978
8	6.258	4.996	2.996
9	5.949	5.312	3.205
10	6.313	6.878	3.154

Table 2. Data scale 1000 evaluation speed (s)

Number of experiments	Evaluation method of teaching quality of adolescent health physical education based on audio synchronization technology	Evaluation method of teaching quality of adolescent health physical education based on Data Mining	The evaluation method of teaching quality of adolescent health physical education course in this paper
1	15.612	15.206	9.161
2	14.347	14.978	8.557
3	14.619	14.696	9.253
4	13.548	15.313	9.467
5	15.098	14.899	8.949
6	13.647	13.262	8.649
7	14.220	14.649	10.202
8	15.361	15.212	9.667
9	14.515	16.955	10.154
10	15.315	14.113	10.161

Table 3. Data scale 2000 evaluation speed (s)

Number of experiments	Evaluation method of teaching quality of adolescent health physical education based on audio synchronization technology	Evaluation method of teaching quality of adolescent health physical education based on Data Mining	The evaluation method of teaching quality of adolescent health physical education course in this paper
1	26.155	26.164	15.669
2	23.610	25.484	14.677
3	22.994	26.913	15.293
4	23.157	26.556	15.204
5	24.055	25.377	16.117
6	23.649	26.199	14.323
7	25.691	26.184	15.266
8	26.384	25.109	14.311
9	25.677	24.616	15.262
10	26.315	23.154	14.379

4 Concluding Remarks

Physical education teaching assessment, as a test measure of technical teaching quality, is an effective way to ensure the smooth completion of teaching objectives, and can also play a positive role in the construction of a good style of study. In the environment of college enrollment expansion and lower assessment standards, the effectiveness of assessment is getting lower and lower. Strengthening the construction of curriculum assessment system plays an important role in improving the teaching quality of technical courses. In the future, we need to constantly expand the application field of the teaching quality evaluation method of adolescent health physical education in this paper.

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