

Multi-Index Measure Model of PE Classroom Teaching Level based on Fuzzy System Theory

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Abstract: Physical education curriculum evaluation is an important part in the teaching of physical education. There are many uncertainties in the evaluation process. We use fuzzy comprehensive evaluation method in fuzzy theory to evaluate college PE classroom teaching effectiveness, and investigate the main body of evaluation from many aspects. Fuzzy evaluation is to introduce the concept of ambiguity in the process of judging the decision-making, which is of great significance for understanding and understanding the essence of the system more profoundly and accurately. Because of the actual social activities, there are many uncertainties and vague factors, and the existence of a thing with a variety of factors. According to the evaluation system, we set up five indicators of students' evaluation of physical education teachers' performance: teaching ability, teaching effect, teaching activity, professional ethics and other ancillary factors. We develop a physical education classroom teaching quality assessment scale. With the integration of the fuzzy theory, we simulate the model on the databases to test the overall performance.

Keywords: Fuzzy system; System theory; Physical education class; Teaching level; Multiple indicators; Measurement model

1. Introduction

In the higher education, the construction of science in all professional classroom teaching quality evaluation system has always been a hot topic, sports are also among them. Physical education teaching has its own unique style and different from other courses, physical education teaching includes theory and practice, skills training. So with the same classroom teaching quality evaluation system, to make a professional evaluation of sports is not reasonable enough, but also unscientific. The construction of the classroom teaching quality evaluation system of PE major should have its own characteristics.

The evaluation of teaching quality is a complex and multifactorial complex problem, most of which are qualitatively described in vague language. For example, in assessing the teaching quality of an PE class, the reviewers often say that "the teacher's class is concise, the model is more accurate, the amount of exercise is more appropriate, the organization of the class is OK, and the teaching is better," and so on.

How to evaluate the teaching quality of PE teachers has always been a rather difficult issue. Some college integrated students evaluate the PE teachers' evaluation and departmental leadership impression on teachers, which is too subjective and general and cannot convince people. Outstanding excellent. Some schools use theoretical tests, skills tests and sports scores as their evaluation criteria.

This method may appear fair on the surface and may neglect factors such as a student's initial physical condition that greatly affect the test scores. At the same time, it is easy for teachers to pay attention to students' scores without regard to the general improvement of students' constitution and the development of life-long sports awareness, which is not conducive to the reform of the quality-oriented education. Physical education teaching is a complex dynamic teaching process, which contains a variety of interrelated and interdependent factors, many of which are ambiguous factors, such as teaching organization, teaching methods, ideological education. Physical education teaching environment plays an important role in all aspects of the PE teaching activities in colleges and universities as well as students' intelligence development, learning motivation, learning effect, physical and mental health, ideological quality and aesthetic conception. Thus, compared with the teaching of other disciplines, physical education teaching environment in ordinary colleges and universities have more direct impact on physical education more timely and more dominant. In order to make these influences develop in the aspect of promoting students' health and improving teaching efficiency, it is necessary to understand and grasp the current situation of the PE teaching environment and the dynamics of its development in ordinary colleges and universities. This inevitably involves the issue of evaluation.

Therefore, for the applications of the proposed model, we should then understand from the following components. In sports and sports, some balance abilities are very important, such as archery, shooting, etc., such as the gymnastics, martial arts, judo, wrestling, etc., which are also important and can be directly applied in research. In addition, the body balance ability test can also provide some new research methods for the balance and stability of the lift-up process of the lifter and the lower squat support process in the snatch. The athletes must have received intensive training before and after high intensity training will cause the body fatigue, the recovery has become a very important question. If the recovery is not good, continue training will often lead to excessive training of athletes, this will affect the athlete's training level, or even seriously affect the athletes the physical and the mental health. It is an important part of sports to get good results. Many athletes training level is very high, but in the game process (especially the big game), due to the influence of various interference factors, and the scene audience, tend to cause disorder. For this type of player, can use the method of simulation (simulation match the scene atmosphere, conditions, etc.) before game balance experiment test, through proper psychological practice again, in order to improve anti-interference ability.

Students are the main training subjects in colleges and universities. The requirements of teachers are more valued by their teaching activities. Through the evaluation of teachers 'performance, students can know clearly the relationship between PE teachers and their students and their deficiencies in teaching process so as to make up for the deficiencies to improve PE teachers' comprehensive teaching ability. Therefore, the student evaluation teacher as a college PE teacher performance evaluation of a complementary means, has an important practical significance.

2. Physical Education Evaluation based on Fuzzy System Theory

2.1. The basic theory of fuzzy judgment

Fuzzy evaluation is to introduce the concept of ambiguity in the process of judging the decision-making, which is of great significance for understanding and understanding the essence of the system more profoundly and accurately. Because of the actual social activities, there are many uncertainties and vague factors, and the existence of a thing with a variety of factors. If only one measure to measure is one-sided. The evaluation of any one thing is often not good, and people's evaluation of things are mostly vague language. Therefore, fuzzy evaluation can better reflect the essence of things, so its method is more accurate and appropriate.

In the teaching process of physical education, there are many related factors that affect the quality of teaching, and the various factors interact and restrict each other in the teaching process. In order to make the teaching quality assessment of physical education more reasonable and scientific, the subject of evaluation is determined to be 15 students in three aspects, including students, subject teachers and teaching management personnel. The index system of evaluation factors is based on the practice of many classroom teaching quality assessment both inside and outside the school and the result of expert interviews. Due to many factors involved, taking into account the correctness and maneuverability of the assessment results, three types of 12 component evaluation index systems were determined, and the primary and secondary factor index system was obtained. Based on the contribution rate of each factor in the judgment, the weight coefficient is deduced.

$$U = \{u_1, \dots, u_n\} \tag{1}$$

$$V = \{v_1, \dots, v_n\} \tag{2}$$

$$f : U \rightarrow F(v) \tag{3}$$

$$R = \begin{bmatrix} r_{11}, \dots, r_{1m} \\ r_{21}, \dots, r_{2m} \\ \dots \\ r_{m1}, \dots, r_{mm} \end{bmatrix} \tag{4}$$

The quality of physical education teaching involves many factors. The selection of these factors is a crucial issue. The selection is appropriate, the analysis and evaluation of the results have a certain impact. Therefore, we should take a cautious attitude to the choice of PE teaching index.

2.2. Decision theory

Fuzzy decision is based on fuzzy mathematics as a tool, the use of fuzzy theory and methods, the reality of a large number of fuzzy phenomena and fuzzy problems of scientific decision-making. Fuzzy decision-making is a combination of fuzzy technology and decision-making method. It consists of three parts: fuzzification, fuzzy reasoning and defuzzification. Fuzzification is the precise input into fuzzy input set, through membership function to achieve. Fuzzy thrust is through a certain calculation to the reality from the fuzzy input set to the fuzzy output set mapping, the commonly used methods are fuzzy rule reasoning, fuzzy comprehensive evaluation, fuzzy statistical judgments. De-obfuscation is the conversion of fuzzy output sets into accurate output sets. The strategies commonly used are the principle of the maximum membership, the fuzzy centroid method, the Gaussian transformation distribution method and so on.

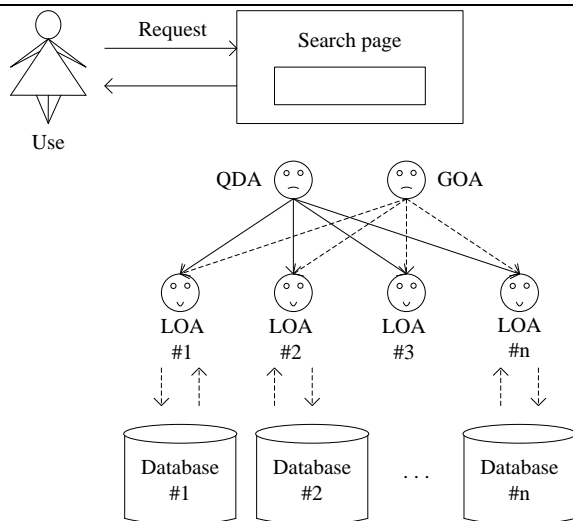


Figure 1. Fuzzy decision

2.3. Assessment scaley

Students evaluate the performance of physical education teachers using standard score method, that is, in accordance with the teacher's performance of the five indicators to design a scientific and rational evaluation index system, one by one to give points, and finally the total score to measure the performance of the teachers. And use questionnaires to obtain the original evaluation information. Based on the principle of fuzzy mathematics, based on the quantitative analysis of a large number of statistical data, the author can comprehensively and accurately analyze the teacher's performance in evaluating PE teachers. Therefore, for the evaluation of the performance, we should understand the model from the following aspects.

Size and combination form. The class combination form refers to the teaching organization form of some class grading according to the general students' different grades, different departments, different gender, hobbies and skills. This class combination to meet the needs of different individuals to let more students can choose according to their own interests, skill levels favorite project, is beneficial to students' physical and mental health development.

The management system. The management of physical education is in accordance with the rules and characteristics of some physical education. The process of planning, organizing, monitoring and supervising sports teaching is aimed at improving teaching quality and implementing whole process management. A scientific and perfect teaching management environment can ensure high quality and efficient operation of physical education activities.

Interpersonal relationship refers to people in social interaction formed by the psychological relationship between

people. The interpersonal relationship in physical education mainly consists of two aspects, one is the relationship between the physical teacher and the student, and the other is the relationship between the student and the student. These relationships and constitutes the interpersonal interaction in the process of sports teaching, a direct impact on the atmosphere of the classroom teaching, teaching feedback and students' classroom participation and enthusiasm, thus influence the effect of physical education teaching. In the sports teaching practice, the good relationship between teachers and students, respect students, care about students, love students, students will, in turn, to the teachers to the corresponding positive affection in return, will be more deep love of the teacher. When the student's love reaches a certain degree, it will produce the emotional transfer phenomenon, that is, by loving the teacher and then loving the subject he teaches, he will be interested in the subject he teaches.

Student assessment performance is filled out by the student and an average score is calculated for the result. In order to ensure the objectivity and accuracy of the evaluation results, students should be trained on the way of then filling out forms before the questionnaires are issued. In the choice of classroom classes, try to choose the overall quality of students divided equally in the middle class, to ensure the universality of evaluation information.

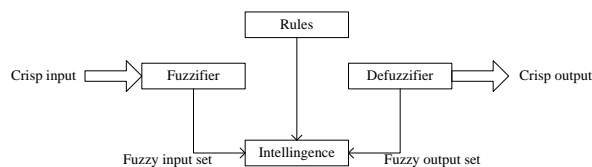


Figure 2. The flowchart of the proposed methodology

Taking a college PE teacher in Nanjing as an example, 35 appraisers, including leaders, experts, peers, and stu-

dents, were asked to fill in the evaluation form for appraiser evaluation and rated the teacher. Under the jurisdiction of various indicators, for example, in the horizon-

tal and horizontal each indicator corresponding to a certain level of evaluation.

Table 1. Teaching quality evaluation form

Evaluation index	V1	V2	V3	V4	V5
U1	-	√	-	-	-
U2	-	-	√	-	-
U3	√	-	-	-	-

$$R = \begin{bmatrix} 0.26, 0.27, 0.19, 0.16, 0.12 \\ 0.30, 0.27, 0.21, 0.18, 0.04 \\ 0.29, 0.23, 0.18, 0.20, 0.10 \end{bmatrix} \quad (5)$$

$$u1 \rightarrow \left(\frac{3}{15}, \frac{6}{15}, \frac{6}{15}, 0, 0 \right) = (0.2, 0.4, 0.4, 0, 0) \quad (6)$$

$$u2 \rightarrow \left(\frac{4}{15}, \frac{5}{15}, \frac{6}{15}, 0, 0 \right) = (0.267, 0.333, 0.4, 0, 0) \quad (7)$$

$$u3 \rightarrow \left(\frac{2}{15}, \frac{4}{15}, \frac{5}{15}, \frac{4}{15}, 0 \right) = (0.133, 0.267, 0.333, 0.267) \quad (8)$$

$$B = A \circ R = (0.15, 0.5, 0.35) \begin{bmatrix} 0.26, 0.27, 0.19, 0.16, 0.12 \\ 0.30, 0.27, 0.21, 0.18, 0.04 \\ 0.29, 0.23, 0.18, 0.20, 0.10 \end{bmatrix} \quad (9)$$

$$R = \begin{bmatrix} B_1 \\ B_2 \\ B_3 \end{bmatrix} \quad (10)$$

The assessment process shows that 25.4% of the evaluation subjects think the teacher teaching is excellent. 26.9% think it is good, 25.2% think it is normal and 16.8% think it is poor. 5.7% thought it's bad. According to the principle of maximum membership, the teacher's teaching is good.

This result can also be expressed as a fraction. If you set 95 points as excellent, 85 points are good. 75 is divided into general, 65 is divided into poor, 55 is divided into poor, then the teaching evaluation of the teacher's score is:

$$S = (0.254, 0.269, 0.252, 0.168, 0.058) \begin{bmatrix} 95 \\ 85 \\ 75 \\ 65 \\ 60 \end{bmatrix} \quad (11)$$

Evaluation is a kind of cognition activity peculiar to human beings. It is the process of consciously identifying and reflecting upon human's own practical activities. The essence of this is to promote the perfection of human practice so as to be more in line with the objective laws governing the development of things. In this sense, what we want to reveal is the meaning and value of things to people. Value is the core issue of universal concern in human practice, which reflects the relationship between

subject and object needs. In fact, human beings always deal with value in their daily life. It can be said that the process of human beings from practice to understanding cannot lack the value of this part. Therefore, by its very nature, evaluation mainly reflects the relationship between the subject and the object, as well as the subject's view of the value of the object. We must emphasize that the evaluation is based on the understanding of value. The correctness of the evaluation is directly related to the practical activities related to it. This involves the orientation of values, because different values will inevitably affect the main body in the evaluation of the principles, methods, standards and mode of operation. As the evaluation of the authenticity of the level of awareness will directly affect human behavior and practical activities, therefore, the evaluation must follow the dialectical materialist epistemology of the basic principles. The subjective evaluation and objective value are unified, and the essential and functional attributes of the value object are recognized. The value subject needs to evaluate the attributes and functions of the value object so as to better meet the needs of human sustainable development.

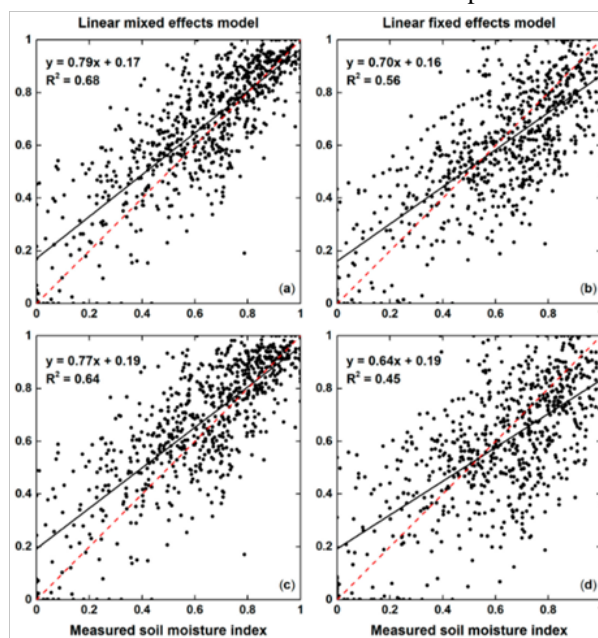


Figure 3. The simulated data for the proposed system

Traditional fuzzy systems based on fuzzy sets to construct the use of the corresponding fuzzy logic inference and precision to achieve specific system functions but fuzzy set has limitations in dealing with the uncertainty of the actual object as one of the possible ways to solve these problems is to enhance the system method ambiguity. A large number of expert experiences are usually accumulated in daily life and production activities while embedding these useful expert experiences in the fuzzy system can improve the interpretability of fuzzy rules. If a subordinate function of a two-type fuzzy set is a type-Gaussian membership function, then the two-type fuzzy set is a type two Gaussian fuzzy set. If the sub-membership function is a type of interval fuzzy set, it is called a type II range collection. The input of the system is generally determined values of fuzzy controller is the role of the numerical determination of mapping into several fuzzy sets of type two fuzzy systems is generally zero input mapping for type two fuzzy sets but also may only be mapped to a type of fuzzy sets and fuzzy sets of type two may appear in the front or back in. Both have the same rule structure is different from the rules of the post-part type is a fuzzy set and type is a specific function from the application point of view a type of system has been successfully applied to the development of fuzzy control, especially for high-precision The development of the fuzzy controller of the device is better than that of the fuzzy controller when it has a clear representation of the characteristics of the object. The system has a good application prospect in dealing with general ambiguity problems, that is, its scope of application more extensive.

Physical education evaluation has always been a weak link. Although great progress has been made in the research of some evaluation theory of physical education in China in recent years, there is still no systematic theoretical conclusion, especially in the process of transforming quality education thought.

Physical education is a dynamic process of development, during which there will be many such or problems. If we cannot find and solve problems in time, it will inevitably affect the quality of the physical education. Formative assessment can capture these problems and changes precisely and provide timely help for both teachers and students to then adjust their teaching and learning. Compared with the summative evaluation of re-evaluation, formative evaluation is more concerned with all aspects of teaching.

3. Conclusion

Diversification is the general trend of the theory and practice of PE teaching evaluation. This diversification includes the diversification of teaching evaluation thoughts, the diversification of teaching evaluation methods, and also the diversification of teaching evaluation

subjects. Any teaching evaluation theory is born and developed under certain social and historical conditions. People cannot find an eternal teaching evaluation standard and method, so it is historic. On the other hand, any kind of evaluation theory serves the educational development, so it is social. Now some experts and scholars are trying hard to explore the scientific evaluation of teaching theory, physical education evaluation there are also scientific issues. Although science is a long historical process, as long as sports continue to develop, then the scientific evaluation of physical education will exist.

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