

Research on Fuzzy Comprehensive Evaluation of University Public Physical Education Classroom Teaching Quality Based on Grey System Theory

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ABSTRACT. *College physical education classroom, as an important subject course for training competitive talents in colleges and universities, shoulders the special mission given by the times and society and the specific needs of students' physical and mental development, so curriculum reform is imperative. How to comprehensively evaluate physical education teaching quality is related to discipline construction, reform and development. Therefore, adopting scientific and reasonable multi-level evaluation is an effective way to standardize the evaluation of physical education teaching quality. Teaching strategy is the research hotspot of current teaching theory, the guiding ideology and soul of implementing teaching, and occupies an important position in teaching theory. Grey teaching strategy is a brand-new teaching strategy based on grey system theory and applied. In this paper, the multi-level comprehensive evaluation method of fuzzy mathematics is used to study the quality of physical education classroom teaching. Based on the grey system theory, a multi-level and multi-index evaluation index system of classroom teaching quality is designed, and a multi-evaluation model is established.*

KEYWORDS: *Physical education class; Teaching strategies; Grey system theory; Evaluation of teaching quality*

1. Introduction

In this period of social transformation, the development of modern social economy characterized by knowledge economy and economic globalization and the development of science and technology with information technology and biotechnology as the core put forward corresponding social requirements for higher education [1]. Teaching evaluation is to judge the value of teaching process and teaching results by using scientific and feasible evaluation methods according to certain teaching objectives, so as to provide reliable information and scientific basis for improving teaching and teaching quality [2]. Whether the evaluation method of physical education teaching quality is scientific or not is related to the improvement

of physical education teaching quality at all levels and all kinds of schools in China, the enhancement of young people's physique, the formation of lifelong physical exercise habits, and the direction of School Physical Education Reform [3]. As an important subject course for colleges and universities to cultivate competitive talents, college physical education shoulders the special mission given by the times and society and the specific needs of students' individual physical and mental development, so curriculum reform is imperative [4]. As an important part of the reform, classroom teaching quality evaluation should be paid more attention to. Physical education is an important part of school quality education. How to evaluate the quality of physical education is related to the construction, reform and development of the discipline [5]. Therefore, adopting scientific and reasonable multi-level evaluation is an effective way to standardize the evaluation of physical education teaching quality [6].

In the transition period from planned economy to market economy, the modern social and economic development characterized by knowledge economy and economic globalization and the development of science and technology with information technology and biotechnology as the core put forward corresponding social requirements for higher education [7]. As an important training subject in universities, students pay more attention to their value in teaching activities. Through students' evaluation of teachers' performance, we can clearly know the relationship between physical education teachers and students in teaching activities and their own shortcomings in the teaching process, so as to make up for the shortcomings in order to improve the comprehensive teaching ability of physical education teachers [8]. The previous evaluation system is based on the experience of physical education workers, lacking objective and quantitative standards, but only making qualitative explanations [9]. However, the evaluation standard of teachers' performance determined by the teaching management department often ignores the influence of teachers on students. Grey teaching strategy is a brand-new teaching strategy based on grey system theory and applied. Grey teaching method is a brand-new teaching method to cultivate students' innovative quality. Grey teaching method will make physical education more humanistic and further expand the extension of physical education teaching method, which is the result of optimization and integration of various teaching modes [10]. In this paper, the multi-level comprehensive evaluation method of fuzzy mathematics is used to study the quality of physical education classroom teaching. Based on the grey system theory, a multi-level and multi-index evaluation index system of classroom teaching quality is designed, and a multi-evaluation model is established.

2. Fuzzy comprehensive evaluation model of physical education teaching quality

Educational evaluation is an important part of educational activities and an indispensable link in educational activities. Because of the function of evaluation in guiding, encouraging and correcting education, the research of educational evaluation, along with the research of basic teaching theory and educational development, has become one of the three major fields of contemporary educational

scientific research, and has been paid more and more attention by the educational circles. The traditional evaluation paradigm is violently impacted by the research paradigm of New Cultural Anthropology, that is, the evaluation is no longer regarded as only measuring the expected educational results, but the whole scheme, including the premise hypothesis, conclusion deduction, implementation effect and difficult problems, etc. Physical education teaching evaluation is the measurement, analysis and evaluation of the quality of physical education teaching [11]. It takes the process and result of the organic combination of teaching objectives, teaching contents and teaching methods as the evaluation object, and it is an evaluation of the overall function of teaching activities.

Looking at the history of educational evaluation development, we can not only see the long-standing educational evaluation thought and rich educational theory and practice in ancient China, but also learn about the development of advanced and systematic educational evaluation theory in western countries, especially in modern times. Table 1, for example, is the survey and statistics of the degree of achieving the educational goal of physical education in physical education class teaching. Table 2 is the survey statistics of students' satisfaction with the school physical education class.

Table 1 Investigation and statistics of the degree to which college physical education teaching achieves physical education goals

| Degree of realization | Fully realized | Partially realized | Not implemented |
|---------------------------|----------------|--------------------|-----------------|
| Selected number of people | 12 | 27 | 22 |
| Proportion (%) | 23.0 | 44.3 | 36.1 |

Table 2 Survey statistics of students' satisfaction with school physical education

| Satisfaction | Very satisfied | Satisfaction | General | Not very satisfied | Dissatisfied |
|------------------|----------------|--------------|---------|--------------------|--------------|
| Number of people | 20 | 39 | 90 | 62 | 40 |
| Proportion (%) | 8.0 | 15.5 | 35.9 | 24.7 | 15.9 |

Classroom teaching evaluation is not only an important part of teaching management, but also an important means of scientific management of education. The grey system theory is applied to the evaluation of teaching quality, which mainly adopts the correlation degree theory and improves the fuzzy comprehensive evaluation method. Among them, "fuzzy comprehensive evaluation method" is a comprehensive evaluation method based on fuzzy set theory of fuzzy mathematics, which accords with the fuzziness of educational phenomenon and can collect the opinions of all evaluators comprehensively. Classroom teaching evaluation is not only an important part of teaching management, but also an important means of scientific management of education. However, whether it can effectively promote

classroom teaching activities and achieve the aims of improving teaching work, promoting teaching management, improving teaching level and ensuring the quality of personnel training depends on whether the evaluation method is scientific, standardized and feasible, and whether the reliability and validity of the evaluation results are ideal. The functional modules included in the evaluation of physical education mainly include: adding sports test items, modifying and deleting sports test items, setting weights and so on. The implementation process is shown in Figure 1.

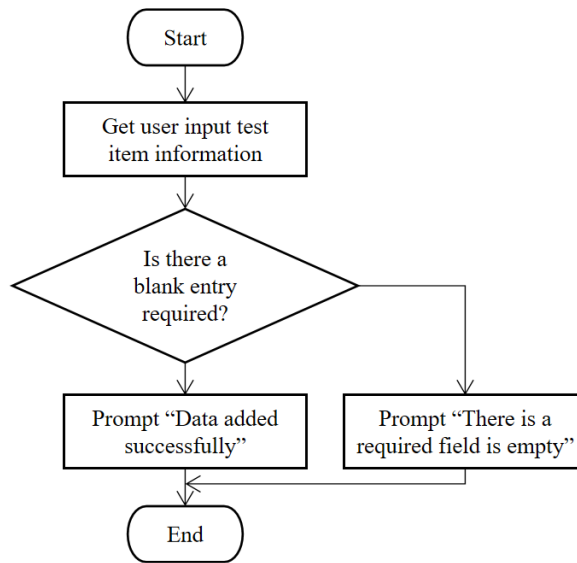


Figure 1 New test project program flow

Sustainability is used to measure the sustainability of teaching quality evaluation transformation system and the development of each subsystem. The development rate of each subsystem is used as the measurement standard

$$w = (w_{\max} - w_{\min}) \times \frac{I_{\max} - I_i}{I_{\max}} + w_{\min} \quad (1)$$

The clustering algorithm function method is used to obtain the following results

$$Cr_{(t+1)} = k \times Cr_{(t)} \times (1 - Cr_{(t)}) \quad (2)$$

The calculated trend is as follows:

$$f_1(x) = \sum_{i=1}^{D-1} \left[100(x_{i+1} - x_i^2)^2 + (x_i - 1)^2 \right] \quad (3)$$

In the evaluation, we should try our best to avoid horizontal comparison among students, and evaluate and reward students according to whether they have made progress, rather than reward them according to their grades. At the same time, students should be helped to set personal progress goals, so that they can feel progress every time they participate in sports activities, and guide students to strive to achieve their goals and make self-evaluation. In the comprehensive evaluation of the teaching quality of university public physical education class, we should first determine the evaluation elements and scientifically and reasonably determine the specific evaluation contents. In other words, we must first determine the evaluation system of physical education teaching quality. Evaluation index is the basic unit of the evaluation system, which is relatively uncertain. The new concept of learning evaluation requires not only paying attention to the development of students' ability and intelligence, but also paying attention to the development of students' emotions, attitudes, values and other potentials. With the deepening of research on quality education, students' evaluation methods are constantly innovating, including developmental evaluation method, process evaluation method and authenticity evaluation method.

3. The implementation of grey teaching method in Physical Education

3.1 "Grey" optimization of physical education teaching content

According to cybernetics and system theory, the information of a system is known as "black", the information of a system is known as "white", and the information of a system is known as "grey". As far as gender is concerned, basketball and volleyball are the most suitable sports for boys. The most suitable sports for girls are aerobics, a kind of traditional Chinese shadowboxing (tai chi chuan), badminton and table tennis. Teaching strategy is to select teaching content, teaching organization form, teaching method and technology related to combination according to the set teaching tasks and students' characteristics after the teaching objectives are determined, and to form a specific teaching scheme with efficiency significance. Traditional student evaluation only focuses on students' academic achievements, and only measures students' mastery of knowledge. Developmental learning evaluation serves to train all-round people and promote quality education. Therefore, this kind of evaluation pays attention to the investigation of students' comprehensive quality, not only paying attention to academic achievements, but also paying more attention to the development of students' abilities of innovation, inquiry, cooperation and practice, as well as the development of good psychological quality, learning interest and positive emotional experience [12]. Gray teaching strategy is a teaching strategy which is established between "white teaching strategy" and "black teaching strategy" and needs by social development. Grey teaching strategy refers to the overall scheme of teaching implementation, which is based on the grey system theory and aims at cultivating students' innovative spirit and ability to explore problems.

Developmental learning evaluation focuses on changing from one-way

evaluation to multi-way evaluation, and enhances the interaction of two-way selection, communication and negotiation among evaluators: emphasizing that the evaluators become one of the evaluators, establishing an evaluation system in which students, teachers, parents, managers and experts participate and interact with each other, and promoting the development of the evaluators with multi-channel feedback information. Grey teaching strategy is a brand-new teaching strategy based on the grey system theory and completely following the basic rules of teaching strategy. The grey system theory is applied to the evaluation of teaching quality, which mainly adopts the correlation degree theory and improves the fuzzy comprehensive evaluation method. Among them, "fuzzy comprehensive evaluation method" is a comprehensive evaluation method based on fuzzy set theory of fuzzy mathematics, which accords with the fuzziness of educational phenomenon and can collect the opinions of all evaluators comprehensively. Any teaching strategy points to a certain teaching goal and is created to accomplish a certain teaching task. The teaching goal of grey teaching strategy is to cultivate students' innovative spirit and ability to explore problems. Grey correlation degree is a method to analyze the correlation degree of various factors in the system. The fuzzy comprehensive evaluation method is improved by using the correlation degree, which overcomes the disadvantage that only considering the maximum membership degree loses more information and even leads to abnormal conclusions when using the maximum membership degree principle. It is worth noting that the grey teaching strategy is not to blur the information, but to gray the teaching methods and strategies, which makes the information richer and more exploratory, and makes students have a strong interest in understanding, analyzing and solving problems.

3.2 The implementation of "grey" in the process of Physical Education Teaching

Grey teaching is not only the application result of grey system in physical education, but also the result of the integration of discovery learning teaching and inquiry teaching. A large-scale decision involves the interests and wishes of all parties. In grey decision-making, considering the wishes of all parties and coordinating the interests and relations of all parties is called grey level decision-making. In the implementation process of discovery teaching mode, students find difficulties and problems blindly, while in the later stage of the implementation of inquiry teaching mode, students' learning will be fixed and passive. The times need an optimized teaching mode, and grey teaching is a brand-new teaching mode which overcomes the disadvantages of the two modes and optimizes and integrates [13]. In the control stage of grey teaching strategy, we mainly search for the law of their development and change, predict their future behaviors and take corresponding measures according to their predicted values of future behaviors. Grey teaching strategy is not only the result of the application of grey system in physical education, but also the result of the integration of discovery learning teaching and inquiry teaching. Grey evaluation personnel should not be single, but should be held by multiple teachers. At the same time, teachers, parents and students can be held together to make grey decisions from multiple evaluators. Finally, we choose to optimize the evaluation results to make the evaluation more

accurate, reasonable and authoritative.

Public physical education class is a compulsory public course for college students, which takes physical exercises as the main means, and through reasonable physical education and scientific physical exercise process, achieves the main goal of strengthening physical fitness, improving health and improving sports literacy. In the implementation process of discovery teaching mode, students find difficulties and problems blindly, while in the later stage of the implementation of inquiry teaching mode, students' learning will be fixed and passive. In physical education, students' social adaptability is mainly manifested in whether they can understand and respect other students and teachers, and show good interpersonal skills and cooperative spirit in the process of physical education learning, and strive to bear the responsibility in group study and practice. From the perspective of lifelong physical education, the important goal of the new physical education curriculum is to establish students' correct understanding of physical education and health, and to make students form a correct and positive attitude towards physical education and health. Therefore, students' attitude towards the study and practice of physical education and health courses should be an important part of the evaluation of the new physical education courses. The times need an optimized teaching mode as a concrete measure in the operation stage of the teaching system. The grey teaching strategy just overcomes the disadvantages of the two modes in terms of methods and modes, thus optimizing and integrating a brand-new teaching mode.

4. Conclusions

With the deepening of educational reform, the reform of educational thought, teaching mode and classroom mode is attracting more attention. However, the research on education evaluation, especially the research on classroom teaching quality evaluation, is somewhat insufficient. The collection of evaluation information, the determination of index system and the establishment of evaluation standards are random and lack of scientificity and systematicity, which makes the evaluation itself lack of reliability and effectiveness. From the perspective of lifelong physical education, the important goal of the new physical education curriculum is to establish students' correct understanding of physical education and health, and to make students form a correct and positive attitude towards physical education and health. Therefore, students' attitude towards the study and practice of physical education and health courses should be an important part of the evaluation of the new physical education courses. School teaching management departments should pay a return visit to teachers with deficiencies in the performance evaluation process at any time, so as to better promote teachers to improve their deficiencies in a targeted manner. To collect evaluation information objectively and accurately, experts and leaders must ensure the number of lectures and go deep into the teaching and research section to understand and check teachers' teaching materials. As long as we pay attention to the influencing factors of each link in the evaluation activities, and be objective, fair and scientific, we can really achieve the goal of promoting classroom teaching reform and improving classroom teaching quality.

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