

# *Construction of the Evaluation Index System of Gymnastics Technique Class Teaching in Colleges and Universities Based on AHP*

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**Abstract:** Using AHP method to establish the evaluation index system of gymnastics skill class teaching in colleges and universities is of great significance to improve the teaching effect, achieve the teaching purpose and teaching quality of gymnastics skill class. Through the experiment, the evaluation index system of gymnastics technology class teaching is constructed, which is guided by the teaching effect. By collecting and sorting out the main contents and indicators of different teaching evaluation systems, it is helpful to build the teaching evaluation indicator system of gymnastics technical courses in colleges and universities, and improve the teaching quality of gymnastics technical courses from the aspects of teaching content, teaching methods and teaching effects. The final experimental results show that: gymnastics teachers' performances in teaching, including 16 demonstrations, protection and assistance are the unique characteristics of gymnastics teaching, and the training of students majoring in gymnastics technology in colleges and universities has important practical significance for the high-quality development of national sports.

## **1. Introduction**

With the rapid development of China's economy, the "Healthy China" strategy has been constantly promoted, and the construction of a sports power has become a development strategy agreed by all countries in the world. "While vigorously developing sports, we will increase support for the cause of the disabled, focus on supporting the development of vocational sports and college physical education in the central and western regions and ethnic minority areas, and improve the awareness of fitness for all and physical fitness. We will support social forces to run various sports events well; we will promote fitness for all and sports consumption, enrich the cultural life of the people, and constantly improve the people's physique.". Therefore, promoting the further development of mass sports and competitive sports is one of the important tasks facing China's sports work.

With the rapid development of gymnastics technology, various new movements emerge in endlessly. With the continuous emergence of new sports technology, Wu Y's demand for college physical education is also growing. Therefore, we use multimedia simulation technology to build a rigid body model of the human body, and combine it with the texture characteristics to present the simulated image in the form of texture [1]. Hasan AJ's goal is to develop an educational curriculum. The quantitative evaluation of physical exercise is a prerequisite for professional sports analysis based on scientific training and data. However, there is a contradiction between the high accuracy and consistency of the evaluation method, and it is difficult to improve the two indicators in the same device [2]. Zhao Y proposed an effective motion identification and evaluation system for this problem [3]. In the teaching of sports skills for students majoring in sports technology, we should strengthen the strength and breadth of teaching evaluation and improve the quality of teaching. Therefore, it is necessary to establish a complete evaluation system.

In view of the current training objectives of gymnastics technical talents in higher vocational colleges and the characteristics of gymnastics technical courses, this paper puts forward a comprehensive evaluation index system for the comprehensive quality of students in physical education colleges. This article aims to let students understand the influence of gymnastics technology on students' individual, school and society, so as to improve their comprehensive quality and improve their comprehensive quality.

## 2. Construction of the Evaluation Index System of Gymnastics Technical Class Teaching

The consistency indicators can be summarized into three levels: principal component - target level - specific model level (P level) - system level (AHP) [4-5].

Analytic Hierarchy Process (AHP) is an important method from AHP to qualitative analysis to quantitative analysis. Therefore, when analyzing the hierarchical structure of the research object according to the determined hierarchy, it is necessary to reasonably divide the analytic hierarchy process, and then rank the hierarchy according to the evaluation criteria, and get the results. Teachers' teaching ability is the basic premise for the smooth development of teaching. AHP is the booster to promote students' effective learning and deep learning. The acquisition of students' higher-order thinking ability is the direct reflection of teaching effect. Specifically shown in Figure 1.

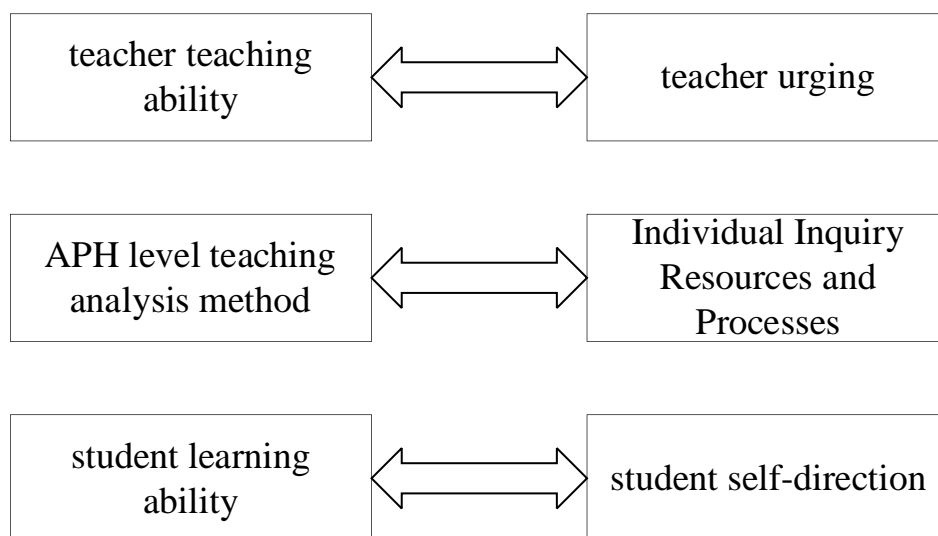


Figure 1: Framework of key elements of AHP teaching

(1) Indicator Extraction Process and Steps

Based on AHP analytic hierarchy process, the analysis results are judged and the weight of the analytic hierarchy process model is determined. Before determining the indicator weight, the indicator system needs to be set and implemented [6-7]. First of all, we should collect the main contents of the classroom teaching evaluation system indicators; Secondly, we should analyze the relationship between the main factors that affect the index weight of the evaluation system; Finally, the factors related to the weight of the evaluation system should be determined according to the analysis, judgment and synthesis of the evaluation system. The selection of indicators requires that the required factors are extracted and analyzed and calculated according to the relationship between different levels and the corresponding relationship of elements after the analysis level is determined [8].

(2) The Method of Constructing the Index System Hierarchical Model

AHP analytic hierarchy process uses decision-makers' preferences and attitudes towards a factor to determine the key features of things and the extent of influencing factors. The constituent elements of the evaluation index are grouped according to the acceptable degree and placed at the factor level. On this basis, the hierarchical structure model is set up to clearly show the interaction between various factors. The basic idea of AHP is to classify things from their respective perspectives according to the differences between different levels, the relationship between corresponding factors and the interaction between them [9-10]. The final effect can be obtained by classifying and comprehensively analyzing each factor. The factors are divided into 8 levels according to the hierarchical structure. Analytic hierarchy process can be applied to any level, and it can also be applied to different fields and different levels. Therefore, in order to facilitate teachers and managers to more accurately understand and apply different levels of analytical models, this paper adopts the method shown in the AHP model to determine the weight of each level of indicator system [11]. This paper needs to consider the factors that affect the quality of distance teaching, and use AHP to determine the subjective weight of each factor, and then carry out weighted summation, so as to build a model of distance teaching quality evaluation system based on AHP, as shown in Figure 2.

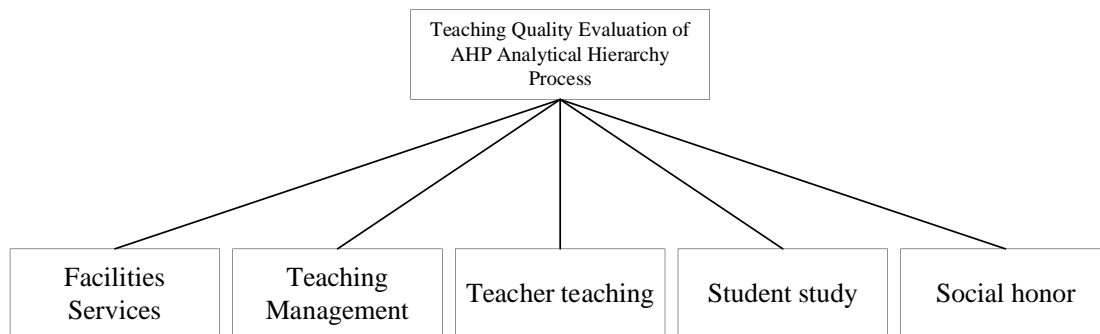


Figure 2: The model of distance teaching quality evaluation system based on AHP

### 3. Design Experiment on the Construction of Evaluation Index System of Gymnastics Technique Class Teaching

From April to May 2022, a total of 47 physical education teachers and heads of teaching departments from 17 colleges and universities in A Province distributed 47 questionnaires, 45 of which were sent by on-site delivery and mail, 45 of which were effective, with a recovery rate of 95.7%. In 8 universities, a total of 400 samples were distributed, 370 of which were recovered, with a recovery rate of 92.5%. 25 invalid samples and 345 valid samples were removed, with an effective recovery rate of 86.3%. Table 1 lists the basic information of the respondents.

Table 1: Basic Information of the Respondents

		Number of people
Age	30-39	8
	40-49	28
	Above 50	9
title	professor	7
	associate professor	26
	lecturer	12
education	Learned scholar	4
	master	36
	bachelor	5

Rank sum operation is a method used to determine the weight of indicators. It refers to consulting relevant experts in the form of questionnaires, then ranking them according to their importance, and ranking them in order to determine their weight. Its calculation formula is:

$$S_j = \frac{2[(n+1)m - K_j]}{nm(n+1)} (j = 1, 2, 3, \dots, n) \quad (1)$$

$S_j$  is the weight of the  $j$ th indicator,  $K_j$  is the rank sum of the  $j$ th indicator,  $n$  represents the number of indicators, and  $m$  represents the number of experts.

Before calculating the weight of each index, it is necessary to conduct a significant consistency test on the assessment results of experts. The judges have basically the same opinion, which is meaningful for the calculation of indicator weight. The formula for testing is as follows:

$$A^2 = \frac{\sum K_j^2 - (\sum K_j)^2 / n}{1/12nm(n+1)} \quad (2)$$

On this basis, three first level indicators and 14 second level indicators are proposed. The importance of each index in the teaching evaluation system was ranked by 20 gymnastics, gymnastics management and college sports teaching experts. Through the calculation example of a kind of index weight, the overall calculation of the weight is described in detail. In the classroom teaching evaluation index system, the number of the first type of indicators is  $n=3$ ,  $m=20$ .

## 4. An Experimental analysis on the Construction of the Evaluation Index System of Gymnastics Technique Class Teaching

### 4.1 Teaching Status of Gymnastics Teachers

Improper selection of teaching methods and means will directly affect students' knowledge and skills, which is of great significance for teachers to complete teaching tasks and achieve teaching objectives.

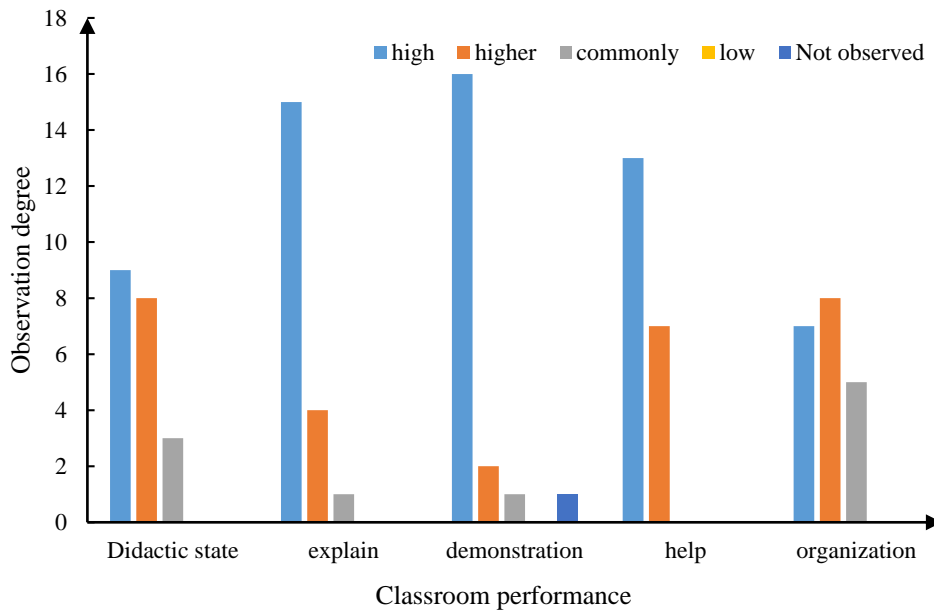


Figure 3: Statistics of classroom observation teachers

It can be seen from Figure 3 that the performance of gymnastics teachers in the classroom includes demonstration, explanation, protection and assistance, and teaching organization. Among them, the demonstration is conducted for 16 times and the explanation is conducted for 15 times. Protection and help are unique characteristics of gymnastics teaching. Teaching organization is an important content for orderly classroom teaching, and the application is conducted for 7 times. Through the observation of experimental data, it is found that students' subjective initiative is an important factor affecting their teaching quality in gymnastics class. Teacher factor is an important factor that affects students' academic performance. In addition, gymnastics teachers in different teaching stages, using different teaching methods and methods will produce different results.

#### 4.2 Current Learning Situation of Gymnastics Students

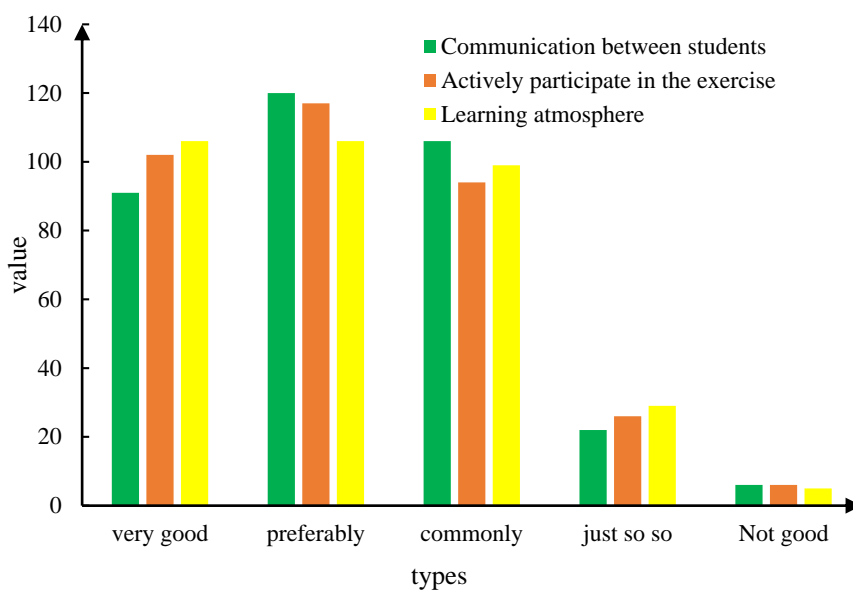


Figure 4: Teaching atmosphere of gymnastics technology class

It can be seen from Figure 4 that students are the objects of imparting knowledge and direct participants in classroom teaching. They have a deep understanding of the whole classroom teaching process, and conducted a questionnaire survey from three aspects: the frequency of student communication, the degree of student participation, and the learning environment of students. The results show that the overall teaching atmosphere is good.

In the teaching evaluation of gymnastics technical course, the corresponding evaluation criteria should be formulated according to the purpose and principle of evaluation. For example, the connotation of teaching design: define the teaching purpose and task, fully consider the actual situation of students in the design, and be consistent with the syllabus, while the preparation of the teaching plan is focused on the writing standard. The standard directly determines the degree or level of education goal.

Teaching evaluation is a subjective measurement and evaluation of teaching effect in teaching activities, and a reflection of the realization of a specific teaching goal. As gymnastics skill class belongs to competitive events, classroom behavior must be used as a reference index for evaluation. The evaluation index system needs to be considered from the following aspects: on the whole, have a good understanding of this course; Carry out special activities against key objectives; Adopt flexible and diversified models to strengthen classroom penetration. Teachers should design teaching activities of one or more subjects that meet their teaching objectives and ability requirements and have certain pertinence and effectiveness through specific problems, so that students can get comprehensive development in exercise. Through specific measures and methods to implement performance appraisal, promote teachers to improve physical education quality and professional level. The objectives and evaluation indicators generally include five aspects, namely "ability, knowledge structure and attitude"; "Learning attitude, innovation spirit and practical ability"; "Comprehensive quality and scientific and cultural level"

According to the construction of the above indicator system, guide students to learn independently and cooperatively in the classroom to promote the dual development of students' ability and knowledge. Teachers should make full use of multimedia, actively participate in the construction of curriculum reform, combine the characteristics of the curriculum with the school conditions, and constantly innovate, so that students can obtain more knowledge, acquire more rich knowledge, and improve sports skills. Colleges and universities should make full use of modern information technology, new textbooks, new models and other factors to effectively use network resources. To improve students' interest in learning gymnastics skills. The combination of gymnastics classes and extracurricular activities, and the learning method based on in class exercises, can effectively improve the overall level of students' sports skills, so that the new textbooks have a deeper understanding of the existing learning situation. Gymnastics lessons can be previewed before class, so that students can be familiar with the teaching materials, teachers can explain the demonstration actions and practice after class to master the whole learning process, and achieve the dual goals of knowledge and skills. Finally, through independent participation in classroom activities, students' practical ability and enthusiasm for participation can be improved.

## 5. Conclusions

Using AHP method to construct the evaluation index of physical education technology teachers' classroom teaching is conducive to improving the teaching quality of physical education technology courses. This paper classifies the factors that affect the effect of classroom teaching, and obtains the corresponding conclusions after screening layer by layer. Through the extraction of the main contents of different teaching evaluation systems, it can help the staff related to gymnastics education in colleges and universities to find and improve the deficiencies in teaching work and

make corresponding improvements and optimization. For example, for the problem that the weight of some indicators in the classroom teaching evaluation system is too low, it can be improved by adjusting the weight and redesigning the scoring standard to promote the rational optimization and improvement of the evaluation indicator system. The deficiencies in the evaluation system based on actual teaching need to be improved according to the actual situation.

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