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AHP and FCE Fusion Method-Based Evaluation Model for the Teaching Quality of Ideological and Political Education in Physical Education Courses

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Abstract The reform of higher education in the new era emphasizes the fundamental task of cultivating morality, and the new mode of cultivating people, curriculum politics, has received widespread attention. Physical education courses have the dual functions of physical exercise and character building, and have unique advantages in cultivating students' patriotic sentiment, team spirit, and will to fight. This paper constructs an evaluation model based on hierarchical analysis and fuzzy comprehensive evaluation to scientifically evaluate the quality of the teaching of Civics and Politics in physical education courses. Literature analysis method and expert interview method are used to determine the evaluation index system, hierarchical analysis method is used to determine the weights of each index, and fuzzy comprehensive evaluation method is used to evaluate the teaching quality. The study established an evaluation system containing 6 primary indicators and 21 secondary indicators of patriotic sentiment, social adaptation, values, physical health view, thinking judgment, and sports personality. The results show that patriotic sentiment has the highest weight of 0.263, followed by physical personality 0.203 and social adaptation 0.155, and national cultural identity 0.358. Verified by the example of school A, the fuzzy comprehensive evaluation score is 67.925, with an evaluation grade of good, which is close to the actual teachers' average score of 65.12. The study shows that the model can effectively integrate qualitative and quantitative evaluation, provide a scientific method for evaluating the quality of teaching Civics and Politics in physical education courses, and help to improve the teaching effect and the quality of talent cultivation.

Index Terms Civics and Politics of Physical Education Course, Teaching Quality Evaluation, Hierarchical Analysis Method, Fuzzy Comprehensive Evaluation, Weight Determination, Lifelong Learning of Virtue

I. Introduction

“Establishing moral character and cultivating talents” has long been the aim of Chinese education, which aims to improve the ideological and political quality of students, and is also the fundamental need for students to realize self-improvement and self-development. In the new era, it is clearly put forward to set up moral education as the fundamental task of higher education, and to cultivate new generations of people with all-round development of morality, intelligence, physical fitness, aesthetics and aptitude who are capable of taking up the great responsibility of national rejuvenation is the ultimate direction of school sports to implement the principle of “establishing morality and cultivating talents” [1]-[3]. Based on this background, curriculum Civics has become an effective carrier for physical education subjects to realize moral education, which is the embodiment of the innate moral education function of physical education [4]. Through the construction of curriculum Civics, the integration of teaching resources, the realization of the process of transforming disciplinary and curricular resources into parenting resources, and the enhancement of the teaching quality of curriculum Civics in physical education are the driving force of the demand for the reform of physical education teaching in colleges and universities [5]-[7].

It is generally believed that the quality of course teaching is the degree of teaching that achieves the pre-established teaching objectives, meets the developmental needs of the educated, and caters to the developmental needs of the society [8]. However, the quality of teaching and learning of college physical education courses is different from the quality of teaching and learning of physical education, in addition to the above general provisions for the quality of teaching and learning of physical education, physical education courses also have some special provisions. On the one hand, the sports course ideology needs to reflect the guiding ideology and relevant requirements in the construction of the course ideology, with the essential characteristics of normative, instructive and clear [9], [10]. On the other hand, the ideology and politics of physical education courses also need to meet the teaching quality regulations at the level of “students' needs for growth and success”, and need to measure the

teaching effect against the standard of “cultivating people with moral integrity”, and test the effect of talent cultivation through the comprehensive quality of students [11]-[13]. Therefore, it is of great practical value to construct an objective and reasonable evaluation index system to improve the teaching quality of Civics and Politics in physical education courses.

This study adopts the method of combining theoretical construction and empirical analysis. First, the construction principles and specific contents of the evaluation index system are determined through literature combing and expert interviews to establish a comprehensive evaluation framework covering six dimensions: patriotic sentiment, social adaptation, values, physical fitness view, thinking judgment, and sports personality. Secondly, the hierarchical analysis method is used to determine the weight distribution of indicators at all levels, and the scientificity and rationality of the weight setting is ensured through expert questionnaire survey and consistency test. Finally, the teaching quality evaluation model is constructed by combining the fuzzy comprehensive evaluation method, and the effectiveness and practicality of the model is verified through examples.

II. Construction of a system of indicators for evaluating the quality of teaching civics and politics in physical education courses

II. A.Principles of construction

(1) Principle of Purpose

The selection of evaluation indicators must start from the purpose of evaluation, and the most critical indicators should be selected practically according to the evaluation object and the purpose of evaluation. Based on the theory of socialist core values and comprehensive development of human being and according to the cultivation goal of sports course ideology, this paper selects six first-level indicators, namely, patriotic sentiment aspect, social adaptation aspect, value aspect, physical aspect, thinking aspect, and sports personality aspect.

(2) Principle of scientificity

The principle of scientificity is the basis for constructing the evaluation index system. It mainly consists of three elements: first, the indicators should fully reflect the main content and inner connection of the evaluation objectives, and reflect the essential qualities of the evaluation object. Secondly, in the process of constructing the evaluation indicators, the selection, design, data collection and calculation methods of the evaluation indicators should be reasonable, so that the indicators are clearly defined and the measurement methods are scientific and reasonable. Thirdly, there should be no duplication or crossover between the indicators.

(3) Systematic and hierarchical principle

Bid evaluation indicators often have several levels, and each level contains a number of subsystems, before constructing the indicators, we should consider the wholeness of the indicator system, and deal with the relationship between the part and the whole, the indicators are not simply stacked, and the intrinsic correlation between each indicator should be sorted out as far as possible, and they should be divided into different levels, and the indicators should be selected to reflect the evaluation object as comprehensively as possible, and they should not be omitted.

(4) Principle of feasibility

The principle of feasibility is that in the process of selecting indicators, the data should be reliable, accessible and realizable. Data sources to ensure that the real, try to use quantitative indicators to ensure that the data and information can be quantified, the indicators should be fine, the relevance of the indicators is not strong recommended to be deleted.

(5) Combination of qualitative and quantitative principles

In the process of constructing the evaluation index system for the quality of teaching Civics and Politics in physical education courses, the screening of indicators should be carried out in strict accordance with the combination of qualitative and quantitative research. Qualitative research is to explore the scope of indicators for evaluating the quality of teaching quality of sports courses' Civics and Politics oriented towards moral education through interviews with instructors and front-line teachers before the preparation of indicators in the early stage, and the specific research process adopts an inductive summarization method to classify and screen the indicators from seven dimensions after reviewing a large amount of literature. Listening to the opinions of many parties and determining the evaluation index system based on the literature, and then continuously optimizing the evaluation system through the Delphi method at a later stage.

II. B.Process of selecting the indicator system

First of all, it is necessary to screen the indicators, and the screening of the indicators is the starting point for creating a quality evaluation index system for the teaching quality of sports course civics. Initial screening, through the interpretation of the documents related to the course civic politics, in-depth understanding of the syllabus of physical education courses, and read a large number of related literature, the origin of the course civic politics, the specific

connotation, the development of the status quo and the development of the path of the course civic politics and the construction of the course civic politics system, the theoretical research on the integration of a number of disciplines into the course civic politics, including physical education, to access and summarize and analyze, and to refine the elements of the course of the sports civic politics and the teaching and evaluation indicators for this study. Evaluation indexes, laying the foundation for the research of this paper.

Secondly, according to the existing relevant types of index system as a reference. Civic and political connotation of physical education course is shown in 10 parts from 5 aspects, such as patriotic dedication and teamwork, disciplinary constraints and reverence for rules, tenacious struggle and defiance of the enemy, frustration education and respect for others, and physical and mental dual cultivation and health penetration.

By summarizing the teaching evaluation indexes proposed by experts and scholars, the aspects of national sentiment, values, social adaptation, body and mind, thinking, and sports personality are important indexes reflecting the quality of Civics teaching in physical education courses.

II. C. Construction of evaluation index system

Based on the above steps, a system of indicators for evaluating the quality of teaching Civics and Politics in physical education courses was constructed as shown in Table 1. Six primary indicators and 21 secondary indicators were identified.

Table 1: Teaching quality evaluation index system

Primary indicator	Secondary indicator
Patriotism (A)	National identity (A1)
	National cultural identity (A2)
	National sense (A3)
Social adaptation (B)	Great view (B1)
	Solidarity (B2)
	Incorporate (B3)
Values (C)	Rule consciousness (C1)
	Patriotic law (C2)
	Polite and Integrity (C3)
Health outlook (D)	Health education (D1)
	Physical education (D2)
Thinking judgment (E)	Keep up with (E1)
	Rational thinking (E2)
	Dialectical thinking (E3)
Physical personality (F)	Optimism (F1)
	Tenacity (F2)
	Unformidable (F3)
	Beyond oneself (F4)
	Dare to do (F5)
	Self-improvement (F6)
	Discipline oneself (F7)

III. Construction of a model for evaluating the quality of Civics teaching in physical education courses

III. A. Methodology for determining indicator weights

Hierarchical analysis (AHP) is a decision analysis method that combines quantitative and qualitative analysis. The division of various influencing factors in a problem into a set of hierarchical and logical structural models is the key to AHP [14]. Influential factors are generally divided according to the criteria of general objectives, criterion level and program level, and the purpose of such division is to make the factors interconnected and have affiliation. The degree of importance of each factor is determined by experts based on their knowledge and experience, taking values according to the relative scale. Then the relative importance weights of each layer of factors are derived using mathematical methods to obtain the relative weights of all factors in the model.

The basic steps of AHP are as follows:

(a) Constructing the hierarchical model

Constructing the hierarchical model is a key step in the basic steps of AHP. Insufficiently reasonable establishment of the hierarchical model will affect people's ability to analyze the relative importance of the factors, which will lead to inaccurate results of the final weights. The top layer of the model is the target layer, usually only one factor, and the bottom layer is usually the program layer, and there can be one or several criterion layers in the middle.

(b) Constructing the judgment matrix

The construction of judgment matrix is an important part of determining the weights of factors in hierarchical analysis. The decision maker compares the factors two by two with each other and constructs the judgment matrix using the relative scale, and the elements in the judgment matrix satisfy $a_{ij} = 1/a_{ji}$, and a_{ij} represents the relative importance of factor i to factor j. The judgment matrix is shown in equation (1):

$$A = \begin{bmatrix} 1 & a_{12} & \cdots & a_{1n} \\ a_{21} & 1 & \cdots & a_{2n} \\ \vdots & \vdots & 1 & \vdots \\ a_{n1} & a_{n2} & \cdots & 1 \end{bmatrix} \tag{1}$$

(c) Hierarchical single sorting and consistency test

After the judgment matrix is established, the largest characteristic root $\lambda_{\max}$ of the judgment matrix and its eigenvector w are calculated, and this process is called hierarchical single sorting. The elements of W represent the relative importance weights of factors at the same level for a factor at the previous level. When the judgment matrix satisfies consistency, all feature roots are zero except for one non-zero maximum feature root $\lambda_{\max} = n$.

The purpose of consistency test is to identify whether the constructed judgment matrix is acceptable or not. The consistency index is calculated using CI, and the formula for CI is as follows:

$$CI = \frac{\lambda_{\max} - n}{n-1} \tag{2}$$

where, CI denotes consistency index, $\lambda_{\max}$ denotes the maximum eigenvalue, n denotes the order of the judgment matrix,

When $CI = 0$, the consistency is complete. As the CI value gets closer to 0, the consistency of the judgment matrix is better. The larger the CI value, the weaker the consistency.

(d) Calculate the stochastic consistency ratio CR.

$$CR = \frac{CI}{RI} \tag{3}$$

where, CR denotes the stochastic consistency ratio, CI denotes consistency index, RI denotes random consistency indicator.

The stochastic consistency indicator RI is used to measure how consistent the judgment matrix of different orders is, the value of RI is related to the order of the judgment matrix, and its correspondence is shown in Table 2.

Table 2: The random consistency index RI is evaluated

Order number	1	2	3	4	5	6	7	8	9	10
RI	0	0	0.52	0.89	1.12	1.26	1.36	1.41	1.46	1.49

When $CR < 0.1$, the consistency of this judgment matrix is considered satisfactory. When $CR \geq 0.1$, the consistency of this judgment matrix is unsatisfactory, indicating that the values of some elements are not logical, and the judgment matrix needs to be corrected.

(e) Indicator weight summary

In order to make the weights calculated by the hierarchical analysis method not subjective and arbitrary, it is necessary to finally summarize the weights calculated by the questionnaire. Here the average of the weights of the indicators is used to determine the final weights. For example, a total of m questionnaires were distributed with n evaluation indicators. Let the weight value of the j th indicator of the i th expert be w_{ij}, and the weight matrix of all questionnaires aggregated is $W = (W_{i,j})_{m \times n}$. Then the weight of an indicator is calculated by the following formula:

$$\bar{W}_{ij} = \sum_{i=1}^{m} w_{ij} / m \tag{4}$$

Eq. $i = 1,2,3,...,m; j = 1,2,3,...,n$.

III. B. Fuzzy integrated evaluation

III. B. 1) Treatment of evaluation indicators

After obtaining the evaluation index $b_j (j = 1,2,\ldots,m)$, the specific results of the evaluation object can be determined according to the following methods.

(a) Maximum affiliation method

Take the alternative element V_L corresponding to the largest evaluation index $\max b_j$ as the result of the evaluation, that is:

$$V = (V_L \mid V_L \to \max b_j) \tag{5}$$

The shortcoming of the maximum affiliation method is that it only considers the role of the largest evaluation index, leaving out the information provided by other indexes, and when there is more than one largest evaluation index, it is difficult to decide the evaluation results by the maximum affiliation method [15]. In order to solve this problem, we can properly consider the use of “gray correlation theory” to amend this. Gray correlation:

$$\begin{aligned} &\eta_{ij}(k) = \frac{\min \Delta_i(k) + \rho_{\max} \Delta_i(k)}{\Delta_i(k) + \rho_{\max} \Delta_i(k)} \\ &\rho \in (0,1) \\ &\Delta_{ij}(k) = \mid A_j^{'}(k) - A_i^{'}(k) \mid \\ &\eta_{ij} = \frac{1}{k} \sum_{1}^{k} \eta_{ij}(k) \\ &n = 1,2,\Lambda,n \end{aligned} \tag{6}$$

where $A_i^{'}$ and $A_j^{'}$ are the primitive images of A, ρ is the discrimination coefficient, and η_{ij} is the degree of association.

(b) Weighted average method

Take the value of the weighted average of each alternative element v_i with b_i as weights as the evaluation result, i.e:

$$V = \frac{\sum_{j=l}^{n} b_j v_j}{\sum_{j=l}^{n} b_j} \tag{7}$$

If the evaluation index b_j has been normalized, then $V = \sum_{j=1}^{n} b_j v_j$.

If the evaluation object is a numerical quantity, the value calculated according to the above two methods is the result of the fuzzy comprehensive evaluation of the quantity. If the evaluation object is a non-numerical quantity, the weighted average method can not be used, only the maximum affiliation method.

(c) Fuzzy distribution method

This method directly to the evaluation indicators as the evaluation results, or evaluation indicators will be normalized, using the normalized evaluation indicators as the evaluation results. The specific method of normalization is as follows:

First find the sum of each evaluation indicator, i.e.:

$$b = b_1 + b_2 + \Lambda + b_m = \sum_{j=l}^{m} b_j \tag{8}$$

Then divide the original individual evaluation metrics by their sum:

$$B' = (\frac{b_1}{b}, \frac{b_2}{b}, \Lambda, \frac{b_m}{b}) = (b_1', b_2', \Lambda, b_m') \tag{9}$$

B' is the normalized fuzzy comprehensive evaluation set, and $b_j'(j = 1,2,\Lambda,m)$ is the normalized fuzzy comprehensive evaluation index, i.e.: $\sum_{j=1}^{m} b_j' = 1$.

Each evaluation index, specifically reflecting the characteristics of the evaluation object, enables the evaluators to carry out the evaluation more scientifically and, in the process of actual operation, to make scientific and reasonable treatment in accordance with the relevant requirements combined with the actual situation.

III. B. 2) Teaching quality evaluation modeling

(1) Establishment of factor set

Factor set is a collection of factors of the evaluation object, represented by a capital letter "U". That is, $U = \{U_I, U_2, U_3, \Lambda, U_n\}$. Where each element $U_i, (i = 1,2,\Lambda,n)$, represents each factor.

(2) Establish the weight set

In general, the degree of influence of each evaluation factor on the evaluation results is not the same. In order to accurately reflect the importance of each factor, each influencing factor $u_i(i = 1,2,\Lambda,n)$ should be assigned a corresponding appropriate weight value $a_i(i = 1,2,\Lambda,n)$ according to the degree of importance. The set of weights: $A = \{a_1, a_2, \Lambda, a_m\}$ is called the set of factor weights, also called the "weight set".

Usually, each weight $a_i(i = 1,2,\Lambda,n)$, should satisfy the two conditions of normalization and non-negativity:

$$\sum_{i=1}^{n} a_i = 1, \quad a_i \geq 0 \quad (i = 1,2,3,\Lambda,n) \tag{10}$$

They can be regarded as the degree of affiliation of each factor $u_i(i = I,2,\Lambda,n)$ to the evaluation result, and the set of weights can also be regarded as a fuzzy subset on the set of factors. The setting of weights is generally subjectively determined by the evaluator in accordance with the needs of the actual situation. For the same influencing factors, with different values of weights, the evaluation results will certainly be different. For the indicators with high teaching workload, relatively high requirements and direct impact on quality, higher values should be assigned when setting the weight values, and vice versa, lower values, so the setting of weights also represents the overall orientation of teaching evaluation.

(3) Establishment of alternative set (evaluation set)

Alternative set is also generally called "evaluation set", is the evaluator of the evaluation object to make a variety of total evaluation results composed of a collection. It is usually denoted by the capital letter V, i.e., $V = \{v_1, v_2, \Lambda, v_m\}$.

Each element $v_i(i = 1,2,\Lambda,m)$, represents various possibilities to arrive at the total evaluation result. The main purpose of using fuzzy comprehensive evaluation is to select the best result based on the overall synthesis of all the influencing factors involved.

(4) Determination of Fuzzy judgment matrix

Fuzzy comprehensive evaluation is a comprehensive evaluation of all the influencing factors, mainly to synthesize the impact of all the evaluation factors on the evaluation object, and then finally come up with the most scientific and reasonable results, it should be said that this method is more thoughtful and detailed, and the results given are closer to the actual [16]. Evaluation of only one factor to determine the degree of affiliation of the evaluation object to the elements of the alternative set is called single-factor fuzzy evaluation. Let the evaluation object evaluate the i th factor U_i in the factor set, and the degree of affiliation to the j th element v_j in the alternative set is r_{ij}, then the result of evaluating according to the i th factor U_i can be derived from the single-factor evaluation set R_i as $R_i = (r_{i1}, r_{i2}, \Lambda, r_{im})$.

Similarly, the individual factor fuzzy evaluation set corresponding to each influencing factor can be derived as follows:

$$\begin{aligned} R_1 &= (r_{11}, r_{12}, \Lambda, r_{1m}) \\ R_2 &= (r_{21}, r_{22}, \Lambda, r_{2m}) \\ &\Lambda \\ R_n &= (r_{n1}, r_{n2}, \Lambda, r_{nm}) \end{aligned} \tag{11}$$

The affiliation of the evaluation set of each influence factor is the row to form the evaluation matrix R_i of the i th single factor:

$$R_i = \begin{bmatrix} r_{ill} & r_{il2} & \Lambda & r_{ilm} \\ r_{i2l} & r_{i22} & \Lambda & r_{i2m} \\ M & M & M & M \\ r_{inl} & r_{in2} & \Lambda & r_{inm} \end{bmatrix} \tag{12}$$

Single-factor fuzzy evaluation can only reflect the impact of a factor on the evaluation object, only a comprehensive evaluation of all the influencing factors can produce a more scientific evaluation results. The weight set A can be regarded as a fuzzy matrix with one row n columns, and by synthesizing the weight set with the single-factor fuzzy evaluation matrix, a fuzzy comprehensive evaluation set B_i can be obtained:

$$B_i = A_i \cdot R_i = (a_1, a_2, \Lambda, a_m) \cdot \begin{bmatrix} r_{i11} & r_{i12} & \Lambda & r_{i1m} \\ r_{i21} & r_{i22} & \Lambda & r_{i2m} \\ M & M & M & M \\ r_{in1} & r_{in2} & \Lambda & r_{inm} \end{bmatrix} \tag{13}$$

$b_j (j = 1, 2, \Lambda, m)$ is the fuzzy comprehensive evaluation index. Its is the degree of affiliation of the evaluation object to the j element in the alternative set when considering the influence of all factors. From the fuzzy evaluation set of the second level evaluation, the first level fuzzy comprehensive evaluation matrix can be obtained:

$$R = \begin{bmatrix} B_1 \\ B_2 \\ M \\ B_m \end{bmatrix} \tag{14}$$

This results in a first-level fuzzy comprehensive evaluation set $B = A \cdot R$.

(5) Comprehensive evaluation score:

$$M = B \cdot V^T = (b_1, b_2, \Lambda, b_m) \cdot \begin{bmatrix} v_1 \\ v_2 \\ M \\ v_m \end{bmatrix} \tag{15}$$

where M is the quantitative score of the comprehensive evaluation, B is the result of the fuzzy comprehensive evaluation, and V is the specific score of the evaluation grade.

IV. Findings and analysis

IV. A. Determination of indicator weights

After determining the content of the evaluation indicators of the quality of teaching Civics and Politics in physical education courses, it is necessary to assign weights to each indicator, so as to quantify the importance of each indicator, so that the whole evaluation indicator system is more scientific and specific, and only after assigning weights to each indicator can the evaluation system be applied to the actual teaching evaluation. This chapter uses the AHP hierarchical analysis method to calculate the weights of the indicators in the evaluation system according to the four steps of constructing a hierarchical structure, constructing a comparison matrix, consistency test and calculating the weights.

In order to ensure that the experts have a certain degree of familiarity with the evaluation indicators, so that the final indicator assignment is scientific and reasonable, select 10 experts and invite them to assign weights to each indicator by issuing questionnaires, recover the 10 questionnaires, collate the experts' opinions and suggestions, and use the yahp network hierarchical analysis method to assist the software, and initially integrate all the experts' indicator weights, and then carry out a judgment matrix for the Consistency test, to ensure that experts fill out the rationality of the data, after passing the consistency test, the final determination of the weight of each indicator in the evaluation system is shown in Table 3.

It can be seen that the weight of student patriotism is the highest among the first-level indicators, with a value of 0.263, indicating that relatively speaking, student patriotism is the most important thing for experts, and it is also

what should be emphasized in the teaching of sports curriculum ideology oriented to the cultivation of morality. Secondly, the weight assignment of sports personality and social adaptation is higher, respectively 0.203 and 0.155, and the weight assignment of physical health view, value and thinking judgment is lower, respectively 0.135, 0.126 and 0.118. In the secondary indicators, the weight assignment scores of national cultural identity, national system identity and national sense of belonging are higher, not because the content of the other indicators is not important enough, but because in the sports curriculum Civics teaching should be emphasized. This is not because the content of other indicators is not important enough, but because in the teaching of ideology and politics in physical education courses, facing non-sports majors, in order to play the educational role of the concept of ideological and political education, it is still necessary to take the education of sportsmanship as a “fulcrum”, and through the education of sportsmanship, it is necessary to link the students' education goals related to patriotic feelings, perseverance and other willful qualities, so as to ultimately realize the educational purpose of ideological and political education and humanistic education. Educational purpose. In addition, the sports ideology classroom still can not be separated from the sports class “sports” “fitness” and other physical characteristics, physical education teachers in the teaching process, the most frequent use of didactic teaching method is the key indicators of the examination of the sports course ideology teaching, physical education teachers need not to deviate from the sports class movement and fitness, physical education teachers need not to deviate from the sports class movement and fitness. Physical education teachers need not to deviate from the nature of physical education and sports classes to teach skills, but also through the transfer of knowledge, infiltrate the minds of students, which requires physical education teachers to constantly improve and enhance the methods and techniques of didactic teaching, therefore, the evaluation of physical education teachers whether in the classroom “good” is the key to the evaluation of the teaching of physical education courses of the Civics and Political Science.

Table 3: Evaluation index weight assignment

Primary indicator	W	Secondary indicator	W	RW
A	0.263	A1	0.336	0.088
		A2	0.358	0.094
		A3	0.306	0.08
B	0.155	B1	0.296	0.046
		B2	0.355	0.055
		B3	0.349	0.054
C	0.126	C1	0.339	0.043
		C2	0.288	0.036
		C3	0.373	0.047
D	0.135	D1	0.522	0.07
		D2	0.478	0.065
E	0.118	E1	0.316	0.037
		E2	0.359	0.042
		E3	0.325	0.038
F	0.203	F1	0.122	0.025
		F2	0.13	0.026
		F3	0.143	0.029
		F4	0.196	0.04
		F5	0.108	0.023
		F6	0.122	0.025
		F7	0.179	0.037

IV. B. Fuzzy integrated evaluation

The quality of teaching Civics and Politics of Physical Education courses in School A is assessed using the evaluation system and index weights determined above.

For the assessment of the quality of teaching and learning of sports courses in school A, the set of comments is selected as {excellent, good, moderate, qualified, unqualified}, and the corresponding set of scores is {100, 75, 50, 25, 0}. Ten experts were selected to do single-factor evaluation on the indicators in the evaluation index system, and the evaluation results were normalized as shown in Table 4, and none of the 10 experts made “unqualified” evaluation on the quality of Civic and Political Teaching of Physical Education Courses in School A, indicating that the quality of the Civic and Political Teaching of Physical Education Courses in School A was recognized by the

experts.

Table 4: Single factor evaluation result

Secondary indicator	Excellence	Good	Medium	Qualify	Unqualify
A1	0.2	0.4	0.2	0.2	0
A2	0.3	0.5	0.1	0.1	0
A3	0.2	0.4	0.3	0.1	0
B1	0.2	0.4	0.2	0.2	0
B2	0.1	0.4	0.2	0.3	0
B3	0.2	0.4	0.2	0.2	0
C1	0.4	0.3	0.2	0.1	0
C2	0.2	0.3	0.3	0.2	0
C3	0.2	0.3	0.2	0.3	0
D1	0.2	0.6	0.2	0	0
D2	0.2	0.4	0.2	0.2	0
E1	0.2	0.4	0.2	0.2	0
E2	0.4	0.3	0.3	0	0
E3	0.2	0.4	0.2	0.2	0
F1	0.3	0.3	0.3	0.1	0
F2	0.3	0.4	0.2	0.1	0
F3	0.3	0.5	0.1	0.1	0
F4	0.3	0.4	0.2	0.1	0
F5	0.2	0.3	0.3	0.2	0
F6	0.2	0.3	0.2	0.3	0
F7	0.2	0.4	0.2	0.2	0

The comprehensive evaluation matrix is shown in table 5. More experts rated values and thinking judgment as “excellent” than any other indicator.

Table 5: Integrated evaluation matrix

Primary indicator	Excellence	Good	Medium	Qualify	Unqualify
A	0.23	0.43	0.2	0.13	0
B	0.17	0.4	0.2	0.23	0
C	0.27	0.3	0.23	0.2	0
D	0.2	0.5	0.2	0.1	0
E	0.27	0.37	0.23	0.13	0
F	0.26	0.37	0.21	0.16	0

IV. C. Analysis of evaluation results

Comprehensive evaluation weight vector:

$$A = (A, B, C, D, E, F) = (0.263, 0.155, 0.126, 0.135, 0.118, 0.203) \tag{16}$$

The fuzzy comprehensive evaluation value can be obtained according to Equation $B = A \cdot R$, where the operator uses the weighted average algorithm:

$$B = (0.234, 0.404, 0.207, 0.155, 0) \tag{17}$$

A School's Combined Score:

$$M = B \cdot V^T = (0.234, 0.404, 0.207, 0.155, 0) \cdot (100, 75, 50, 25, 0) = 67.925 \tag{18}$$

50<67.925<75, according to the principle of maximum affiliation, the quality of teaching Civics and Politics of Physical Education course in this school is good.

Comparing the model evaluation results with the actual situation of the school, the assessment results of the quality of teaching quality of sports course Civics of the five teachers taken are shown in Figure 1. Using "1~5" to

represent 5 teachers, it can be seen from the figure that the evaluation scores of each teacher on the 6 first-level indicators are between 50~75, and the comprehensive average score of the 5 teachers is 65.12, which is close to 67.925, indicating that the evaluation model constructed in this paper can accurately evaluate the quality of ideological and political teaching in physical education courses.

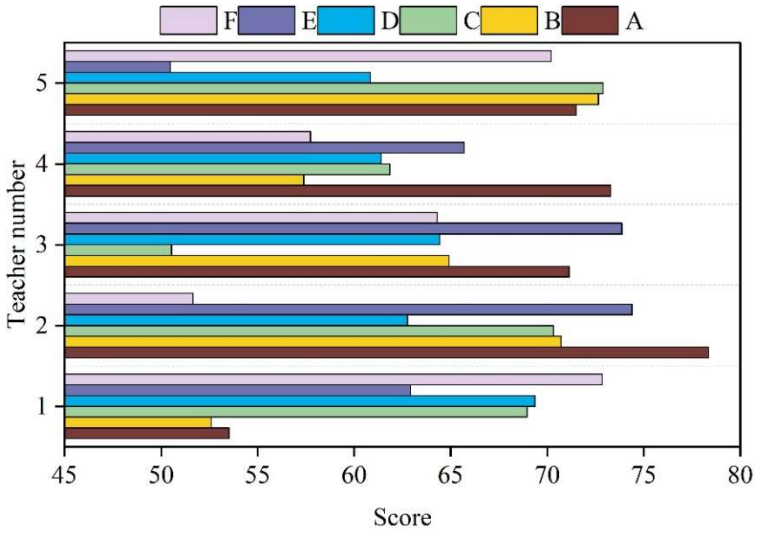

Figure 1: The results of the teaching quality evaluation

Verified by examples, the fuzzy comprehensive evaluation method can synthesize all aspects of the indicators to produce the results of the quality assessment of the teaching quality of the sports course of Civics and Politics, and the model established in this paper fits the actual situation of the school.

V. Conclusion

In this study, by constructing a teaching quality evaluation model of Civics and Politics of Physical Education courses based on hierarchical analysis method and fuzzy comprehensive evaluation, a scientific evaluation system containing 6 first-level indicators and 21 second-level indicators is formed. The results of the weighting analysis show that patriotic sentiment occupies a core position in the evaluation system, with a weighting value of 0.263, reflecting the importance of the teaching of sports course civics in cultivating students' patriotism. Physical personality and social adaptation ranked second and third with weights of 0.203 and 0.155 respectively, indicating that physical education plays an important role in shaping students' character and social adaptation.

The application of fuzzy comprehensive evaluation method effectively solves the difficulty of combining qualitative and quantitative in traditional evaluation. Verified by the example of School A, the comprehensive score of the quality of teaching Civics and Politics of Physical Education course in the school is 67.925, with an evaluation grade of good, which is highly consistent with the average score of 65.12 of the five teachers in the actual research, and verifies the accuracy and practicability of the model. The evaluation results show that the dimensions of values and thinking judgment are highly recognized by experts, while there is still room for improvement in social adaptation.

The evaluation model provides a standardized tool for evaluating the quality of teaching Civics and Politics in physical education courses, which can objectively reflect the current status of teaching, identify the weak links, and provide a scientific basis for teaching improvement and quality enhancement. The successful construction and validation of the model provides a reference paradigm for other universities to carry out similar evaluation work, and has good value for popularization and application.

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References

[1] Eryong, X., & Li, J. (2021). What is the ultimate education task in China? Exploring “strengthen moral education for cultivating people”(“Li De Shu Ren”). Educational Philosophy and Theory, 53(2), 128-139.

[2] Han, Y., & Tang, Y. (2018, June). Education in the new era should focus on strengthening moral education and cultivating people's overall development as the key direction. In 2018 3rd International Conference on Humanities Science, Management and Education Technology (HSMET 2018) (pp. 366-369). Atlantis Press.
[3] Abdullah, A. (2018). Cultivating morals students through character education: a case study. Journal of Education and Learning (EduLearn), 12(3), 457-463.
[4] Hu, M., & Wang, Z. (2023). The Ideological and Political Teaching of School Physical Education Courses under the Background of Big Ideological and Political. International Journal of Educational Curriculum Management and Research.
[5] Chen, X. K., & Yu, J. (2022). Evaluation model of physical education integrated ideology and politics based on principal component analysis. Mobile Networks and Applications, 27(3), 1240-1251.
[6] Li, C. A. O. (2020). Humanism Based Ideology and Politics of Physical Education in Colleges and Universities. Journal of International Education and Development Vol, 4(10).
[7] Cai, C., & Huang, P. (2021). Theoretical Research and Practical Application of Ideological and Political Education Construction of Physical Education Curriculum. Frontiers in Sport Research, 3(1), 10-14.
[8] Jiang, Y., & Wang, Y. (2016). Evaluation of teaching quality of public physical education in colleges based on the fuzzy evaluation theory. Journal of Computational and Theoretical Nanoscience, 13(12), 9848-9851.
[9] Cheng, P. (2022). Evaluation method of ideological and political classroom teaching quality based on analytic hierarchy process. Scientific Programming, 2022(1), 6554084.
[10] Liu, Z., Wu, S., Pu, S., & Li, R. (2023). Research on Teaching Evaluation of “Six-Dimensional Integration” by Integrating Course Ideology and Politics into Mixed Teaching—Taking “Project Evaluation” Series Course as an Example. Open Journal of Social Sciences, 11(4), 119-127.
[11] Baodong, J., & Xiaoxi, L. (2020). Strengthening Ideology and Politic in Value Guidance and Promoting Innovation in Moral Education Method. Frontiers in Educational Research, 3(8).
[12] Di, H., Zhang, H., & Li, P. (2022). Teaching quality of ideological and political education in colleges based on deep learning. International Journal of e-Collaboration (IJeC), 19(4), 1-15.
[13] Zhang, C., & Wei, Z. (2021, January). Research on strategies for improving the effectiveness of moral education in ideological and political courses in universities. In 2021 10th International Conference on Educational and Information Technology (ICEIT) (pp. 190-194). IEEE.
[14] Jia Li,Hong Chang & Libin Cai. (2023). Effect Evaluation of Integrating Socialist Core Values into Ideological and Political Courses—Research-based on Hierarchical Analysis. Journal of Educational Research and Policies,5(3),
[15] Panbao WANG,Wei WANG,Nina MENG & Dianguo XU. (2017). Multi-objective energy management system for DC microgrids based on the maximum membership degree principle. Journal of Modern Power Systems and Clean Energy,6(4),668-678.
[16] Wei Zhang. (2024). Research on Ideological and Political Teaching Evaluation of "Engineering Project Management and Practice" Based on Fuzzy Comprehensive Evaluation. International Journal of Social Science and Education Research,7(5).