The Effect Evaluation of Curriculum Ideological and Political Elements Based on AHP Model

Taking the Course of Engineering Economics and Management as an Example

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Abstract. Curriculum ideological and political education is a key course to implement the fundamental task of moral education. Teaching evaluation is an important part of curriculum ideological and political construction. It is an urgent need to further deepen the reform of curriculum ideological and political teaching and improve the quality of curriculum ideological and political teaching to construct a perfect evaluation index system of curriculum ideological and political elements. The existing evaluation of ideological and political teaching in colleges and universities is not perfect enough. There are some problems, such as lack of scientific evaluation index, lack of integrity of evaluation content, lack of diversity of evaluation methods and lack of authority of evaluation results. On the basis of following the correct value orientation, constructing a perfect evaluation index system of the effect of curriculum ideological and political elements can better serve the practice of curriculum ideological and political teaching.

Keywords: curriculum ideological and political · AHP · effect evaluation

1 Introduction

The relevant departments of the state have comprehensively promoted the reform and practice of curriculum ideological and political education, and have successively formulated a series of policy documents to further emphasize the importance of improving the quality of curriculum ideological and political education [1]. The concept analysis and practical exploration of curriculum ideological and political education are becoming more and more clear, while the theory and method research on the effect evaluation of curriculum ideological and political elements are relatively lacking. A sound and perfect evaluation index system of curriculum ideological and political elements is an important content and effective means to improve the quality of curriculum ideological and political teaching [2]. Starting from the construction of the evaluation index system of ideological and political teaching effect in colleges and universities, this paper takes the course of engineering economy and management as an example to explore the principles and basic framework of the construction of the evaluation index system of the

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effect of ideological and political elements in the course, and comprehensively analyzes the weight of each ideological and political element in the evaluation of the effect of ideological and political elements in the course, trying to play a certain role in promoting the ideological and political teaching in the course.

2 Model Principles and Methods

2.1 The Basic Concept of AHP

Analytic Hierachy Process (AHP) is a multi-criteria decision-making method proposed by T.L. Saaty et al. in the 1970s to deal with the combination of qualitative and quantitative analysis. The basic steps of AHP are:

(1) Establish a hierarchical structure model. The structure diagram includes the target layer, the criterion layer (considered attributes), and the scheme layer (decision objects).
(2) Construct judgment matrix. From the second layer, the 1–9 scale is used to construct a pairwise comparison matrix, which constitutes the target layer and the criterion layer matrix. The pairwise comparison matrix represents the comparison of the relative importance of all objects in this layer for a certain factor in the previous layer. The element amn of the pairwise comparison matrix represents the comparison result of the mth factor relative to the nth factor. The specific meaning is shown in Table 1.
(3) Calculate the weight vector and test the consistency. The eigenvector corresponding to the maximum eigenvalue is calculated for each pairwise comparison matrix, and then the consistency test is performed according to the formula. Through, the feature vector is the weight vector; otherwise, the comparison matrix is reconstructed.

The consistency ratio C.R formula is as follows:

$$C.R = \frac{C.I}{R.I} \tag{1}$$

In the formula: $C.I = \frac{\lambda - n}{n-1}$; R.I is the random consistency index. In general, C.R < 0.1 indicates adoption.

(4) Calculate the combination weight vector and test the combination consistency.

According to the formula to do the total sort consistency ratio C.R test:

$$C.R = \frac{a_1 C.I_1 + a_2 C.I_2 \cdots + a_n C.I_n}{a_1 R.I_1 + a_2 R.I_2 + \cdots + a_n R.I_n} \tag{2}$$

In general, C.R < 0.1 indicates that the decision can be made according to the total ranking weight vector.

2.2 AHP Model

The AHP model is constructed by Malcolm J. Beynom et al. on the basis of DS evidence theory and AHP analytic hierarchy process [3]. It is used to deal with multi-attribute decision making problems under uncertain information [4]. The main steps are as follows:

Table 1. Basic Principle of 1–9 Value Method

Scale	Implication
1	Element m and element n have the same importance to the factors of the previous level.
3	The element m is slightly more important than the element n.
5	The element m is more important than the element n.
7	The element m is much more important than the element n.
9	The element m is extremely more important than the element n.
2,4,6, 8	the median value of the above adjacent judgment
Reciprocal	The comparison judgment value of element m and element n is a_{mn}, then the comparison judgment value of element n and element m is $a_{mn} = 1/a_{mn}$.

(1) Clear decision objectives, related criteria set, alternative decision set Θ and analytic hierarchy process;
(2) According to the weight judgment, the corresponding weight value q of each criterion is calculated, where $q \in (0,1]$;
(3) For each criterion, the mass function is calculated according to the following formula:

$$m(s_i) = \frac{a_i q}{\sum_{j=1}^{d} a_j q + \sqrt{d}}, i = 1, 2, \ldots, d \tag{3}$$

$$m(\Theta) = \frac{\sqrt{d}}{\sum_{j=1}^{d} a_j q + \sqrt{d}} \tag{4}$$

3 Modeling and Analysis

3.1 Establish Index System

The indicators that affect the effect of the ideological and political elements of the curriculum are diverse, and the ideological and political elements excavated by different levels of universities and different disciplines are also different [5]. The construction of this index is mainly aimed at sorting out and summarizing the ideological and political elements that have been excavated in the course of 'Engineering Economics and Management'. Combined with the views of other experts and peer teachers, the evaluation index of the effect of ideological and political elements in the course is created. The evaluation index is divided into 3 first-level indicators and 12 s-level indicators. The indicators are explained as in Table 2.

3.2 Build a Hierarchy Diagram

The content of the effect evaluation of curriculum ideological and political elements in this paper is divided into three major aspects, involving a total of 12 factors, and constructing a hierarchical structure of interrelated factors. The model is shown in Fig. 1.

Table 2. The Effect Evaluation Index System of Curriculum Ideological and Political Elements

First-level Indicator	Second-level Indicator	Explanation
the emotion of "family-country" (C)	national consciousness (C_1)	love the party, love the country, love socialism, love people, love the collective, love family
	political standpoint (C_2)	adhere to building socialism with Chinese characteristics and Xi Jinping's Thought on Socialism with Chinese Characteristics for a New Era;
	Chinese culture (C_3)	the recognition and persistence of the national spirit and the spirit of the times and the excellent traditional Chinese culture
	socialism core values(C_4)	social level: freedom, equality, justice, the rule of law; personal level: patriotic, dedicated, honest, friendly.
personal quality (Q)	ideal and belief (Q_1)	do not forget the original intention, keep in mind the mission, to achieve the great rejuvenation of the Chinese nation.
	cognitive abilities (Q_2)	have basic cognitive ability to various natural and social phenomena, can distinguish between right and wrong
	innovative and creative spirit (Q_3)	have the courage to emancipate the mind, break through the stereotypes, explore boldly, have dreams, dare to innovate
	competition and collaboration awareness (Q_4)	keep pace with the times, not willing to lag behind, strive to be the first, pursue progress, tenacious struggle, perseverance, self-improvement, forge ahead, pursue higher, farther, faster, stronger, more refined, more efficient, dare to win, and have the spirit of teamwork

(*continued*)

Table 2. (*continued*)

First-level Indicator	Second-level Indicator	Explanation
view of science (S)	dialectical thinking (S_1)	adhere to materialism and dialectical thinking, respect history, respect science, respect objective laws, realistic and pragmatic
	scientific manners (S_2)	adhere to the objective and fair scientific attitude to look at the problem and evaluate the problem, adhere to the practice is the standard of testing the truth, and so on
	professional spirit (S_3)	professional skills, excellence, ingenuity, follow the discipline and professional frontier
	occupational quality (S_4)	comply with professional ethics, love and dedication, sense of responsibility, take responsibility, serve the people, contribute to the society, and so on.

Figure 1 shows the effect evaluation index system of curriculum ideological and political elements. The top layer (target layer) represents the final evaluation result of the effect of curriculum ideological and political elements. The second layer (criterion layer) reflects the categories of ideological and political elements involved in the curriculum, and is a subsystem of the effect evaluation of ideological and political elements in the curriculum. The bottom layer (sub-criterion layer) is the specific index that affects the evaluation of the effect of curriculum ideological and political elements.

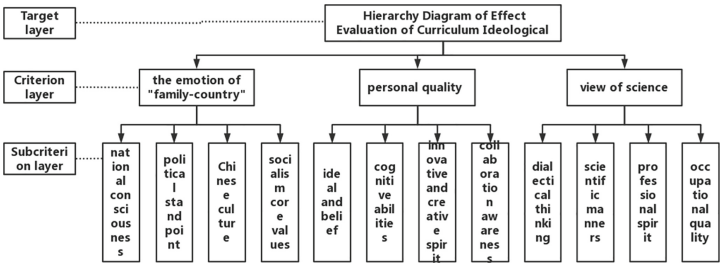

Fig. 1. Hierarchy Diagram of Effect Evaluation of Curriculum Ideological and Political Elements

3.3 Build Judgment Matrix

Judgment matrix refers to the relative importance of each factor related to a factor at the previous level. The establishment of judgment matrix is based on AHP method to solve the problem, and the construction of judgment matrix is a key step of AHP. The weight of each index is scored by the questionnaire of teachers and students. The course of this survey is 'Engineering Economics and Management'. All the teachers are teachers of this course and have more than two years of teaching experience. The students are the students of the course, and the attendance rate is more than 95%. The weights of teachers and students each account for 50%, and then take the average score, so as to determine the subjective weight through the analytic hierarchy process (AHP). Using the basic principles comparison method of 1–9 value method in Table 1, the judgment matrix of the problem is obtained by comparing the factors of each layer. According to the evaluation index system of the effect of ideological and political elements in curriculum, four judgment matrices can be constructed. The criterion layer has three first-level indicators, and the sub-criteria layer is the second-level indicator layer corresponding to the three first-level indicators. The generated four judgment matrices are:

The above is the evaluation data of the effect of curriculum ideological and political elements. The lower right diagonal of the matrix must be 1, indicating that it is completely equal to its own importance. The data of the upper right corner and the lower left corner are reciprocally symmetrical. The number represents the relative importance between the indicators, and the larger the number, the stronger the relative importance.

When using AHP analytic hierarchy process to calculate the weight, it is necessary to carry out consistency test analysis, which is used to study the consistency test results of the evaluation weight calculation results, that is, to calculate the consistency index CR value (CR = CI/RI). Firstly, the CI value obtained by the above calculation is described, and the RI value is obtained by combining the order of the judgment matrix. Finally, the CR value is calculated and the consistency judgment is carried out. The results are shown in Table 3.

In general, the smaller the CR value, the better the consistency of the judgment matrix. In general, the CR value is less than 0.1, and the judgment matrix satisfies the consistency test. If the CR value is greater than 0.1, it indicates that there is no consistency, and the judgment matrix should be adjusted appropriately and then analyzed again. The CI values calculated for the four judgment matrices were 0.004,0.007,0.005,0.006, and the RI values were 0.520,0.890,0.890,0.890, so the calculated CR values were 0.008 <

Table 3. The Consistency Test Values of Each Matrix

Matrix Test Results	Eigenvalue of Maximum	CI Value	RI Value	CR Value	Consistency Test Results
{C,Q,S}	3.009	0.004	0.520	0.008	Pass
{C1,C2,C3,C4}	4.021	0.007	0.890	0.008	Pass
{Q1,Q2,Q3,Q4}	4.015	0.005	0.890	0.005	Pass
{S1,S2,S3,S4}	4.018	0.006	0.890	0.007	Pass

0.1,0.008 < 0.1,0.005 < 0.1,0.007 < 0.1, which means that the judgment matrix of this study meets the consistency test, and the calculated weights are consistent. According to the index weight results in Table 4, it is also necessary to do all one-time tests, and it can also pass all one-time tests.

From Table 4, it can be concluded that the proportion of weight in the first-level indicators is ranked from large to small as family-country feelings, personal qualities, and scientific views. Among them, the most important element affecting the evaluation of the effect of curriculum ideological and political elements is the view of science, followed by personal quality, and the weakest national feelings. Among the secondary indicators, professionalism and professionalism have the greatest impact on the effect of curriculum ideological and political elements, accounting for 18.45% and 17.54% respectively. It can be concluded that in the course of "Engineering Economics and Management", the integration of teachers' ability to increase professional spirit and occupational quality into the ideological and political elements of the course can maximize the ideological and political effects of the course. Therefore, the ideological and political elements of the curriculum need to be fully explored by teachers in the teaching process, so as to maximize the professional spirit and occupational quality of the ideological and political elements of the curriculum. At the same time, we should strengthen the construction of the ideological and political elements of the family and country feelings and personal qualities, and maximize the influence of these two ideological and political elements.

Table 4. The Weight of Effect Evaluation Index of Curriculum Ideological and Political Elements

Link Points	First-level Index Weight (%)	Link Points	Second-level Index Weight (%)	Node Weight (%)	Ordering
O → C	23.650	C → C1	14.215	3.362	12
		C → C2	19.399	4.588	8
		C → C3	42.644	10.085	5
		C → C4	23.742	5.615	7
O → Q	32.286	Q → Q1	10.923	3.527	11
		Q → Q2	18.909	6.105	6
		Q → Q3	33.479	10.809	4
		Q → Q4	36.689	11.845	3
O → S	44.064	S → S1	8.723	3.844	10
		S → S2	9.598	4.229	9
		S → S3	41.876	18.452	1
		S → S4	39.803	17.539	2

4 Conclusion

Based on the AHP evaluation model, this paper constructs an evaluation index system for the effect of ideological and political elements in the curriculum. The index covers a wide range, almost covering the ideological and political elements of the whole curriculum, and has good applicability. At the same time, the AHP analysis method is used to construct the judgment matrix to determine the index weight, and the consistency test is carried out. The evaluation index system is used to conduct an empirical test on the course construction of 'Engineering Economics and Management'. It is concluded that the scientific view of the first-level index accounts for the highest proportion of the evaluation of the ideological and political elements of the whole course, and the professional spirit and occupational quality of the second-level index under the scientific view account for 36.96% of the whole node weight. This is also consistent with the characteristics of engineering students, indicating that students are more interested in the ideological and political elements such as ingenuity, professional skills, dedication, and serving the people. Relatively speaking, the heat of political theory and dialectical thinking is weaker. Therefore, we need to dig deeper into the ideological and political elements of the curriculum again, realize the organic integration of ideological and political education orientation and professional knowledge such as political identity, national consciousness and dialectical thinking, and make the organic combination of explicit and implicit education.

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