

The Study on Evaluating Method of Ideological and Political Education in University Curriculum

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Abstract: The evaluation of curriculum ideology and politics is a guarantee measure for the comprehensive implementation of curriculum ideology and politics. Based on the construction of the ideological and political index system for professional courses in colleges and universities, this paper uses the rough set-based information decision-making method to determine the weight of the constructed index system. Using fuzzy language multi-attribute decision-making method to study the evaluation method of the ideological and political teaching level of professional courses in colleges and universities, in order to provide a theoretical basis and a practical basis for the ideological and political evaluation of professional courses in colleges and universities.

Keywords: Professional Courses Ideological and Political; Evaluation Index System; Rough Set; Multi-attribute Decision-making

“Curriculum Ideological and Political” is a new mode of ideological and political education reform in colleges and universities. The current research on the relationship between the principles, standards, basic characteristics, implementation paths, evaluation index system and “ideological and political curriculum” education of college courses has achieved fruitful results. However, the research on the ideological and political evaluation methods of professional courses in colleges and universities is almost blank, which is directly related to the lack of evaluation basis for the ideological and political teaching effects and levels of professional courses in colleges and universities, and then affects the gradual deepening of the ideological and political education of the courses. Based on this, this article makes a useful exploration of the evaluation methods of ideological and political teaching of professional courses in colleges and universities.

1. Construction of evaluation index system for ideological and political teaching of professional courses in colleges and universities

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The construction of the evaluation index system for the ideological and political teaching of professional courses in colleges and universities is based on the educational concept of “three holistic education” as the guiding ideology. At the same time, combined with the Ministry of education’s notice on the issuance of the “Guiding Outline for the Ideological and Political Construction of Curriculum in Colleges and Universities”, the professional curriculum ideological and political Constructed by the requirements of education. In this paper, guided by the educational philosophy of “Three All—round Education”, centering on the ideological and political education process of “goal—process—result”, the ideological and political evaluation index system for professional courses in colleges and universities is initially constructed, and the index system is optimized by using the LOWA operator. Obtained a more scientific evaluation index system for ideological and political teaching of professional courses in colleges and universities. The index system includes 3 first-level indicators, 11 second-level indicators and 29 third-level indicators. See Table 1 for details.

Table 1. Ideological and political evaluation index system of professional courses in colleges and universities

First-level index	Second-level index	Third-level index
Objective (A)	Professional training objective (A1)	Professional training orientation (A11)
		Ideological and political training goals (A12)
		Support the guarantee target (A13)
	Professional curriculum training objectives (A2)	Knowledge system objectives (A21)
		Ideological and Political Goals of the Curriculum System (A22)
		Occupational Quality Training Goals (A23)
	Classroom teaching goals (A3)	Classroom knowledge and skills training goals (A31)
		Organic integration of ideological and political elements (A32)
Process (B)	Teacher (B1)	Teacher’s Ethics and Style (B11)
		Business literacy (B12)
		Teaching reflection (B13)
		Ideological and Political Teaching Awareness (B14)
	Syllabus (B2)	Achievability of goals (B21)
		Arrangement for the integration of teaching content and ideological and political elements (B22)
	Textbook (B3)	Thoughtfulness of textbook (B31)
		Professionalism of teaching materials (B32)
	Teaching content (B4)	The advanced nature of teaching content (B41)
		Embedding of hidden ideological and political elements (B42)
		Applicability of teaching content (B43)
	Teaching methods (B5)	Diversity of teaching methods (B51)
		Interactive teaching effect (B52)
		Timely update of teaching methods (B53)
		Effectiveness of teaching reform (B54)
	Teaching assessment (B6)	Process assessment (B61)
		Diversity assessment (B62)
		Practical ability assessment (B63)
Results (C)	Academic effect (C1)	Academic effect (C11)
	The effect of ideological and political education (C2)	Awareness of ideological and political education (C21)
		Achievement of ideological and political goals (C22)

2. Determination of the weight of the evaluation index system based on rough set theory

2.1 The idea of determining weight based on rough set theory

Rough set is a set of theories proposed by Professor Z. Pawlak of Polish University of technology to study uncertain data, the expression, learning, and induction of imprecise knowledge. It is a new mathematical tool for dealing with ambiguity and uncertainty. It has been widely used in the fields of knowledge discovery, machine learning, decision

support, pattern recognition, expert systems and inductive reasoning. Under the premise of ensuring that the classification of uncertain knowledge remains unchanged, the rough set theory reduces redundant knowledge and information through knowledge reduction and improves the processing and analysis speed and accuracy of valid data. Different attributes in the decision table have different importance. Rough set theory can remove this attribute from the decision table, and then examine the change of the entire decision classification when the attribute is missing. If the change is large after culling, it means that the attribute is of great importance. The larger the value, the larger the corresponding index weight value.

2.2 Steps to determine weight based on rough set

2.2.1 Build an information decision table

Construct a two-dimensional information decision table by collecting the original data or descriptive data of the evaluation object. The decision table contains two types of attributes, one is conditional attributes, and the other is decision attributes. In the professional course ideological and political teaching evaluation system, set the indicator of the right to be confirmed as the conditional attribute and record it as $C = \{c_1, c_2, c_3, \dots, c_n\}$; the other is the decision-making attribute, which is set as the professional course ideological and political teaching level and recorded as $D = \{d\}$.

2.2.2 Calculate the attribute dependency

First calculate the dependence of decision attribute D on conditional attribute C:

$$\gamma_c(D) = \frac{|\text{pos}_c(D)|}{|U|} = \frac{\sum_{i=1}^m |\text{pos}_c(D_i)|}{|U|}$$

At the same time, calculate the dependence of the decision attribute D on the condition attribute set $C - c_i$ after excluding a certain attribute:

$$\gamma_{c-c_i}(D) = \frac{|\text{pos}_{c-c_i}(D)|}{|U|} = \frac{\sum_{i=1}^m |\text{pos}_{c-c_i}(D_i)|}{|U|}$$

2.2.3 Calculate the importance of a single attribute

Calculate the importance of each attribute c_i separately, where the importance of the i-th attribute c_i is:

$$\text{Sig}_{CD}(c_i) = \gamma_c(D) - \gamma_{c-c_i}(D)$$

2.2.4 Normalization processing

The weight coefficient of each condition attribute is obtained through the normalized budget, and the corresponding weight is the weight of the indicator.

2.3 The process of determining the weights of the ideological and political teaching evaluation index system for professional courses in colleges and universities

In the process of determining the weight based on the rough set method, the data collection method of the information decision table required is to invite 10 relevant experts in the field of teaching quality evaluation to determine the importance of the impact of each lower-level index on the upper-level index, and the ideological and political teaching level of professional courses will be scored. The scoring of the ideological and political teaching level of professional courses needs to rely on the established index system. The evaluation object is the “Statistics” of Zhejiang University of Finance and Economics, which is selected at random from the MOOC of Chinese universities. To evaluate the level of ideological and political teaching. The specific requirements are: taking the indicators to be confirmed as the conditional attributes and the ideological and political teaching level of the course as the decision-making attribute, constructing an information decision table for evaluating the ideological and political teaching level of professional courses. In order to explain the decision-making process of definite power, the “target” system in the evaluation system of ideological and political teaching of professional courses in colleges and universities is used to illustrate. To this end, set the expert domain set $= \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$; Conditional attribute set $\{A_1, A_2, A_3\}$, where A_1, A_2, A_3 represent respectively professional training objectives, professional curriculum training objectives, and classroom teaching objectives are three secondary indicators to be confirmed; The attribute of decision-making is the level of curriculum ideological and political teaching. In order to facilitate data processing, the importance of the lower-level indicators to the upper-level indicators and the ideological and political teaching level of the course are scored using a three-scale method. The corresponding relationship is shown in the following table.

Table 2. Three-scale scoring meaning

Points	1	2	3
Meaning of Importance	weak	middle	strong
Meaning of Level	weak	middle	strong

According to expert opinions, construct the information decision table as follows:

Table 3. Decision-making table of ideological and political secondary index information for professional courses in colleges and universities

Discourse number	Conditional attribute C			Decision attribute D
	Professional training objective A1	Professional course training objective A2	Classroom teaching goal A3	Ideological and political teaching level
1	2	2	3	3
2	3	1	3	1
3	3	3	2	3
4	3	3	3	2
5	2	3	3	3
6	2	2	3	2
7	3	3	3	3
8	3	2	1	3
9	3	2	3	3
10	2	1	3	3

The data universe in Table 3 is divided into equivalence classes according to conditional attributes and decision-making attributes, and we can get:

$$U|IND(C)=\{\{1, 6\}, \{2\}, \{3\}, \{4\}, \{5\}, \{7\}, \{8\}, \{9\}, \{10\}\}$$

$$U|IND(D)=\{\{1, 3, 5, 7, 8, 9, 10\}, \{4, 6\}, \{2\}\}$$

After removing a conditional attribute, the equivalence classes of the universe of discourse are divided into:

$$U|IND(C-T1)=\{\{1, 6, 9\}, \{2, 10\}, \{3\}, \{4, 5, 7\}, \{8\}\}$$

$$U|IND(C-T2)=\{\{1, 5, 6, 10\}, \{2, 4, 7, 9\}, \{3\}, \{8\}\}$$

$$U|IND(C-T3)=\{\{1, 6\}, \{2\}, \{3, 4, 7\}, \{5\}, \{8, 9\}, \{10\}\}$$

The positive domain of the decision attribute under each condition attribute can be calculated separately:

$$pos_C(D)=\{2, 3, 4, 5, 7, 8, 9, 10\}$$

$$pos_{C-A1}(D)=\{3, 8\}$$

$$pos_{C-A2}(D)=\{3, 8\}$$

$$pos_{C-A3}(D)=\{2, 5, 8, 9, 10\}$$

Approximate accuracy of each condition attribute with respect to the decision attribute:

$$\gamma_C(D)=\frac{|pos_C(D)|}{|U|}=\frac{8}{10}$$

$$\gamma_{C-A1}(D)=\frac{|pos_{C-A1}(D)|}{|U|}=\frac{2}{10}$$

$$\gamma_{C-A2}(D)=\frac{|pos_{C-A2}(D)|}{|U|}=\frac{2}{10}$$

$$\gamma_{C-A3}(D)=\frac{|pos_{C-A3}(D)|}{|U|}=\frac{5}{10}$$

The importance of each condition attribute with respect to the decision attribute:

$$Sig_{CD}(A1) = \gamma_C(D) - \gamma_{C-A1}(D) = \frac{6}{10}$$

$$Sig_{CD}(A2) = \gamma_C(D) - \gamma_{C-A2}(D) = \frac{6}{10}$$

$$Sig_{CD}(A3) = \gamma_C(D) - \gamma_{C-A3}(D) = \frac{3}{10}$$

The importance of each condition attribute $Sig_{CD}(A1)$, $Sig_{CD}(A2)$, $Sig_{CD}(A3)$ to the decision-making attribute of the ideological and political teaching level of the course is standardized, and the results are 0.4, 0.4, and 0.2 respectively, that is, the weight of each secondary indicator of the primary indicator “target”, professional training goals. The weights of professional curriculum training objectives and curriculum teaching objectives are 0.4, 0.4, and 0.2 respectively. In the same way, the weight of each three-level indicator can be obtained.

Due to space limitations, according to the above method, based on the rough set method, the weight set of the

ideological and political evaluation index system for college professional courses can be obtained as shown in the following table.

Table 4. Ideological and political evaluation index system for professional courses in colleges and universities (weights)

First level indicator	Secondary indicators	Three-level indicators	Weights
Goal (A) 0.23	Professional training objectives (A1) 0.40	Professional training positioning (A11)	0.0267
		Ideological and political training goals (A12)	0.0442
		Support the guarantee target (A13)	0.0212
	Professional course training objectives (A2)0.40	Knowledge system goal (A21)	0.0175
		Ideological and Political Goals of the Curriculum System (A22)	0.0469
		Occupational Quality Training Goals (A23)	0.0276
	Classroom teaching goals (A3) 0.20	Classroom knowledge and skills training objectives (A31)	0.0129
		Organic integration of ideological and political elements (A32)	0.0331
Goal (B) 0.46	Teacher (B1) 0.28	Teacher's Virtue and Style (B11)	0.0438
		Business literacy (B12)	0.0155
		Teaching reflection (B13)	0.0270
		Ideological and Political Teaching Awareness (B14)	0.0425
	Syllabus (B2) 0.08	Goal achievability (B21)	0.0114
		Arrangement for the integration of teaching content and ideological and political elements (B22)	0.0254
	Textbook (B3) 0.12	The ideological nature of the textbook (B31)	0.0320
		Professionalism of teaching materials (B32)	0.0232
	Teaching content (B4) 0.22	The advanced nature of teaching content (B41)	0.0273
		Embedding of hidden ideological and political elements (B42)	0.0324
		Applicability of teaching content (B43)	0.0415
	Teaching method (B5) 0.19	Diversity of teaching methods (B51)	0.0280
		Interactive teaching effect (B52)	0.0227
		Timely update of teaching methods (B53)	0.0201
		Effectiveness of teaching reform (B54)	0.0166
	Teaching assessment (B6) 0.11	Process assessment (B61)	0.0167
		Diversity assessment (B62)	0.0157
		Practical ability assessment (B63)	0.0182
Result (C) 0.31	Academic effect (C1) 0.28	Academic effect (C11)	0.0868
	Ideological and political education effect (C2) 0.72	Awareness of ideological and political education (C21)	0.1027
		Achievement of ideological and political goals (C22)	0.1205

3. Evaluation methods of ideological and political teaching of professional courses in colleges and universities

According to the evaluation strategy and standard of the evaluation index of ideological and political teaching of professional courses in colleges and universities, the evaluator evaluates and scores the three-level index of the evaluation object according to the fuzzy language scale. The interval number corresponding to the scale is expressed as: Excellent = [90,100], Good = [80,90], Moderate = [70,80], Poor = [60,70], Quite Poor = [0,60].

Suppose $X = \{x_1, x_2, \dots, x_n\}$ is the object to be evaluated, $G = \{G_1, G_2, \dots, G_n\}$ is the set of evaluation indicators for ideological and political teaching of professional courses in colleges and universities established, and is the set of weights of the indicator system.

The evaluator gives the fuzzy language evaluation value of the evaluated object x_i under the index G_j , and constructs an evaluation matrix according to the corresponding relationship between the set fuzzy language scale and the interval number $R = (r_{ij})_{n \times m}$.

Collect each index value of the object to be evaluated to obtain its comprehensive index value $r_i = \sum_{j=1}^m \omega_j r_{ij}$, which

is the interval number r_i here. The assembly operation is carried out according to the following formula:

$$\omega_1 r_1 + \omega_2 r_2 = \omega_1 [r_1^-, r_1^+] + \omega_2 [r_2^-, r_2^+] = [\omega_1 r_1^-, \omega_1 r_1^+] + [\omega_2 r_2^-, \omega_2 r_2^+] = [\omega_1 r_1^- + \omega_2 r_2^-, \omega_1 r_1^+ + \omega_2 r_2^+].$$

Make pair wise comparisons of the comprehensive index value s , mark $p_{ij} = p(r_i > r_j)$, and establish the possibility matrix $P = (p_{ij})$. For, $r_i = [r_i^-, r_i^+]$, $r_j = [r_j^-, r_j^+]$ p_{ij} calculation can be calculated according to the following formula:

$$p(r_i > r_j) = \max\{1 - \max\{\frac{r_j^+ - r_i^-}{l_i + l_j}, 0\}, 0\} \text{ in } l_i = r_i^+ - r_i^-, l_j = r_j^+ - r_j^-.$$

Calculate the ranking vector $W = \{w_1, w_2, \dots, w_n\}$ of the matrix P . And

$$w_i = \frac{1}{n(n-1)} \left[\sum_{j=1}^n p_{ij} + \frac{n}{2} - 1 \right]$$

Use the number of intervals to sort, and the corresponding order is the final evaluation result.

4. Conclusion

On the basis of constructing the evaluation index system of ideological and political teaching of professional courses in colleges and universities, this paper studies the weight determination of the constructed index system and the evaluation method of the ideological and political teaching of courses. The long-term development of curriculum ideological and political education provides motivation and connection points to help colleges and universities complete the fundamental task of cultivating people.

References

1. Tan H, Guo Y, Wang J. Construction and improvement of the ideological and political evaluation index system of college curriculum. *Teacher Education Research* 2020; (5): 11-15.
2. Xu Y. Construction of the evaluation system of ideological and political teaching in colleges and universities. *Think Tank Times* 2019; (1): 209-211.
3. Xie H, Li X, Jiang W. Research on the ideological and political evaluation of professional curriculum of university teachers in the new era. *Education Teaching Forum* 2019; (23): 51-53.
4. Wang Y. On the construction of the ideological and political evaluation system of college courses. *Journal of Ideological and Theoretical Education* 2020; (10): 125-130.
5. Du Z, Zhang M, Qiao F. The teaching evaluation principles and standard operation strategies of ideological and political courses in science and engineering. *Ideological and Theoretical Education* 2020; (7): 70-74.
6. Lu D. The design and implementation of curriculum ideological and political evaluation. *Ideological and Theoretical Education* 2021; (3): 25-31.