

Exploration on the Construction of the Ideological and Political Teaching Evaluation Index System for the Course "Hydrology and Water Resources"

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Abstract

Aiming at the course "Hydrology and Water Resources", this article constructs a comprehensive ideological and political teaching evaluation system, aiming to promote the improvement of teaching quality and the all-round development of students. This system includes four first - level indicators, namely teaching content, practical ability, cultural confidence, and value guidance, and sixteen second - level indicators subordinate to them. Through factor analysis and extensive questionnaire surveys, and combining the perspectives of teachers (accounting for 80%) and students (accounting for 20%), the weights of each evaluation indicator are determined. The weight proportion shows that the "teaching content and objectives" dimension has the highest weight, highlighting its core position. The high weights of the "cultural confidence and sustainable development" and "value guidance and moral character shaping" dimensions reflect the emphasis on students' moral character shaping and cultural confidence. This system provides a theoretical basis and practical guidance for the ideological and political construction of the "Hydrology and Water Resources" course, promotes the in - depth integration of course content and ideological and political education, and helps to improve the educational effectiveness of the course.

Keywords

Ideological and Political Education in Courses, Hydrology and Water Resources, Teaching Evaluation.

1. Introduction

In the "Guidelines for the Construction of Ideological and Political Education in Courses in Institutions of Higher Learning" issued by the Ministry of Education in 2020, it is clearly stated that institutions of higher learning need to promote the construction of ideological and political education in courses in a classified manner in combination with the characteristics of various professional disciplines and integrate it into the whole process of teaching construction[1-3]. The teaching evaluation of ideological and political education in courses is the key for institutions of higher learning to deepen teaching reform and improve the quality of education. It not only focuses on the imparting of disciplinary knowledge and the cultivation of literacy but also attaches great importance to the shaping of students' values, aiming to realize the educational concept of "imparting knowledge, teaching skills, and dispelling doubts" and promote the all-round improvement of students' comprehensive qualities. Many scholars have deeply explored the teaching evaluation of ideological and political education in courses from different perspectives. Xu Yaoyuan et al. believe that the teaching evaluation of ideological and political education in courses in institutions of higher learning needs to be carried out from five aspects[4]: objectives, content, subjects, process, and methods. Xie Zhenwang believes that the

effective evaluation of ideological and political education in courses should mainly focus on aspects such as the teaching process, ideological guidance, knowledge imparting, physical and mental health and sound personality, and social stability and development[5]. Hu Hongbin et al. emphasize the importance of elements such as evaluation subjects, objects, content, and procedures and propose a multi - evaluation model[6]. Jiang Xiaoyun et al. focus on the current situation and problems of the teaching quality evaluation of ideological and political courses in higher vocational colleges and put forward countermeasures[7]. Zhao Yuying adopts a comprehensive evaluation method to construct a system with 19 indicators and assigns weights using the entropy method[8]. Zhuang Jing et al. point out that ideological and political education in courses is of great significance in application - oriented universities, and the CIPP evaluation model should be integrated to cultivate talents with correct values and practical abilities[9]. Ma Dongtang et al. construct a diversified, whole - process, and dynamic evaluation system for ideological and political education in courses that integrates the characteristics of online and offline[10]. Gao Fen constructs a teaching evaluation scale for ideological and political education in college foreign language courses with 27 evaluation indicators and puts forward suggestions for its application[11].

This study aims to construct an ideological and political teaching evaluation index system applicable to the "Hydrology and Water Resources" course by integrating theoretical analysis and practical exploration in light of the actual situation of the discipline. The establishment of this system will contribute to the improvement of the teaching quality of the Hydrology and Water Resources course and the comprehensive development of students.

2. Construction of the Evaluation System

2.1. Selection of Indicators

In the process of selecting evaluation indicators, four core dimensions were meticulously considered: teaching content and objectives, practical ability and innovative thinking, cultural confidence and sustainable development, and value guidance and character shaping. Based on these, the framework was further refined into sixteen specific secondary indicators, as depicted in Fig. 1. Among these secondary indicators, the first is the indicator of the alignment between the professionalism of teaching objectives and ideological - political education (A_{11}). When formulating teaching objectives, educators must not only guarantee the depth and breadth of professional knowledge but also seamlessly integrate ideological - political education. This ensures that as students master professional skills, they simultaneously develop correct worldviews, outlooks on life, and values. The indicator of the integration of ideological - political elements in teaching (A_{12}) entails organically incorporating elements such as values and professional ethics into hydrology teaching. This way, students can not only absorb professional knowledge but also internalize and apply these crucial social norms. Regarding the indicator of the application of diversified teaching methods (A_{13}), educators can adopt case - based and discussion - based teaching approaches. These methods are effective in stimulating students' learning enthusiasm and fostering their critical thinking and problem - solving capabilities. Finally, the indicator of the timeliness of teaching materials (A_{14}) mandates that teachers regularly update teaching materials. By doing so, students are guaranteed exposure to the latest knowledge in hydrology and water resources.

Within the dimension of "Practical Ability and Innovative Thinking", the Indicator of Students' Mastery of Basic Hydrology Theories (B_{11}) is considered. Through experiments, students can gain first - hand experience of the hydrological process, which in turn enhances their comprehension of professional knowledge. Regarding the Indicator of Utilizing Technological Means to Solve Practical Problems (B_{13}), it predominantly pertains to the capacity to employ GIS software and conduct data analysis for resolving issues within the domain of hydrology and

water resources. As for the Indicator of Ideological and Political Education in the Classroom (B₁₄), its evaluation serves to assist students in their pursuit of scientific truth and fosters an educational effect of cultivating individuals through the context of water - related knowledge.

Under the indicator system of "Cultural Confidence and Sustainable Development", there is the Indicator of the Proportion of Chinese Water Culture in the Curriculum (C₁₁). By recounting the development history of Chinese water culture, students' cultural confidence can be enhanced. The Indicator of Environmental Protection and Sustainable Development Concepts (C₁₂) helps students establish a correct ecological outlook and promotes the sustainable development of society. Regarding the Cultivation of Students' Cooperative Learning Skills (C₁₃), through group cooperation, students can learn to communicate and collaborate with others to solve problems together. For the Indicator of Multiperspective and Cross - cultural Communication Abilities (C₁₄), students' multiperspective thinking and cross - cultural communication abilities are evaluated by analyzing typical hydrological cases.

In the dimension of "Value Guidance and Character Shaping", the Self - reflection Report Indicator (D₁₁) involves guiding and educating students in a targeted manner by having them write self - reflection reports. For the Team Spirit and Social Responsibility Indicator (D₁₂), group - based cooperative learning activities are used to promote students' understanding of hydrology knowledge. Teachers observe and evaluate students' performance during the course. The Indicator of Awareness of Social Responsibility and National Interests (D₁₃) helps students foster a correct sense of patriotism and dedication to the country, enabling them to contribute to the development of the national water resources industry. Regarding the Indicator of Changes in Ideological and Political Emotions and Attitudes during Learning (D₁₄), by observing and assessing the changes in students' ideological and political emotions and attitudes throughout the learning process, educators can continuously optimize teaching methods and approaches.

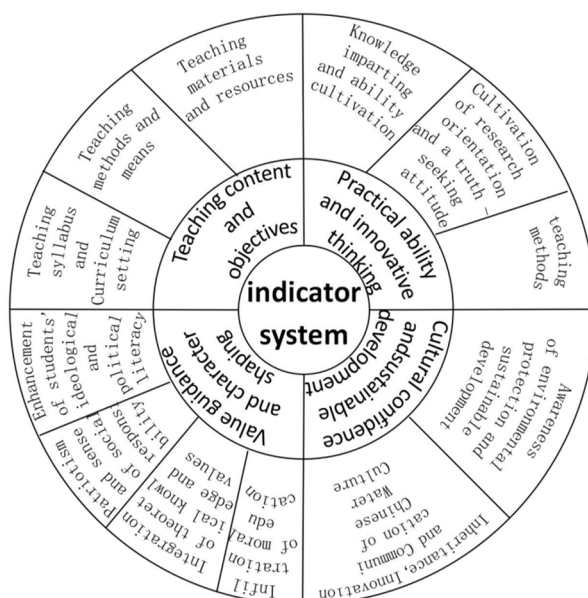


Figure 1. Ideological and Political Teaching Evaluation Index System for the Hydrology and Water Resources Course

2.2. Weighting Methods and Questionnaire Distribution

This study employed the factor analysis method to determine the weights of evaluation indicators. The core objective of factor analysis is to reveal the underlying structure behind observed variables, identifying the internal relationships among them by measuring the

correlations between variables. The research focused on the geography science major, aiming to deeply explore and evaluate the effectiveness of ideological and political teaching in the "Hydrology and Water Resources" course. Thirty - two professional teachers in the geography discipline from three universities were invited to participate in the questionnaire survey. With their rich teaching experience and profound understanding of the discipline's development trends, these teachers made professional judgments on the importance of the proposed observation indicators. In addition, to obtain students' learning experiences and feedback, a wide - scale questionnaire survey was conducted among 218 students majoring in geography science from these three universities. Each indicator in the questionnaire was presented in the form of a declarative sentence to ensure clarity and ease of understanding. A Likert five - point scale was used for scoring[12], with options including "very unimportant", "unimportant", "neutral", "relatively important", and "very important", which were assigned values from 1 to 5 respectively. This design was intended to accurately capture the views and opinions of teachers and students on the importance of each evaluation indicator. During the data processing and analysis stage, the SPSS statistical software was used for reliability and validity verification. The reliability analysis helped us assess the internal consistency of the questionnaire, ensuring the reliability of the data. The validity analysis, on the other hand, verified whether the evaluation indicators of the questionnaire truly reflected the key aspects of ideological and political teaching in the course, ensuring the accuracy and scientific nature of the analysis results.

3. Reliability and Validity Tests of the Indicator System

Through strict screening of the collected questionnaires, after excluding invalid ones, the sample data of 30 professional geography teachers and 210 students majoring in geography science were finally adopted. These data were used for the confirmatory factor analysis of the ideological and political teaching evaluation index system for the "Hydrology and Water Resources" course. The results of the reliability test show that the Cronbach's alpha coefficients of teachers' and students' views are 0.970 and 0.965 respectively, indicating that the scale has extremely high reliability. In addition, the Cronbach's alpha coefficients of all dimensions exceeded 0.70, meeting the standard. Before conducting the factor analysis, the KMO (Kaiser - Meyer - Olkin) value was used to assess the suitability of the items for factor analysis. The results showed that the KMO values of all dimensions exceeded 0.70. The KMO values of the total scale were 0.794 and 0.881 respectively, which further confirmed the suitability of the data. Meanwhile, the Bartlett test and Sig values of each dimension and the total scale met the standards. Therefore, the results of the reliability and validity tests in this study indicate that the constructed ideological and political teaching evaluation index system has high reliability and validity in both the teacher and student samples, providing a basis for subsequent analysis.

Table 1. Validity Test Table for Teachers and Students

category	Number Of items	A coefficient"		KMO value		Bartlett's x2		Sig.	
		Teachers' viewpoints	student	teacher	student	teacher	student	teacher	student
Teaching Content and Objectives	4	0.852	0.782	0.815	0.701	46.204	84.409	0.000	0.000
Practical Ability and Innovative Thinking	4	0.910	0.800	0.829	0.755	126.697	421.844	0.000	0.000
Cultural Confidence and Sustainable Development	4	0.939	0.726	0.828	0.721	89.141	186.386	0.000	0.000
Value Guidance and Character Shaping	4	0.925	0.737	0.829	0.705	111.265	241.694	0.000	0.000
Total scale	16	0.972	0.918	0.794	0.881	661.975	1880.651	0.000	0.000

4. Determination of the Weights of the Indicator System

4.1. Weights of the Indicator System from Teachers' Perspective

Based on the ideological and political teaching evaluation indicators of the "Hydrology and Water Resources" course, through factor analysis from the teachers' perspective, an explained total variance table (Table 2) was obtained. Four main components were determined according to the eigenvalues and variance percentages. These factors jointly explained 65.26% of the total variance, thus covering the core information of the ideological and political teaching evaluation indicators of the course. The variables not included had a relatively limited impact on the total variance. Therefore, the ideological and political teaching evaluation indicators of the course from the teachers' perspective were diagnosed as 4 key factors. Further principal component analysis revealed that the eigenvalues of these 4 principal components all exceeded 1, corresponding to variance contribution rates of 22.89%, 18.13%, 12.14% and 12.1% respectively. Based on these data, we calculated the relative proportions of each factor: Factor 1 was 0.35, Factor 2 was 0.28, Factor 3 was 0.35, and Factor 4 was 0.28. The eigenvalues and variance percentages of each factor differed significantly, resulting in different weight distributions of them in the evaluation system. Through factor analysis, the contribution rate of each factor was calculated based on the variance percentage. Combining with the rotated component matrix from the teachers' perspective, the weights corresponding to each indicator were obtained, that is, the components of each level dimension were divided by the sum of components. On this basis, the weights of each indicator were further calculated. The method was to multiply the component weight corresponding to each indicator by the proportion of the corresponding factor to obtain the weight.

When evaluated from the teachers' perspective, the "Teaching Content and Objectives" has the highest weight ($W = 0.278$). It is closely followed by "Value Guidance and Character Shaping" ($W = 0.252$), then "Cultural Confidence and Sustainable Development" ($W = 0.248$), and finally "Practical Ability and Innovative Thinking" ($W = 0.221$). This weight distribution reflects teachers' understanding and assessment of the importance of each dimension in the ideological and political teaching evaluation of the course, laying a foundation for constructing a reasonable evaluation system.

Table 2. Total Variance Explained Table from Teachers' Perspective

Factor (Dimension)	Eigenvalues of the covariance matrix			Extraction Sums of Squared Loadings			Rotated Sums of Squared Loadings		
	eigenvalue	Percentage of variance	Cumulative Percentage	eigenvalue	Percentage of variance	Cumulative Percentage	eigenvalue	Percentage of variance	Cumulative Percentage
1	5.516	34.475	34.475	5.516	34.475	34.475	3.662	22.89	22.89
2	1.829	11.434	45.909	1.829	11.434	45.909	2.9	18.126	41.016
3	1.732	10.824	56.733	1.732	10.824	56.733	1.943	12.143	53.159
4	1.364	8.526	65.259	1.364	8.526	65.259	1.936	12.1	65.259
5	0.936	5.848	71.107						
6	0.856	5.347	76.454						
...	...	...	...						
16	0.035	0.216	100.000						

Note: The factor extraction method is the principal component analysis method.

4.2. Weights of the Indicator System from Students' Perspective

From the perspective of students, through factor analysis, the latent structure of the evaluation indicators was revealed, and then three main factors were determined. These factors jointly explained 54.90% of the total variance, comprehensively summarizing the core elements of the evaluation indicators for ideological and political education in the curriculum. The three identified factors respectively represent different teaching evaluation dimensions. Factor 1, as the most prominent component, has a proportion of 0.340, indicating that it occupies a relatively large proportion in the evaluation system. Following closely are Factor 2 with a

proportion of 0.247, Factor 3 with a proportion of 0.212, and Factor 4 with a proportion of 0.201. Through further calculation and analysis, the weights of these factors were assigned from the students' perspective. The results show that the "Cultural Confidence and Sustainable Development" dimension has the highest weight, reaching 0.265, which reflects students' high attention to the cultivation of cultural confidence and environmental awareness. Next is the "Teaching Content and Objectives" dimension with a weight of 0.254, indicating that students consider the consistency between the professionalism of teaching content and ideological and political education as a key element in the evaluation system. Then comes the "Value Guidance and Character Shaping" dimension with a weight of 0.250, and this result reveals students' concern for the formation of personal morality and values. Finally, the "Practical Ability and Innovative Thinking" dimension has a weight of 0.231. Although it ranks the lowest among the four dimensions, it still reflects students' emphasis on practical operation ability and innovative thinking. The weight distribution of the evaluation system from the students' perspective reflects students' understanding of the importance of each dimension of ideological and political education in the curriculum, and also provides important reference for constructing a scientific and reasonable evaluation system.

Table 3. Total Variance Explained Table from Students' Perspective

Factor (Dimension)	Eigenvalues of the covariance matrix			Extraction Sums of Squared Loadings			Rotated Sums of Squared Loadings		
	eigenvalue	Percentage of variance	Cumulative Percentage	eigenvalue	Percentage of variance	Cumulative Percentage	eigenvalue	Percentage of variance	Cumulative Percentage
1	1	4.98	31.123	31.123	4.98	31.123	31.123	2.88	18.002
2	2	1.306	8.161	39.285	1.306	8.161	39.285	2.091	13.068
3	3	1.125	7.031	46.316	1.125	7.031	46.316	1.801	11.257
4	4	1.068	6.678	52.994	1.068	6.678	52.994	1.707	10.668
5	0.921	5.755	58.749						
...	...	...	...						
16	0.323	2.020	100.000						

Note: The factor extraction method is the principal component analysis method.

4.3. Weights from the Joint Perspective of Teachers and Students

The ideological and political evaluation system of the "Hydrology and Water Resources" course is dedicated to driving the continuous improvement of teaching quality and the all - round development of students. When determining the weights, we adhered to the Pareto principle and established an 8:2 weight ratio. This principle posits that, in most scenarios, a small number of crucial factors exert a decisive influence on the outcomes. Ultimately, we formulated a weight - distribution scheme where teachers' perspectives account for 80% and students' viewpoints make up 20%. This proportion is grounded in our acknowledgment of teachers' in - depth comprehension of ideological and political education within the curriculum and their extensive teaching expertise. Meanwhile, we also take into consideration that students, as the immediate recipients of teaching outcomes, can offer unique insights, even though their understanding may be somewhat restricted. This weight distribution is designed to ensure that the evaluation system can precisely mirror the actual teaching effectiveness and students' developmental requirements, thereby guaranteeing the fairness and validity of the evaluation. The detailed results are presented in Table 4.

Table 4. The Indicator System and Weights for the Ideological and Political Teaching Evaluation of the "Hydrology and Water Resources" Course

primary dimension	weight	secondary dimension	weight
A Teaching content and objectives	0.274	A ₁₁ The consistency between the professionalism of teaching objectives and ideological and political education	0.065
		A ₁₂ The integration of ideological and political elements in teaching, such as values, regulations, and professional ethics.	0.077
		A ₁₃ The application of diversified teaching methods, including case - based teaching and seminar - style teaching.	0.067
		A ₁₄ The timeliness of teaching materials	0.065
B Practical ability and innovative thinking	0.223	B ₁₁ Students' mastery of the basic theories of hydrology	0.044
		B ₁₂ Hydrological experimental operation skills	0.050
		B ₁₃ Evaluate students' problem - solving abilities by using GIS software and data analysis	0.060
		B ₁₄ Ideological and political education in the classroom	0.069
C Cultural confidence and sustainable development	0.251	C ₁₁ The proportion of Chinese water culture in the curriculum and the enhancement of students' awareness	0.065
		C ₁₂ Concepts of environmental protection and sustainable development in the discussion	0.057
		C ₁₃ Students' cooperative learning skills	0.060
		C ₁₄ Analyze water - related cases to assess students' multiple perspectives and cross - cultural communication skills.	0.069
D Value guidance and moral shaping	0.252	D ₁₁ Self - reflection reports to assess students' awareness of water resource protection	0.053
		D ₁₂ Evaluate teamwork spirit and social responsibility through students' performance	0.058
		D ₁₃ Students' understanding of social responsibility and national interests in water resource management	0.068
		D ₁₄ Changes in students' ideological and political emotions and attitudes during the learning process	0.073

5. Conclusions

The evaluation index system established in this research furnishes a robust theoretical underpinning and practical guidance for the ideological and political construction of the "Hydrology and Water Resources" course. It endeavors to propel the profound integration of

the course content and ideological and political education, thereby attaining the dual educational objectives of knowledge dissemination and value - orientation cultivation. The weight allocation manifests the significance of each dimension within the overall evaluation framework. The "Teaching Content and Objectives" dimension, with the highest weight coefficient (0.274), accentuates its pivotal position in the ideological and political instruction of the course. This clearly demonstrates that the cultivation of teaching content and objectives constitutes the core focus of the ideological and political teaching of the course. Subsequently, the "Cultural Confidence and Sustainable Development" dimension (0.251) and the "Value Guidance and Character Shaping" dimension (0.252) follow closely. The high - weighted values of these two dimensions mirror that, in addition to emphasizing knowledge transfer, the ideological and political teaching of the course also places great emphasis on the cultivation of students' moral character and cultural confidence. In the context of the incessant deepening of educational reform, the course development team is committed to continuously enhancing the allure and impact of the course. The ultimate objective is to materialize the seamless integration of ideological and political education and professional education, and to steadily augment the course's capacity to educate and edify students.

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