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Construction of an Ideological and Political Teaching Effectiveness Evaluation Index System for the Introduction to Big Data Course Based on the CIPP Evaluation Model

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Abstract:
Advances in big data and AI are steering educational assessment toward data - driven and intelligent methods. Evaluating the effectiveness of ideological and political teaching in the Introduction to Big Data course is vital for better integrating ideological and ethical elements into curricula. This study uses the CIPP evaluation model with big data analysis to create an evaluation index system for such teaching effectiveness. The system has four primary indicators, nine secondary, and twenty - seven tertiary indicators. Through iterative Delphi expert consultations, the indicators were refined for scientific validity. AHP was applied to assign weights, exploring the impact of each teaching phase and emphasizing the CIPP model's procedural and situational features. The system focuses on both immediate outcomes and the relationships among context, input, and process, providing a comprehensive view for assessing and improving IPC teaching effectiveness in big data and other academic areas.

Keywords: cipp evaluation model, delphi method, analytic hierarchy process (ahp), introduction to big data course, evaluation of ideological and political teaching effectiveness.

INTRODUCTION

The fundamental purpose of education is to nurture individuals, and at the heart of this nurturing process is moral cultivation. In China's educational framework, moral cultivation has always occupied a crucial and indispensable position. Reinforcing students' ideological and moral development is not only a fundamental requirement of educational policies but also the linchpin for fostering outstanding individuals who are in line with the demands of the contemporary era.In the past few years, as educational reforms have been steadily progressing, the integration of ideological and political education into curriculum teaching, an innovative educational approach, has been gradually rolled out across the country and has yielded remarkable outcomes. In 2020, the Ministry of Education released the "Guidelines on Integrating Ideological and Political Elements into Higher Education Courses", which further specified the development direction of this integration, with a special focus on the significance of establishing a scientific assessment mechanism. By means of a closed - loop system involving "implementation - assessment - feedback - enhancement", the quality of the integration of ideological and political education into curriculum teaching can be continuously enhanced. This, in turn, enables the more effective fulfillment of the essential mission of cultivating individuals with moral integrity and offers robust support for bringing up new - era talents who possess both moral rectitude and professional proficiency.

In the context of the swift development of big data and artificial intelligence technologies, educational assessment is evolving towards data - driven and intelligent directions. As a crucial aspect of educational reform in the new era, the evaluation of the teaching effectiveness of integrating ideological and political education into curriculum (IPC) urgently needs to utilize advanced technological means to guarantee the scientific rigor and precision of the assessment. "Introduction to Big Data" serves as a fundamental introductory course for majors related to data science. It not only offers students an initial understanding of professional knowledge but also plays a role in general education by popularizing data science theories and technologies for learners from interdisciplinary backgrounds.Nevertheless, most of the existing research on gauging the teaching effectiveness of ideological and political education within this course still mainly depends on traditional methods. There is a lack of profound exploration and application of big data technologies, as well as insufficient quantitative assessment. Leveraging the CIPP evaluation model and integrating big data analysis techniques, this research devises an evaluation index framework for the teaching effectiveness of ideological and political education in the "Introduction to Big Data" course. The goal is to offer a novel perspective and methodological assistance for the quantitative evaluation of IPC teaching effectiveness and its continuous enhancement.

RESEARCH STATUS AND THEORETICAL BASIS OF IPC TEACHING EVALUATION

Research Status

Currently, studies within the Chinese academic sphere on assessing the integration of ideological and political elements into course instruction are growing steadily. Nonetheless, a unified understanding of how to evaluate such integration remains lacking. The scope of these investigations primarily centers on two key areas.

First, the development and interpretation of theoretical frameworks for assessing Elements of IPC instruction have been a focal point. Sun et al.[1] employed diverse research methodologies to design evaluation subsystems tailored to peers, students, and teachers based on their roles. Utilizing the Analytic Network Process, weights were assigned to construct a comprehensive index system for evaluating moral values education in scientific and engineering courses. Yang [2] emphasized the developmental impact on students, creating a "two-stage, six-dimension" dynamic evaluation model for professional spirit. This model assesses professional sentiment during the mid-school stage and professional belief at the end of the 2020 stage, based on the psychological development patterns of college students. Cui et al. [3] aligned with vocational education evaluation reform and teaching principles, advocating for the integration of professional and ideological education through dimensions such as talent development, curriculum standards, teaching teams, materials, and practice. Zhao and Zou [4] developed a teaching quality evaluation system for ideological and political education in professional courses, grounded in educational objective classification theory. This system encompasses emotional, attitudinal, and value dimensions, using stepwise regression to quantify indicators and establish a closed-loop process of design, implementation, evaluation, and improvement to enhance students' professional qualities. Xu and Liao [5] explored the evaluation mechanism for moral values education in college courses using the CIPP model and literature research. They highlighted the current emphasis on outcomes over process and environmental factors, proposing an evaluation system that includes educational environment, resource allocation, implementation processes, and effects. Hu and He [6], drawing on Marzano's educational objective taxonomy, combined the Delphi method and the Analytic Hierarchy Process to define four dimensions: self-system, metacognition, cognition, and knowledge system acquisition. The activation of college students' self-system is emphasized for its practical significance in enhancing teaching effectiveness and fostering comprehensive student development.

Second, specific practical explorations of the evaluation of ideological and political education in professional courses. Zhao et al. [7], taking the course "Mechanical Drawing and CAD" as an example, integrated ideological and political education into professional knowledge, adopted information - based teaching methods, proposed an evaluation method combining process - based and summative assessments, and constructed a teaching effectiveness evaluation standard involving multiple subjects such as teachers, students, supervisors, and enterprises. Xiong and Yao [8], taking the finance professional courses of 10 applied finance and economics universities in Hebei Province as samples, investigated the course assessment methods and constructed a quantitative evaluation system, aiming to ensure that IPC guides professional teaching and realizes the coordinated education of professional courses and ideological and political theory courses. Wang et al. [9] and fellow researchers investigated the significance and application principles of formative assessment in the evaluation of IPC. Using "Urban Ecology" as a case study, they explored its practical implementation in specialized courses, aiming to enhance the comprehensive educational outcomes of professional courses in terms of knowledge delivery, skill development, emotional cultivation, and responsibility nurturing. Han et al. [10] utilized the CIPP evaluation model to develop a comprehensive teaching evaluation system tailored to both the general aspects of IPC and the specific characteristics of "Chinese Materia Medica." This system aims to optimize the assessment and evaluation of ideological and political teaching in the "Chinese Materia Medica" course..

Internationally, although there is no direct research on IPC, moral education has always been a topic of concern for international educators [11]. Jarrar [12], in order to obtain the effect of moral education for postgraduate students at Petra University, analyzed questionnaires and concluded that postgraduate students did not have a truly accurate understanding of moral terms, and there even existed moral dilemmas and crises. Felder et al. [13] explored the professional and moral development in postgraduate courses in higher education, examined its role through reflective teaching, and emphasized morality, reflection, and social justice. Brant et al. [14] evaluated the character cultivation in universities, emphasized the importance of implementing character education for postgraduate students, and launched a new character development plan for postgraduate students at the University of Oxford.

Lamb et al. [15] proposed seven character education strategies based on Aristotle and demonstrated through Oxford cases how to integrate them into the postgraduate character cultivation plan.

In summary, research on the evaluation of IPC focuses more on normative analysis. The application of empirical research methods is insufficient and its scientific nature needs to be enhanced. The limitations of current research lie in the scarcity of empirical data, which affects the popularization of research results and practical guidance. The perspective of the evaluation system is narrow and lacks comprehensiveness. Therefore, this study adopts the CIPP model, takes the "Introduction to Big Data" course in universities as an example, constructs an evaluation index system formoral values education in the course, and uses the Delphi method and the Analytic Hierarchy Process for scientific verification, aiming to provide a solid basis for the evaluation of IPC.

Theoretical Basis

The CIPP evaluation model is a comprehensive evaluation framework that comprehensively serves educational management. It encompasses four core stages: context evaluation, input evaluation, process evaluation, and product evaluation. It aims to guide, improve, and enhance educational activities through systematic evaluation. The CIPP evaluation theory has now become a classic evaluation model in educational evaluation, analyzing educational evaluation not only from a macro perspective but also from a micro perspective. For example, Lee et al. [16] and others used the CIPP model to explore the multi-dimensions of global health courses from the perspective of learning and teaching, and proved that the CIPP model can comprehensively evaluate the advantages, disadvantages and value of courses; Chanthalangsy et al. [17] and others used the CIPP model to evaluate the advantages and disadvantages of the obstetrics and gynecology postgraduate residency training program; during the COVID-19 pandemic, Gerayllo et al. [18] and others used the CIPP model to obtain the views of teachers and students on the implementation of virtual learning.

In the evaluation of IPC teaching, the CIPP model stands out due to its comprehensive assessment perspective, which aligns closely with the "Three-Wide Education" concept (whole-person participation, whole-process coverage, and all-round evaluation) [19]. Applying the CIPP model to IPC evaluation not only enables systematic assessment of teaching effectiveness but also provides strong support for teaching improvement, driving continuous enhancement of teaching quality.

SCREENING OF EVALUATION INDICATORS FOR IDEOLOGICAL AND POLITICAL TEACHING IN THE INTRODUCTION TO BIG DATA COURSE BASED ON THE DELPHI METHOD

Preliminary Construction of the Indicator System

Previous research achievements have provided a solid theoretical foundation for the construction of an evaluation indicator system for teaching that integrates ideological and political elements into the Introduction to Big Data course [20-22] Relying on the CIPP evaluation model and existing academic contributions, this study deeply analyzed the core arguments in relevant literature on IPC and national policy documents, and refined the specific content of the three - level evaluation indicators. On this basis, through systematic collation, induction, and classification, the elements of the two - level evaluation indicators were formed. Furthermore, with the help of the CIPP model, this study integrated and condensed these elements into one - level evaluation indicators. The indicator system is shown in Table 1. In this chapter, the Delphi method will be used to revise and improve the evaluation indicators for ideological and political teaching in the course.

Table 1. Evaluation Indicators (Preliminary Draft)

First-level Indicators	Second-level Indicators	Third - level Indicators
A Teaching Background	A1 Course Objectives	A11 The goal of IPC is to develop students' proficiency in the fundamental theories and skills of data science.
		A12 The objective of IPC is to foster students' awareness of social responsibility and scientific ethics, tailored to the unique aspects of data science.
		A13 The goals of IPC must be well-defined, detailed, clearly articulated, and aligned with the cognitive development level of students.
	A2 Course Positioning	A21 The curriculum should incorporate the latest advancements in fields like big data and artificial intelligence, as well as address current social issues.
		A22 The course content is both practical and effective.
		A23 The course aims to develop skilled and practical professionals who align with the demands of national and societal advancement in the modern era.

B Teaching Input	B1 Resource Input	B11 The richness and timeliness of course textbooks and collections of ideological and political cases.
		B12 The continuous training situation of the teaching team inmoral values education.
		B13 The degree to which the course uses modern information technologies (such as online learning systems, multimedia teaching tools, etc.) and enterprise platforms for ideological and political education.
	B2 Teacher Input	B21 Educators possess the awareness and capability to integrate ideological and political elements into the curriculum.
		B22 Teachers can integrate into the school's teaching concept of "employer - oriented, student - centered".
		B23 Teachers have a firm political stance and demonstrate good political qualities and professional ethics of teachers.
C Teaching Process	C1 Teacher Teaching	C11 Prioritize optimizing the ideological - political education content in the curriculum, highlighting crucial aspects like data ethics, technological innovation, social responsibility, and legal thinking.
		C12 Employ diverse teaching methods to subtly incorporate ideological - political education and stimulate students' thought processes.
		C13 Ensure that the assessment approaches and tools for ideological - political teaching in the course are sound.
		C14 Set a rational proportion of class hours for ideological - political components.
		C15 Integrate ideological - political elements tightly with the curriculum's knowledge points.
	C2 Student Participation	C21 The course's ideological and political themes are designed to enhance students' engagement and involvement.
		C22 Students' learning state and behavior performance in class are good.
D Teaching Effect	D1 Knowledge Level	D11 Students acquire a solid understanding of the core knowledge, concepts, and theories covered in the course.
		D12 Students understand the development history of data science and related research fields.
		D13 Students have the basic tool skills in data science practice.
	D2 Ability Level	D21 Students can identify the data elements involved in business problems.
		D22 Students have the preliminary ability to obtain, clean, and analyze data.
		D23 Students can communicate and collaborate effectively.
		D24 Students have critical thinking.
	D3 Quality Level	D31 Students have the spirit of being brave to take on responsibilities and dare to innovate.
		D32 Students demonstrate a robust sense of social responsibility and uphold high standards of professional ethics.
		D33 Students have correct outlooks on life and values.
		D34 Students have the mindset of embracing change and adapting to changes.

Implementation Process of Delphi Method

Selection of experts

Table 2. Basic Information of Experts

Parameter	Group	Number of People	Frequency
Gender	Male	4	40%
	Female	6	60%
Age	Aged between 31 and 40	4	40%
	Aged between 41 and 50	5	50%
	Aged between 51 and 60	1	10%
Working Years	Less than 5 years	2	20%
	The 6-10 year range	2	20%
	The 11-15 year range	3	30%
	The 16-20 year range	2	20%
	More than 20 years	1	10%
Education Background	Doctorate	1	10%
	Master's Degree	8	80%
	Bachelor's Degree	1	10%
Professional Title	Senior - level (Full Professor)	3	30%
	Associate - senior - level (Associate Professor)	4	40%
	Intermediate - level (Lecturer)	3	30%

To ensure the validity of developing teaching evaluation indicators, the experts chosen for this research must possess teaching experience in the "Introduction to Big Data" course at applied undergraduate institutions. The selected participants consist of educators who have previously taught the course, specialists inmoral values education, school-level teaching supervisors, and personnel from the teaching quality assessment center. Detailed information is provided in Table 2.

In this research, the expert authority coefficient (Cr) is utilized to indicate the level of authority of the consulted experts. Typically, Cr is determined by considering two factors: the expert's familiarity level (Cs) and the intensity coefficient of their judgment basis (Ca). Experts' familiarity with the problem is classified into five levels, and the coefficient is determined through self-assessment: very familiar is 1, relatively familiar is 0.8, generally familiar is 0.6, not very familiar is 0.4, and very unfamiliar is 0.2. The judgment of experts on specific indicators is based

on their prior teaching experience, logical analysis of the evaluation criteria for ideological and political teaching in the course, personal subjective assessments, and their comprehension of both domestic and international theories onmoral values education in curricula. The formula for calculating Cr is Cr = (Cs + Ca) / 2. The values for Ca are assigned based on the quantification tables provided in Table 3.

Table 3. Quantification Table of the Intensity of Experts' Judgment Basis

Judgment Basis	Influence Intensity of Experts' Judgment Basis		
	High (1.0)	Medium (0.8)	Low (0.6)
Past teaching practical experience	0.5	0.4	0.3
Logical reasoning	0.3	0.2	0.1
Understanding of domestic and foreign theories	0.1	0.1	0.1
Personal subjective judgment	0.1	0.1	0.1

Result analysis

(1) Experts' Enthusiasm

The engagement level of experts in the study greatly impacts the smooth progress and quality of research outcomes, mainly measured by the questionnaire response rate. In the Delphi method implementation, questionnaires were distributed in two phases. Initially, 10 were sent out and all returned, with a 100% response rate. In the second phase, another 10 were distributed and also all returned, keeping the rate at 100%. This full response in both rounds clearly shows experts' strong interest in the research and high cooperation level.

(2) Experts' Authority Level

The consultants' expertise directly impacts the reliability of their input. The same 10 - expert group took part in two - round consultations. Table 4 shows their expertise levels. Results indicate levels range from 0.75 to 1.0, averaging 0.83, above the 0.7 acceptable threshold. This proves the expert panel meets the Delphi method's research needs.

Table 4. Quantitative Analysis Table of the Authority Level of 10 Experts

Expert Code	Familiarity Coefficient (Cs)	Experts' Judgment Basis				Judgment Basis Coefficient (Ca)	Authority Coefficient (Cr)
		Past Teaching Practical Experience	Logical Reasoning	Understanding of Domestic and Foreign Theories	Personal Subjective Judgment		
1	0.80	0.40	0.10	0.10	0.10	0.70	0.75
2	0.80	0.40	0.30	0.10	0.10	0.90	0.85
3	0.60	0.50	0.20	0.10	0.10	0.90	0.75
4	0.80	0.50	0.20	0.10	0.10	0.90	0.85
5	0.80	0.50	0.30	0.10	0.10	1.00	0.90
6	0.60	0.40	0.20	0.10	0.10	0.80	0.70
7	0.80	0.50	0.20	0.10	0.10	0.90	0.85
8	0.80	0.50	0.20	0.10	0.10	0.90	0.85
9	0.80	0.50	0.20	0.10	0.10	0.90	0.85
10	0.80	0.50	0.30	0.10	0.10	1.00	0.90
Average	0.76	0.47	0.22	0.10	0.10	0.89	0.83

(3) Degree of Expert Consistency

The results of the first - round expert consultation showed that Kendall's W coefficient of concordance was 0.262, the accompanying chi - square statistic was 112.731, and the significance level P - value was 0.001. After entering the second - round consultation, this coefficient of concordance increased to 0.479, falling within the acceptable range of 0.4 - 0.5, indicating that the results are reliable. At the same time, the chi - square statistic in the second round increased to 171.584, and the P - value decreased to 0.000, further strengthening the conclusion that the experts' opinions tend to be consistent.

(4) Results of the First - round Expert Consultation

In the first - round expert consultation, four primary indicators were set: teaching context, input, process, and outcomes. They were further split into nine secondary and thirty tertiary indicators. Each indicator's meaning was fully explained. Experts scored each one with a five - level system and gave suggestions on adjustment, improvement, addition, or removal.

The data analysis results showed that the average evaluation scores of the first - level indicators generally exceeded 4.2 points, and the coefficient of variation was kept below 0.15, verifying the rationality of the evaluation indicator system. For the second - level indicators, the average scores of all indicators exceeded 3.7 points, and the coefficient of variation was less than 0.17, indicating that the setting of the second - level indicators was also widely recognized. However, at the third - level indicator level, the average score of the indicator "B22 Teachers can integrate into the school's 'employer - oriented, student - centered' teaching concept" was 3.7 points, and the coefficient of variation was as high as 0.41. The average score of the indicator "D13 Students have the basic tool skills in data science practice" was 2.9 points, and the average score of the indicator "D22 Students have the preliminary ability to obtain, clean, and analyze data" was only 2.7 points. The low average scores and high coefficients of variation of these indicators reflected the differences in experts' understanding of the importance of the indicators. Therefore, it was decided to remove them from the evaluation system.

(5) Results of the Second - round Expert Consultation

Table 5. Results of the Importance of the Third-Level Indicators in the Second Round of Expert Consultation

Indicator	Mean Value	Coefficient of Variation
A11 The goal of IPC is to develop students' proficiency in the fundamental theories and skills of data science.	3.900	0.179
A12 The objective of IPC is to foster students' awareness of social responsibility and scientific ethics, tailored to the unique aspects of data science.	4.600	0.106
A13 The goals of IPC must be well-defined, detailed, clearly articulated, and aligned with the cognitive development level of students.	4.400	0.151
A21 The curriculum should incorporate the latest advancements in fields like big data and artificial intelligence, as well as address current social issues.	4.100	0.131
A22 The course content is both practical and effective.	4.100	0.131
A23 The course aims to develop skilled and practical professionals who align with the demands of national and societal advancement in the modern era.	4.300	0.149
B11 The richness and timeliness of course textbooks and collections of ideological and political cases.	4.300	0.149
B12 The continuous training situation of the teaching team inmoral values education.	3.900	0.138
B13 The degree to which the course uses modern information technologies (such as online learning systems, multimedia teaching tools, etc.) and enterprise platforms for ideological and political education.	3.700	0.211
B21 Educators possess the awareness and capability to integrate ideological and political elements into the curriculum.	4.200	0.178
B22 Teachers have a firm political stance and demonstrate good political qualities and professional ethics of teachers.	4.500	0.111
C11 Prioritize optimizing the ideological - political education content in the curriculum, highlighting crucial aspects like data ethics, technological innovation, social responsibility, and legal thinking.	4.300	0.149
C12 Employ diverse teaching methods to subtly incorporate ideological - political education and stimulate students' thought processes.	4.100	0.203
C13 Ensure that the assessment approaches and tools for ideological - political teaching in the course are sound.	3.800	0.158
C14 Set a rational proportion of class hours for ideological - political components.	3.600	0.222
C15 Integrate ideological - political elements tightly with the curriculum's knowledge points.	4.100	0.171
C21 The course's ideological and political themes are designed to enhance students' engagement and involvement.	4.100	0.07
C22 Students' learning state and behavior performance in class are good.	4.000	0.158
D11 Students acquire a solid understanding of the core knowledge, concepts, and theories covered in the course.	3.800	0.229
D12 Students understand the development history of data science and related research fields.	4.200	0.208
D21 Students can identify the data elements involved in business problems.	3.800	0.229
D22 Students can communicate and collaborate effectively.	3.900	0.138
D24 Students have critical thinking.	4.300	0.149
D31 Students have the spirit of being brave to take on responsibilities and dare to innovate.	4.100	0.171
D32 Students demonstrate a robust sense of social responsibility and uphold high standards of professional ethics.	4.300	0.182
D33 Students have correct outlooks on life and values.	4.500	0.179
D34 Students have the mindset of embracing change and adapting to changes.	4.100	0.171

Based on the 4 first - level indicators, 9 second - level indicators, and 27 third - level indicators constructed from the results of the first - round expert consultation, a new questionnaire was made and used as the basis for the second - round expert consultation. When consulting the experts in the second round, the average scores of the adjusted third - level evaluation indicators were all greater than 3.8, and the coefficients of variation were all less than 0.23, as shown in Table 5. At the same time, according to the Kendall's coefficient of concordance of the experts in the second round, after the experts' scoring and consultation, the experts' opinions tended to be consistent, so there was no need for the next round of consultation.

ESTABLISHMENT OF INDICATOR WEIGHTS BASED ON THE HIERARCHICAL ANALYSIS APPROACH

Based on the consensus of expert opinions, a multi-level hierarchical model was developed, comprising 4 primary indicators, 9 secondary indicators, and 27 tertiary indicators. Following this, pairwise comparison matrices were formulated and subjected to consistency verification. The relative weights of the elements under comparison were then derived from these matrices. Ultimately, the comprehensive weights for all hierarchical levels were determined.

Illustrate with the weight - calculation of the first - level indicators. Using the expert ratings obtained in the second round, the mean scores for the four primary indicators—A, B, C, and D—were determined. Then, via pairwise comparison, the relative significance among these indicators is defined, and a 4 - order judgment matrix is built. The matrix is analyzed in - depth using the AHP, with relevant results presented in Table 6 and Table 7. During the calculation, initially, the maximum eigenvalue of the judgment matrix is found to be around 4.008. Next, the consistency test is executed, and the consistency index CI is calculated as roughly 0.0002. From this, the consistency ratio CR (CI divided by the random consistency index RI) is derived, approximately 0.00022. As CR is below the 0.1 threshold, the consistency of the expert evaluation is deemed satisfactory. Following the above - mentioned methodology, the final weight - table for evaluating the IPC teaching effectiveness in the course is generated, presented in Table 8.

Table 6. Pairwise Comparison Matrix of First-Level Indicators

	A Teaching Background	B Teaching Input	C Teaching Process	D Teaching Effect
A Teaching Background	1.000	1.024	0.956	0.935
B Teaching Input	0.977	1.000	0.933	0.913
C Teaching Process	1.047	1.071	1.000	0.978
D Teaching Effect	1.070	1.095	1.022	1.000

Table 7. Results of Analytic Hierarchy Process

Item	Weight Value	Maximum Eigenvalue	CI Value
A Teaching Background	24.44%	4	0
B Teaching Input	23.86%		
C Teaching Process	25.57%		
D Teaching Effect	26.13%		

Table 8. Weights of the Evaluation Indicator System for Ideological and Political Teaching in the Introduction to Big Data Course

Primary Indicators	Weight	Secondary Indicators	Weight	Tertiary Indicators	Weight	Weighted Weight
A Teaching Background	24.44%	A1 Course Objectives	51.10%	A11 The goal of IPC is to develop students' proficiency in the fundamental theories and skills of data science.	30.18%	3.77%
				A12 The objective of IPC is to foster students' awareness of social responsibility and scientific ethics, tailored to the unique aspects of data science.	35.68%	4.46%
				A13 The goals of IPC must be well-defined, detailed, clearly articulated, and aligned with the cognitive development level of students.	34.14%	4.26%
		A2 Course Positioning	48.90%	A21 The curriculum should incorporate the latest advancements in fields like big data and artificial intelligence, as well as address current social issues.	32.80%	3.92%
				A22 The course content is both practical and effective.	32.80%	3.92%
				A23 The course aims to develop skilled and practical professionals who align with the demands of national and societal advancement in the modern era.	34.40%	4.11%
B Teaching Input	23.86%	B1 Resource Input	47.43%	B11 The richness and timeliness of course textbooks and collections of ideological and political cases.	36.14%	4.09%

				B12 The continuous training situation of the teaching team inmoral values education.	32.77%	3.71%
				B13 The degree to which the course uses modern information technologies (such as online learning systems, multimedia teaching tools, etc.) and enterprise platforms for ideological and political education.	31.09%	3.52%
		B2 Teacher Input	52.57%	B21 Educators possess the awareness and capability to integrate ideological and political elements into the curriculum.	48.28%	6.06%
				B22 Teachers have a firm political stance and demonstrate good political qualities and professional ethics of teachers.	51.72%	6.49%
C Teaching Process	25.57%	C1 Teacher Teaching	49.46%	C11 Prioritize optimizing the ideological - political education content in the curriculum, highlighting crucial aspects like data ethics, technological innovation, social responsibility, and legal thinking.	21.61%	2.73%
				C12 Employ diverse teaching methods to subtly incorporate ideological - political education and stimulate students' thought processes.	20.60%	2.61%
				C13 Ensure that the assessment approaches and tools for ideological - political teaching in the course are sound.	19.10%	2.42%
				C14 Set a rational proportion of class hours for ideological - political components.	18.09%	2.29%
				C15 Integrate ideological - political elements tightly with the curriculum's knowledge points.	20.60%	2.61%
		C2 Student Participation	50.54%	C21 The course's ideological and political themes are designed to enhance students' engagement and involvement.	50.61%	6.54%
				C22 Students' learning state and behavior performance in class are good.	49.39%	6.38%
D Teaching Effect		D1 Knowledge Level	30.72%	D11 Students acquire a solid understanding of the core knowledge, concepts, and theories covered in the course.	47.50%	3.81%
				D12 Students understand the development history of data science and related research fields.	52.50%	4.21%
		D2 Ability Level	33.07%	D21 Students can identify the data elements involved in business problems.	31.66%	2.74%
				D22 Students can communicate and collaborate effectively.	32.50%	2.81%
				D24 Students have critical thinking.	35.84%	3.10%
		D3 Quality Level	36.21%	D31 Students have the spirit of being brave to take on responsibilities and dare to innovate.	24.11%	2.28%
				D32 Students demonstrate a robust sense of social responsibility and uphold high standards of professional ethics.	25.30%	2.39%
				D33 Students have correct outlooks on life and values.	26.48%	2.51%
				D34 Students have the mindset of embracing change and adapting to changes.	24.11%	2.28%

RESULT ANALYSIS OF THE EVALUATION INDICATOR SYSTEM

In developing the evaluation framework for assessing the teaching effectiveness of ideological and political education within the course, the primary indicators—teaching effect, teaching process, teaching background, and teaching input—are assigned weights based on a progressive logical relationship, with values decreasing in that order. Among these, teaching effect holds the highest weight at 26.13%. This indicator serves as the cornerstone for evaluating teaching outcomes and practical competencies. It captures the extent to which students have mastered the professional knowledge of Introduction to Big Data and the principles of ideological and political education, alongside their ability to apply this knowledge, offering essential insights for ongoing curriculum refinement and teaching quality enhancement. Following this, the teaching process, with a weight of 25.57%,

plays a pivotal role in shaping students' internalization of knowledge and their ideological and value systems. By implementing targeted strategies to optimize the teaching process, educators can effectively engage students and foster active participation, thereby driving improvements in teaching effectiveness. The teaching background, weighted at 24.44%, provides the foundational context for teaching activities. It defines curriculum objectives, aids students in comprehending course content, and enables them to evaluate whether their learning outcomes align with established standards. Although teaching input has a slightly lower weight of 23.86%, it remains critical as the basis for students to acquire structured knowledge and theoretical foundations, ensuring a comprehensive and objective understanding of the course's core principles.

In the secondary - indicator weight distribution, within the teaching - background category, course objectives (A1) and course positioning (A2) have nearly equal weights of 51.10% and 48.90% respectively, highlighting their central roles in the teaching - background framework and significant impact on course - ideological - political - education implementation. For teaching input, teacher input (B2) at 52.57% is slightly higher than resource input (B1) at 47.43%, emphasizing teachers' pivotal role in teaching input and their status as primary drivers of in - course ideological - political - education advancement. In the teaching - process category, teachers' teaching behaviors (C1) and students' participation (C2) have weights of 49.46% and 50.54% respectively, signifying the equal importance of both in the teaching process and the critical role of teacher - student interaction and student engagement in improving teaching effectiveness. Regarding teaching outcomes, knowledge acquisition (D1), ability development (D2), and quality enhancement (D3) have weights of 30.72%, 33.07%, and 36.21% respectively, showing an approach that focuses on both students' course - content mastery and the development of their abilities and overall qualities, thus demonstrating the depth and breadth of ideological - political - education teaching - effectiveness evaluation..

Among the three - level evaluation indicators for ideological and political teaching in the Introduction to Big Data course, the top 4 indicators with a weighted weight exceeding 6% are: " C21 The course's ideological and political themes are designed to enhance students' engagement and involvement", "B22 Teachers have a firm political stance and demonstrate good political qualities and professional ethics of teachers", " C22 Students' learning state and behavior performance in class are good", and " B21 Educators possess the awareness and capability to integrate ideological and political elements into the curriculum ".

Specifically, the two indicators "C2" and "C22" together reflect the close relationship between the design of ideological and political teaching content in the course and students' participation. They emphasize the importance of designing attractive ideological and political topics that are close to students' reality and creating an active classroom atmosphere in stimulating students' learning interest, enhancing their enthusiasm for participation, and promoting teaching effectiveness. At the same time, the two indicators "B22" and "B21" emphasize the core position and decisive role of teachers in IPC. Teachers' political stance, political qualities, professional ethics, as well as their awareness and ability to integrate ideological and political education into professional course teaching not only directly affect the teaching effectiveness of IPC but also are key factors in shaping students' correct values and improving their comprehensive qualities.

CONCLUSION

This study develops an evaluation index system for assessing the teaching effectiveness of ideological and political education in the "Introduction to Big Data" course, utilizing the CIPP evaluation model and integrating big data analysis techniques. The system includes primary indicators such as teaching context, teaching input, teaching process, and teaching outcomes, which are further detailed into secondary and tertiary indicators. By employing the Delphi method for expert consultation and feedback, the indicators are continually refined to ensure their scientific validity and rationality. The Analytic Hierarchy Process is applied to assign weights to indicators at all levels. Additionally, the potential impacts of each teaching component are thoroughly examined using big data analysis, highlighting the process-oriented and situational features of the CIPP model. This approach not only emphasizes direct teaching outcomes but also uncovers the intrinsic connections between teaching context, input, and process through data analysis. It offers a comprehensive, data-driven perspective for evaluating and enhancing the effectiveness of ideological and political education in the "Introduction to Big Data" course and similar programs.

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