

A study on the path to enhance the effectiveness of ideological and political education based on artificial intelligence-assisted learning: a comparative analysis

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Abstract The article first constructs an innovative model of ideological and political education based on artificial intelligence-assisted learning. Subsequently, DEMATEL is used to determine the factors affecting the effect of ideological and political education to be identified and analyzed, and from the important cause factors, the result factors and the key influence factors. 100 sample data were selected for fuzzy set qualitative comparative analysis to obtain the conditional grouping state that affects the effect of ideological and political education. The results of the analysis showed that the study obtained two successful groupings of educational effects, namely “better basic competence * ensuring the role of teachers * good teaching media conditions” and “better basic competence of teachers * students' positive learning tendency * good teaching content * good teaching media”, as well as a grouping that leads to failure in teaching effectiveness: insufficient teacher role * lower student tendency * poor teaching content * poor teaching media.

Index Terms fuzzy set qualitative comparative analysis, group state path, ideological and political education effect

I. Introduction

With the rise of network technology architecture such as mobile Internet and Internet of Things, the information and data generated by Internet users are constantly expanding and extending, and the process of social informatization, digitization and networking is accelerating [1]. The integration of big data with deep learning, supercomputing and other technologies and the occurrence of a strong “chemical reaction” has given rise to the third wave of the development of artificial intelligence [2]. With the emergence of network technology architecture such as mobile Internet, social network and Internet of Things, the amount of data generated by human society has shown a massive growth trend, and the process of social informatization has been accelerating. Artificial intelligence applications such as intelligent search, intelligent Q&A, intelligent assistant, intelligent recommendation, machine translation, machine writing, machine vision, voice recognition, etc. are gradually spread and utilized by the society, and the Internet space has stepped into a brand-new stage of the great development of machine intelligence [3]-[5].

Educational artificial intelligence is the deep integration of the field of education and artificial intelligence technology, actively promoting the application of modern information technology in cultural transmission activities, and comprehensively promoting the brand-new practice of building a networked, digitalized, intelligent, informatized, personalized and modernized education in the new era [6]-[9]. The cultivation of innovative talents in the intelligent era is imminent, and there is an urgent need to innovate the standardized and scaled industrial-style education with the help of intelligent science and technology, and promote its transformation and upgrading to personalized and diversified intelligent-style education [10]-[12]. Not to mention how human beings view artificial intelligence, it is foreseeable that under the powerful impetus of the intelligent revolution and information technology, the education ecology will inevitably undergo innovative changes, and education will be rapidly transformed and upgraded to a new stage, which is of epoch-making significance.

With the continuous development of artificial intelligence, the educators, educational objects, educational environment, as well as educational methods and approaches of ideological and political education in colleges and universities have been affected [13]. In this regard, colleges and universities need to understand this impact, explore ways to play a positive role in artificial intelligence, so that artificial intelligence effectively empowers ideological and political education [14]. In the era of intelligence, actively embracing artificial intelligence is an inevitable trend to comply with the wave of the times, artificial intelligence has brought many opportunities for the innovation and development of ideological and political education in colleges and universities, and the construction of “intelligent

ideology and politics" has become a hotspot of concern for college and university ideological and political workers [15], [16]. Therefore, it is important to discuss how artificial intelligence can empower ideological and political education in colleges and universities, so that the concept, method and mechanism of education can be effectively optimized [17]. How does artificial intelligence help colleges and universities to integrate educational resources, improve educational and teaching capabilities as well as strengthen the connection between various links within ideological and political work [18]. What impact does artificial intelligence have on the educational space, environment, resources, carriers, paths and methods of ideological and political education work in colleges and universities has become an important issue of the times for ideological and political educators in colleges and universities.

The article firstly constructs an innovation model of ideological and political education based on artificial intelligence-assisted learning, mines the factors affecting the effect of ideological and political education from the aspects of teachers, students, teaching content, teaching environment, teaching media, and external disturbances, and identifies and analyzes the influencing factors by using DEMATEL to obtain the cause elements, effect elements, and the centrality degree of each factor. Finally, 100 teachers of ideological and political education were surveyed by questionnaire, and the information and data collected by questionnaire were analyzed by fuzzy set qualitative comparison, and fsQCA software was used to analyze the data with necessary conditions, construct truth table and analyze the sufficient conditions, and finally explored the path to improve the effect of ideological and political education.

II. AI-assisted learning modeling of ideological and political education innovation

The preliminary model of ideological and political education is shown in Figure 1. The preliminary model of ideological and political education based on artificial intelligence-assisted learning mainly contains three layers, namely, the resource layer, the technology layer and the user layer. Among them, the resource layer in turn involves the main body of education. The content system and the school network platform, this layer is ultimately aimed at outputting network ideological and political resources. The technology layer mainly uses various technologies of big data to process and integrate the contents of the received resource layer and push them to users in a targeted way to prepare for personalized services. The user layer mainly targets school students, whose degree of acceptance of knowledge and speed of digestion are different due to the differences in their cognitive and knowledge structures. The purpose of this layer is to provide students with customized information through the analysis of different users, so as to enable students to realize the state of spiral upward of personal correct values, and ultimately to achieve the purpose of educating people. Of course, in order to better implement and run the model, each link in the whole process of implementation should be guaranteed by a corresponding system, especially when it comes to privacy and security, therefore, the 3 layers are unified under a large institutional environment, so that the model can become a system under the guarantee of the system to better utilize its effectiveness.

III. DEMATEL

III. A. DEMATEL concept

DEMATEL is a method that combines matrices and graphs for analysis. DEMATEL is formed through the logical relationship between the degree of mutual influence between the influencing factors in the system to form a matrix, through the normalization of the matrix and other operations can be obtained by the degree of influence of each factor on the other factors and the degree of influence, and then can be derived from the cause of each factor and the center of each factor to determine the position of each factor in the system [19].

III. B. DEMATEL analysis

The modeling process of DEMATEL is divided into 4 steps

Step 1: Find the average matrix A.

Suppose you have experts on the H a n factor to present an opinion, their factors i on the degree of influence factor j rate, the first k a experts say the first i factor of the first j a factor the influence degree of the record into $b(k)_{ij}$, to $\{1, 2, 3, 4, 5\}$ to influence degree, which had no effect on "(0)" "low impact (1)", "medium influence (2)" "high impact (3)" and "very influence (4)". The scores given by each expert form the $n \times n$ non-negative matrix $B^{(k)} = [b_{ij}^{(k)}]_{n \times n}$, and, therefore, the scores given by H the experts give H the matrices $B(1), B(2), B(3), \dots, B(H)$ [20]. The reason that the diagonal element of each matrix $B(k)$ is 0 is that it does not give any influence by itself.

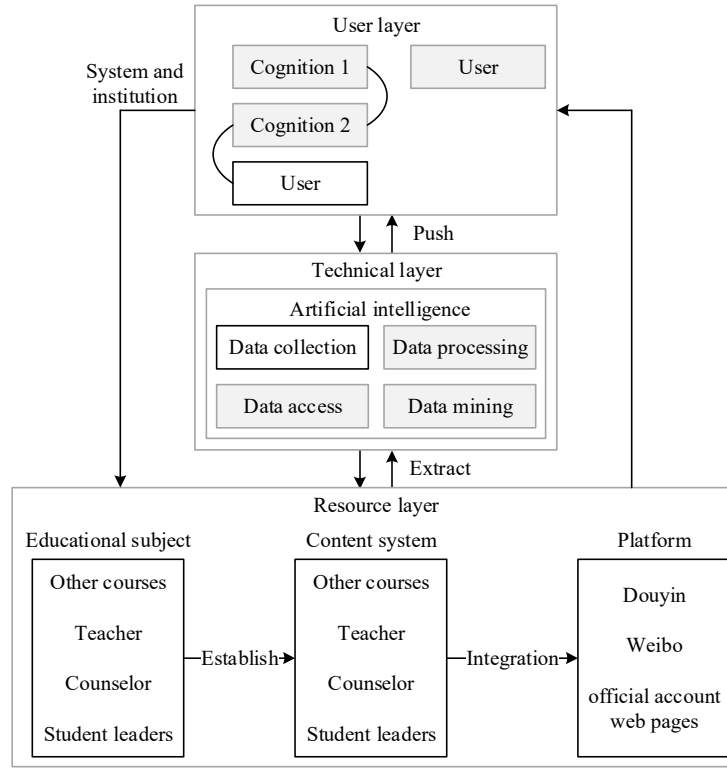


Figure 1: A preliminary model of ideological and political education

The A average matrix of all experts is calculated by averaging the scores of the H experts. The formula is as follows:

$$a_{ij} = \frac{1}{H} \sum_{k=1}^H b_{ij} \quad (1)$$

where the average matrix $a_{ii} = [a_{ij}]_{n \times n}$ is also known as the direct relationship matrix.

The matrix A shows the effects that one factor produces and receives on other factors. In addition, the causal relationship of each pair of factors in the system can be expressed by drawing an image map, an example of the influence mapping is shown in Figure 2.

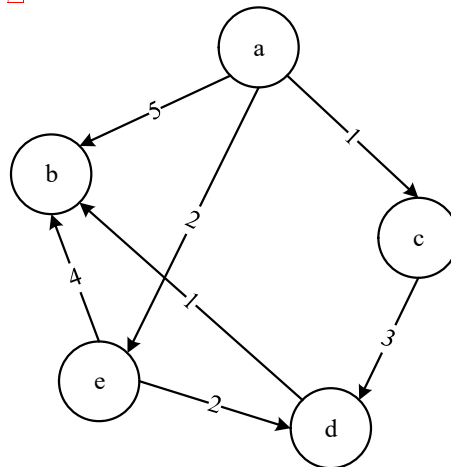


Figure 2: Examples affecting the mapping

The $a \sim e$ letters in the figure all represent factors in the system, the arrows indicate the influence of one factor on another, and the numbers indicate the intensity of the influence, e.g., the arrow from a to b indicates that a has an influence on b with an intensity of 5.

Step 2: Calculate the normalized initial direct correlation matrix D .

By normalizing the average matrix A , the normalized initial direct correlation matrix D , also called the canonical influence matrix, is obtained.

$$D = [d_{ij}]_{n \times n} \quad (2)$$

$$S = \max(\max_{j=1}^n \sum_{i=1}^n a_{ij}, \max_{i=1}^n \sum_{j=1}^n a_{ij}) \quad (3)$$

$$D = \frac{A}{S} \quad (4)$$

where each element of the matrix D is between 0 and 1, $1 \leq i \leq n$ and $1 \leq j \leq n$.

Step 3: Calculate the integrated impact matrix

After continuously self-multiplying the normalized initial direct correlation matrix, all the values of the matrix will converge to 0 indefinitely, and the canonical influence matrix self-multiplication indicates the indirect influences between the elements, and the total influences or total relationship T can be obtained by summing $D, D_1, D_2, \dots, D_\infty$, i.e., the composite influence matrix is the sum of all indirect impacts.

$$T = \lim_{n \rightarrow \infty} (D + D_2 + D_3 + \dots + D_m) = \sum_{k=1}^{\infty} D^k \quad (5)$$

$$T = D(I - D)^{-1} \quad (6)$$

where I is the unit matrix, i.e., the matrix whose diagonal value is 1 and whose value elsewhere is 0. $(I - D)^{-1}$ is the inverse matrix of $(I - D)$.

Step 4: Calculate the degree of influence and the degree of being influenced

Let N represent the sum of the values of the matrices of the rows of T with the following formula:

$$N = (N_1, N_2, N_3, N_4, N_5) \quad (7)$$

Among them:

$$N_i = \sum_{j=1}^n t_{ij}, (i = 1, 2, 3, \dots, n) \quad (8)$$

N represents the value of the combined influence of the corresponding element of each row on all other elements, i.e. the degree of influence.

Let C represent the sum of the values of the matrix of each column of T with the following formula:

$$N = (N_1, N_2, N_3, N_4, N_5) \quad (9)$$

Among them:

$$N_i = \sum_{j=1}^n t_{ij}, (i = 1, 2, 3, \dots, n) \quad (10)$$

N represents the value of the combined influence of the corresponding element of each row on all other elements, i.e. the degree of influence.

Let C represent the sum of the values of the matrix of each column of T with the following formula:

$$C = (C_1, C_2, C_3, \dots, C_n) \quad (11)$$

$$C_j = \sum_{i=1}^n t_{ij}, (j = 1, 2, 3, \dots, n) \quad (12)$$

C denotes the combined influence value of the corresponding factor in each column on all other factors, i.e., the degree of being influenced.

When $j = i$, $N_i + C_i$ denotes the degree of importance of the factor playing a role in the system, i.e., it is the centrality degree M .

$$M_i = N_i + C_i \quad (13)$$

When $j = i$, the difference $N_i - C_i$ shows that the net effect of the factor contributes to the system, i.e., it is the degree of cause R .

$$R_i = N_i - C_i \quad (14)$$

where, when $N_i - C_i > 0$, it means that factor i has more influence on other factors, i.e., factor i is the cause element. Conversely, when $N_i - C_i < 0$, it indicates that factor i is more likely to be influenced by other factors, i.e., factor i is the result element.

Step 5: Set a threshold and obtain an influence relationship diagram

In order to explain the structural relationships between these factors while keeping the complexity of the system at a manageable level, a threshold value p needs to be set to filter out some negligible influences in the matrix T

[21]. When each factor of the matrix T provides information about how one factor affects another, the decision maker must set a threshold to reduce the complexity of the structural relationship model implied by the matrix T . Only some factors in the matrix T have an influence greater than the threshold and should be shown in the Influence Relationship Map (IRM).

IV. Identification and analysis of key factors influencing the effectiveness of ideological and political education

IV. A. Factor extraction

This section of the experiment starts from teachers, students, teaching content, teaching environment, teaching media, external interference and other aspects. To form a more scientific and reasonable system of factors affecting the teaching effect of ideological and political education classroom based on artificial intelligence assistance, the system of factors affecting the teaching effect of ideological and political education classroom is shown in Table 1.

Table 1: The influence factor system of classroom teaching effect target layer

	A-level primary	B-level primary	Child factor and its coding
The analysis affects the key factors of classroom teaching	Teacher (A1)	Teaching content The subject (B1)	The design of teachers' teaching content (c1)
			Create an atmosphere of equality and harmony (c2)
			Teaching methods, habits (c3)
		Teacher teaching state (B2)	Ability to use the teaching media (c4)
			Teacher's board, teaching language (c5)
	Student (A2)	Classroom state (B3)	Focus and cooperation awareness (c6)
			Information thinking ability and problem-solving ability (c7)
			Interaction expectations and satisfaction (c8)
		Nonintellectual factor(B4)	Positive attitude (c9)
			The likes of disciplines and teachers (c10)
	Teaching content(A3)	Content attribute(B5)	Quality of the teaching content (c11)
			The extent to which teaching content is easy to use (c12)
			Practical (c13)
	Teaching media(A4)	Media technology properties (B6)	Compatibility and ease of use (c14)
			Intelligibility (c15)
	Teaching environment(A5)	Internal environment(B7)	The classroom appeal (c16)
		External environment(B8)	Comfortable free learning environment (c17)

Teacher teaching is an important link in the process of classroom teaching, which directly affects the students' mastery of knowledge and the effectiveness of classroom teaching. Students are the main body of classroom teaching, is the carrier of the teaching object and teaching meaning performance. Classroom teaching needs to cultivate students' flexible information thinking, information processing ability, requiring students to focus on the content of teaching, active thinking, find and put forward the problem, and finally solve the problem, students need to cultivate a sense of teamwork, learning is no longer confined to the individual, but extends to the teacher-student and student-student information exchange and sharing, so that students can make progress. Teaching content is the collection and expansion of scientific knowledge, is the premise and foundation of teaching. Teaching environment is one of the factors affecting classroom teaching, and creating a good teaching and learning environment is crucial to classroom teaching.

IV. B. Matrices and transformations

In order to determine the key factors affecting the effectiveness of classroom education, this paper identifies them in 3 steps. Firstly, the factors are extracted, then the matrix construction and transformation are carried out, and finally the data are analyzed and the strength of the relationship between the elements is scored (no relationship = 0, weak relationship = 1, medium relationship = 2, strong relationship = 3), and then the relationship values between the elements are obtained by using the mean rounding method and the direct influence matrix is constructed accordingly, and the direct influence matrix is shown in Table 2.

Table 2: Direct influence matrix

Factor	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17
C1	0	1	2	1	3	1	1	3	2	3	2	3	2	2	2	1	3
C2	1	0	2	1	2	3	3	1	1	3	3	1	2	1	3	1	1
C3	2	2	0	2	3	1	2	2	3	1	3	3	1	2	2	3	2
C4	1	1	2	0	1	1	1	2	3	3	3	2	2	3	3	3	3
C5	3	2	3	1	0	3	1	3	3	2	3	2	1	3	1	3	1
C6	1	3	1	1	3	0	3	1	1	2	2	1	3	2	2	2	2
C7	1	3	2	1	1	3	0	1	1	2	2	1	2	1	1	3	3
C8	3	1	2	2	3	1	1	0	3	1	1	1	2	3	2	3	3
C9	2	1	3	3	3	1	1	3	0	3	2	2	1	3	1	3	2
C10	3	3	1	3	2	2	2	1	3	0	2	1	3	3	3	2	2
C11	2	3	3	3	3	2	2	1	2	2	0	2	1	2	1	1	3
C12	3	1	3	2	2	1	1	1	2	1	2	0	3	2	3	2	1
C13	2	2	1	2	1	3	2	2	1	3	1	3	0	1	3	3	2
C14	2	1	2	3	3	2	1	3	3	3	2	2	1	0	2	3	2
C15	2	3	2	3	1	2	1	2	1	3	1	3	3	2	0	1	1
C16	1	1	3	3	3	2	3	3	3	2	1	2	3	3	1	0	3
C17	3	1	2	3	1	2	3	3	2	2	3	1	2	2	1	3	0

Using MATLAB software, according to the DEMATEL method to calculate each sub-factor influence degree, influenced degree, center degree and cause degree and A, B two levels of the main factor center degree and cause degree, and rank the values, the center degree and cause degree cause and effect relationship as shown in Figure 3.

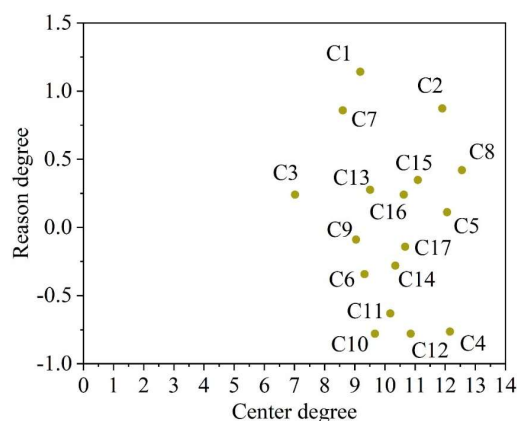


Figure 3: Center degree and cause and effect

IV. C. Data analysis

The influence index and ranking of the factors are shown in Table 3. From this, the following conclusions can be drawn.

(1) The system of factors influencing the effect of ideological and political education is an organic whole consisting of the main body of teaching content delivery, the teacher's teaching state, the classroom state, non-intellectual factors, content attributes, media technology attributes, the internal environment, the external environment, and

other elements interacting with and influencing each other. The intensity, breadth, mode and mechanism of influence of each sub-factor varies greatly, and they cross each other together, jointly constituting a complex system of factors influencing the effect of classroom teaching in the multimedia teaching environment.

(2) The sub-factors cause elements (elements with cause degree > 0) in order of influence are creating an equal and harmonious atmosphere (C2), habit (C3), cooperative consciousness (C6), classroom infectiousness (C16), language of instruction (C5), comfortable and free learning environment (C17), problem solving ability (C7), ability to utilize instructional media (C4), interactive communication expectations and satisfaction degree (C8), etc. 9 factors are in order of influence. Satisfaction Level (C8) and other 9 sub-factors, which actively influence other factors in the system. Among them, the C2 cause degree is 1.013, which is above 1.003, and according to Barlett's law, C2 is the key element among the cause elements.

Table 3: The factors affect the index and the ranking

Main hormone						Subfactor	Influence (D)		Affected (R)		Center degree (D+R)		Reason(D-R)	
A-level primary	Center ranking	Reason ranking	Sub-factor	Center ranking	Reason ranking		Calculation result	Ranking	Calculation result	Ranking	Calculation result	Ranking	Calculation result	Ranking
A1	44.5 22②	2.107 ①	B1	26.7 39③	1.586 ①	C1	4.644	14	4.917	12	9.537	12	-0.336	13
						C2	5.165	7	4.121	15	9.298	13	1.013	1
						C3	4.734	13	3.828	16	8.603	15	0.903	2
			B2	16.5 73⑥	0.288 ④	C4	3.663	17	3.554	17	7.214	16	0.137	8
						C5	4.988	9	4.674	13	9.62	11	0.264	5
A2	54.6 79①	0.31 ③	B3	22.6 3④	1.138 ②	C6	6.102	3	5.29	9	11.331	5	0.789	3
						C7	6.125	2	6.014	2	0.183	17	0.139	7
						C8	5.823	5	5.772	4	11.542	4	0.118	9
			B4	32.9 53①	- 0.847 ⑥	C9	5.485	6	6.114	1	11.653	2	-0.658	15
						C10	4.346	16	4.659	14	9.028	14	-0.304	12
A3	31.9 1③	- 1.615 ⑤	B5	30.6 53②	- 1.634 ⑧	C11	5.09	8	5.216	10	10.275	7	-0.139	10
						C12	4.913	11	5.382	8	10.268	8	-0.551	14
						C13	4.522	15	5.512	7	10.107	10	-0.962	17
A4	19.3 11⑤	- 1.072 ⑤	B6	20.6 57⑤	- 1.244 ⑦	C14	4.931	10	5.196	11	10.142	9	-0.292	11
						C15	4.859	12	5.597	6	10.502	6	-0.762	16
A5	22.5 88④	0.494 ②	B7	11.1 53⑧	0.069 ⑤	C16	6.218	1	5.89	3	12.109	1	0.324	4
			B8	12.6 97⑦	0.352 ③	C17	5.924	4	5.703	5	11.587	3	0.223	6

V. Comparative analysis of the improvement of the effectiveness of ideological and political education

V. A. Research Methodology

The improvement of the effect of ideological and political education is affected by the interaction of multi-dimensional and multi-level factors such as the internal factors of the main body of teachers and the external factors of the educational environment, and there may be an "equivalent" causal chain between the factors such as "moral education intention", "teaching skills", "school support", "peer influence" and "student attitude", that is, different combinations of various factors can obtain results. Therefore, the single causal relationship emphasized by conventional binary statistical analysis is far from explaining this phenomenon, so it must be analyzed and explained in a "holistic" and "combinatorial" way. The qualitative comparative analysis method (QCA) is a set analysis method between case-oriented and variable-oriented, which is based on set theory and Boolean operation, and its outstanding features and advantages are to emphasize configuration analysis, recognize the equivalence between configurations, and believe that social reality is the result of the interaction between multiple factors, rather than the result of independent influence by a single condition, and the possible paths to achieve a certain desired result are

diverse, and there is no only optimal solution in the traditional method. It is highly appropriate to explore the complex causal relationship between the conditions for improving the effect of ideological and political education and the effect.

In this study, according to the characteristics of the enhancement condition variables, we adopted the fuzzy set qualitative comparative analysis method in QCA. fsQCA allows the researcher to calibrate the degree of set affiliation, has the advantages of precise differentiation and fixed-distance variables, and has outstanding application value for this study to probe the whole from the samples and analyze the multiple paths of the enhancement of the effect of ideological and political education based on artificial intelligence-assisted learning.

V. B. Data collection

This study was conducted in the form of a questionnaire on 100 teachers of ideological and political education to obtain first-hand research data. After reliability analysis, the reliability coefficient Cronbach's Alpha of each scale is between 0.893-0.975, indicating that the consistency of each scale entry is very good and the questionnaire has a high reliability. Through principal component analysis and maximum variance rotation, a factor was extracted for each scale, and the cumulative variance contribution of the factor ranged from 71.5% to 88.6%, indicating that the questionnaire had a high degree of efficiency. In terms of sample size determination, we determined the research sample to be 60 according to the requirements of small and medium samples in fsQCA, and the explanatory conditions to be 5. A total of 100 questionnaires were distributed in the research, and 100 valid questionnaires were recovered, with a valid questionnaire recovery rate of 100%.

V. C. Data analysis

V. C. 1) Analysis of Requirements

In this paper, the necessary conditions refer to the condition variables that must appear in the combination of conditions that can make “ideological and political education more effective” or “ideological and political education less effective”, which is an important step in the exploration of the condition pattern. In this analysis, all conditional variables and their negatives in the text will be analyzed for necessity, and the analysis of necessary conditions is shown in Table 4. When conducting the necessary condition analysis, consistency is used as the basis for determining whether the conditional variable is necessary or not. It is generally believed that when the consistency value of a variable is greater than 0.9, it can be judged that the conditional variable or its negation variable is a necessary condition for the generation of the results. The results of the table show that there is no consistency value of more than 0.9 in the conditional variables, which indicates that there is no necessary condition that affects the results, i.e., there is no single conditional variable that can explain the effect of ideological and political education. Accordingly, it can be seen that the factors affecting the effectiveness of ideological and political education are complex and influenced by a combination of conditional variables, which need to be explained by a combination of multiple antecedent conditional variables.

Table 4: Necessary analysis

Conditional variable	Education effect		~ Education effect	
	Consistency	Coverage	Consistency	Coverage
Teacher	0.69786	0.67152	0.47574	0.60563
~ Teacher	0.51324	0.66625	0.61086	0.76704
Student	0.65618	0.81607	0.42471	0.43283
~ Student	0.5267	0.6373	0.65619	0.69706
Teaching content	0.71752	0.64047	0.70816	0.5425
~ Teaching content	0.50883	0.60493	0.64997	0.59817
Teaching media	0.86325	0.63702	0.80035	0.65749
~ Teaching media	0.31098	0.64089	0.54636	0.6568
Teaching environment	0.89472	0.55329	0.7591	0.57996
~ Teaching environment	0.40887	0.63221	0.31254	0.73753

V. C. 2) Construction of the truth table

Research on the factors influencing the effectiveness of ideological and political education conducted from a histogram perspective is able to discover new conclusions from a new perspective, which are more oriented to complex and real teaching situations. Before the group state analysis, the first construction of the truth table, group state analysis needs to use the truth table to analyze, the construction of the truth table will be valid variable values assigned to 1, invalid values or irrelevant values assigned to 0. The use of fsQCA software for the construction of

the truth table, the construction of the truth table needs to be filtered and edited, this study will be the original consistency of the cut-off value of 0.8 to the truth table for deletion and coding. After eliminating the knitting results with insufficient original consistency and no case support, it is also necessary to screen the PRI consistency value, and the PRI consistency value is set to be above 0.7 according to different theoretical recommendations. The PRI consistency value is set to 0.7, and finally four eligible truthful results are screened for the variable learning effect, and two eligible truthful results are screened for the variable ~ learning effect, and the ideological and political education effect truthfulness table is constructed as shown in Table 5. ~The ideological and political education effect truth table is constructed as shown in Table 6.

Table 5: Construction of the real value table of ideological and political education

A1	A2	A3	A4	A5	Raw Consist	PRI Consist
1	1	0	1	1	0.92283	0.79322
1	1	0	1	1	0.89281	0.81011
0	1	1	1	0	0.92609	0.76403
1	1	1	1	1	0.866351	0.720396

Table 6: Construction of the real value table of ~ ideological and political education

A1	A2	A3	A4	A5	Raw Consist	PRI Consist
0	0	0	0	0	0.89531	0.77545
0	0	0	0	1	0.89476	0.71999

V. C. 3) Analysis of the Path to Improve the Effectiveness of Ideological and Political Education

Normalized analysis of the censored truth table will result in three solutions: complex solution, parsimonious solution and intermediate solution. The core conditions and auxiliary conditions are identified through the parsimonious solution and intermediate solution, and finally the grouping is extracted according to the theory and the actual situation. In this study, all conditions are not selected, and the solution is obtained after standardized analysis. Based on the intermediate solution and parsimonious solution output from fsQCA, the path to improve the effect of ideological and political education can be obtained, and the group state analysis-sufficient condition analysis is shown in Table 7 (● and indicate that the condition exists, ⊗ indicates that the condition doesn't exist, ● and ⊗ indicate the core condition, ● and ⊗ indicate auxiliary conditions, and blank indicates that the condition may or may not be present in the configuration). Consistency was used to assess the degree of relationship between the calculated combination of conditions and the combination of conditions presented in the municipal data. 0.8 was used as the recommended criterion for adequacy consistency, and the criterion for determining overall consistency was set at 0.8. There was no minimum threshold set for coverage, but relatively low coverage is rare, and coverage greater than 0.5 is generally considered to be acceptable. The group consistency and overall consistency obtained in this study are both greater than 0.8, indicating that the results obtained are relatively satisfactory and can explain the actual phenomenon. The overall coverage of 0.59 indicates that the two constructs together explain 59% of the high educational effect samples. The three results obtained are now analyzed.

Table 7: Configuration analysis - full condition analysis

Conditional variable configuration	Education effect condition group 1	Education effect condition group 2	Education effect reverse configuration
JS(A1)		●	⊗
XS(A2)	●	●	⊗
JXNR(A3)	●	●	⊗
JXMT(A4)	●	●	⊗
JXHJ(A5)	⊗		
Consistency	0.94902	0.80054	0.85601
Raw coverage	0.36016	0.46486	0.34005
Unique coverage	0.12627	0.18676	0.32477
Solution consistency	0.86212		0.82631
Solution coverage	0.59464		0.3127

(1) Path of grouping 1 - "good basic skills * ensuring the role of the teacher * good conditions for teaching media".

The first ideological and political education effect of the group configuration is $XS^*JXNR^*JXMT^*\sim JXHJ$, the consistency of the group is 0.95, the coverage is 0.36. The grouping is based on the core conditions of students' strong ability, rich teaching content, good teaching media conditions, and poor teaching environment conditions, with no auxiliary conditions. The grouping pattern shows that for students with better basic ability and learning ability, with teachers' clear and explicit explanation of learning objectives tasks, answering questions and successful cooperative learning within the team, students can get better learning results despite the poor condition of teaching environment.

(2) Grouping 2 - "Teachers' basic skills are good * Students' learning tendency is positive * Teaching content is good * Teaching media is good" pathway

The second grouping configuration obtained from the analysis was $JS^*XS^*JXNR^*JXMT$, with a group consistency of 0.8 and a coverage of 0.46. This grouping had better basic teacher competence, positive student learning tendencies, and good teaching content as the core conditions, and a stronger supportive role of instructional media as the secondary conditions. This grouping shows that students can still get better learning results when they have better basic ability, stronger personal learning tendency and better personal learning situation, while the role of media cannot be ignored as an auxiliary condition in this grouping.

(3) Reverse configuration

Through the qualitative comparative analysis of the result "poor educational effect", this study also obtained a reverse grouping, the grouping configuration is $\sim JS^*\sim XS^*\sim JXNR^*\sim JXMT$, the consistency of the grouping is 0.86, the coverage rate is 0.34. This grouping is based on the conditions of lower student dispositions, insufficient teacher roles, and poor instructional media as the core conditions and poor instructional content as the secondary conditions. This grouping indicates that student learning is poor and student learning is ineffective when the core conditions of lower student dispositions, insufficient teacher roles, and poor instructional media roles are missing.

VI. Conclusion

With the rapid development of information technology, artificial intelligence is profoundly affecting the work of ideological and political education. This article uses DEMA-TEL method to identify the key factors affecting the effect of ideological and political education, and finally uses qualitative comparative analysis to analyze the effective paths to improve the effect of education. According to the empirical research and result analysis, the article concludes:

In the analysis of the influence index and ranking of each factor, the sub-factors cause elements in order of influence are creating an equal and harmonious atmosphere (C2), habit (C3), cooperative consciousness (C6), classroom infectiousness (C16), language of teaching (C5), comfortable and free learning environment (C17), problem solving ability (C7), ability to use teaching media (C4), interactive communication Expectation and Satisfaction Level (C8) There are 9 sub-factors, among which, creating an equal and harmonious atmosphere (C2) has a cause degree of 1.013, which is the key element among the cause elements.

There are two paths to analyze the improvement of the effectiveness of ideological and political education: the path of grouping 1 - "better basic competence * ensuring the role of teachers * good conditions of teaching media" and the path of grouping 2 - "better basic competence of teachers * positive learning tendencies of students * good teaching content * good teaching media" path.

Therefore, teachers need to consciously enhance and dynamically monitor students' tendency to learn ideology and politics, design learning materials and learning tasks based on students' ability to drive students to participate in learning, and assist ideological and political education with the help of artificial intelligence-related technologies.

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