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Data Literacy and Value Judgment: Research on the Dual Core Structure of Ideological Ability of Counselors in the Era of AI

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Abstract: In the context of artificial intelligence technology being deeply integrated into higher education, university counselors face new challenges and opportunities in ideological work. This study constructs a dual-core model of "data technology literacy" and "value judgment ability," exploring their interactive mechanisms within counselors' ideological competency framework and their influence pathways on students' ideological identification. Through questionnaire surveys, paired data from 412 counselors and 2,168 corresponding students across 35 universities nationwide were collected, with structural equation modeling used to validate the theoretical model. The findings reveal: data technology literacy significantly positively impacts value judgment ability ($\beta=0.427$, $p<0.001$), jointly explaining 58.7% of variations in students' ideological identification; value judgment ability fully mediates the relationship between data technology literacy and students' ideological identification; counselors' data technology literacy influences students' ideological identification through a three-stage pathway of "tool empowerment-cognitive deepening-value guidance." Multigroup analysis indicates that professional background and work experience mediate the influence pathways of dual-core competencies. Based on these findings, this study establishes a three-tiered cultivation system of "technological adaptation-integrated application-innovation leadership" and proposes a development pathway for counselors' ideological capabilities encompassing "technological empowerment-ethical embedding-subject construction," providing a theoretical framework and practical solutions for the professional development of ideological work in the AI era.

Keywords: Data Literacy, Value Judgment, AI Era, Counselor, Ideological Competence.

1. Introduction

The exponential advancement of artificial intelligence technology is catalyzing profound transformations in higher education paradigms. The deep integration of generative AI, learning analytics, affective computing, and intelligent recommendation systems into pedagogical practices has not only equipped universities with unprecedented data analytics tools and precision intervention mechanisms for ideological work, but also introduced systemic risks including algorithmic bias, information cocoons, data distortion, and value obscuration. In this complex arena where technological revolution intersects with ideological development, university counselors-as frontline practitioners of ideological work and pivotal agents in student value guidance-face the imperative to transition their competency frameworks from "experience-driven" to "data-driven" paradigms.

Current research demonstrates two distinct approaches: some studies focus on technical dimensions, emphasizing the urgency of developing technical competencies such as big data application skills and proficiency in intelligent tools [7]; others maintain a value-oriented perspective, asserting that counselors' core competencies should remain rooted in traditional qualities like ideological discernment, value judgment, and ideological guidance [1-3]. However, these two research paths exhibit a clear "technology-value" dichotomy, failing to adequately address the essential requirement of deep integration between "technological empowerment" and "value leadership" in ideological work during the AI era. In reality, as algorithms increasingly permeate every aspect of ideological education, purely technical capabilities may fall into the trap of "instrumental rationality," while value judgments detached from technological contexts risk becoming "castles in the air." [4]

Building on this foundation, this study proposes a dual-core structural model of "data technology literacy and value judgment competence," aiming to transcend single-dimensional competency frameworks. By examining the integration of technology and values, it explores the complex composition and essence of ideological capabilities for counselors in the AI era. Using quantitative research methods, the study employs structural equation modeling to analyze the internal structure of these dual competencies and their mechanisms in shaping students' ideological identification. Based on these findings, a tiered and categorized training system is developed. The research addresses four core questions: (1) How can the dual-core structure of counselors' ideological capabilities in the AI era be theoretically constructed? (2) What is the interactive relationship between data technology literacy and value judgment competence? (3) How do these dual competencies jointly influence students' ideological identification, and what are their underlying pathways? (4) How can a systematic and differentiated counselor competency development system be designed based on empirical evidence?

2. Theoretical Framework and Research Hypotheses

2.1. Core Concept Definition and Literature Review

2.1.1. Conceptual Evolution and Multidimensional Structure of Data Technology Literacy

The concept of data technology literacy emerges from the

fusion of 'data literacy' and 'technical literacy'. In higher education, Mandinach and Gummer first introduced the notion of educational data literacy, emphasizing educators' ability to make data-driven teaching decisions [5]. With advancements in artificial intelligence, this concept has expanded into a comprehensive literacy encompassing data awareness, data ethics, data analysis, and data application [6].

In the field of counselor research, discussions on data technology literacy remain in their infancy. Current studies primarily focus on two dimensions: at the operational level, they emphasize counselors' ability to collect and analyze student behavioral data using learning management systems, campus big data platforms, and public opinion monitoring tools; at the application innovation level, they explore practical applications of artificial intelligence technologies for personalized ideological guidance, targeted financial aid, and psychological crisis early warning. However, most of these studies adopt a pragmatic approach, lacking systematic theoretical frameworks to construct the intrinsic structure of data technology literacy.

This study posits that data literacy for academic counselors in the AI era constitutes a four-dimensional composite framework: ① Data awareness and ethical consciousness: encompassing sensitivity to data value, foresight of technological risks, and understanding of data ethics standards; ② Data acquisition and processing capabilities: referring to technical proficiency in obtaining multi-source heterogeneous data through web crawlers, API interfaces, and smart terminals, followed by data cleansing, integration, and storage; ③ Data analysis and interpretation skills: covering descriptive, predictive, and normative analytical techniques, along with the ability to identify patterns and detect anomalies from data; ④ Application and innovation of intelligent tools: including the ability to appropriately select and apply AI tools such as conversational systems, sentiment analysis tools, and personalized recommendation algorithms, while innovating adaptively based on practical work scenarios. These four dimensions form a complete competency chain spanning from awareness to operation, and from analysis to innovation.

2.1.2. Theoretical Connotation and Contemporary Challenges of Value Judgment

Value judgment ability, a cornerstone concept in ideological and political education, has been redefined in the AI era. Traditional research defines it as the ability to analyze, evaluate, and select social ideologies and value systems through Marxist perspectives. In the AI age, this capability faces three challenges: First, the "value concealment" caused by algorithmic black boxes, where commercial algorithms' value assumptions are often hidden beneath technical neutrality; Second, the "value polarization" induced by information cocoons, as personalized recommendations reinforce entrenched biases; Third, the "value reification" triggered by human-computer interactions, reducing complex ideological exchanges to data transactions [7].

To address these challenges, this study proposes a three-dimensional framework for counselors' value judgment capabilities in the AI era: ① Algorithmic Value Critique: The ability to identify implicit value assumptions, interest-driven biases, and cultural prejudices in algorithms, and to conduct value assessments on algorithmic recommendations. This requires counselors to possess algorithmic literacy, enabling them to understand the operational principles and value impacts of recommendation systems, ranking algorithms, and filtering mechanisms. ② Human-Machine Synergy Judgment: The capacity to balance technical utility and value risks in specific collaborative scenarios, making context-sensitive decisions. This demands counselors to neither over-rely on technological tools nor outright reject their application, but to find optimal equilibrium points in practical situations. ③ Technology-Enabling Value Guidance: The ability to creatively integrate AI technologies into value education, enhancing the relevance, approachability, and effectiveness of value guidance through technological means. This represents a capability leap from "technology application" to "value innovation".

2.1.3. Measurement Dimensions of Students' Ideological identification

Student ideological identification serves as a key outcome variable for evaluating counselors' effectiveness. Existing research primarily measures this through three dimensions: cognition, emotion, and behavior [3]. This study, adapted to the characteristics of the AI era, refines these dimensions as follows: ① Cognitive dimension: includes theoretical understanding of mainstream ideology, rational recognition of technology-enhanced ideological education, and comprehension of ideological operation patterns in algorithmic societies; ② Emotional dimension: encompasses emotional identification with mainstream ideology, acceptance attitudes toward technology-enhanced approaches, and vigilance against algorithmic manipulation; ③ Behavioral dimension: involves participation in ideological practices, reflective behaviors on technological rationality, and critical practices toward algorithms. Through these three dimensions, we establish a measurement framework for ideological identification that maintains theoretical continuity while reflecting contemporary relevance.

2.2. Theoretical Construction of the Dual-Core Model

Rooted in the integration of "technology empowerment" and "value orientation," this study develops a dual-core structural model of "data technology literacy and value judgment ability". The model's theoretical framework posits that in the AI era, counselors' ideological capabilities exhibit a "dual-core dynamic with mutual reinforcement and synergistic effects." Data technology literacy provides new tools, data, and methodologies for value judgment, transitioning it from empirical intuition to data-driven enhancement. Meanwhile, value judgment ability offers directional guidance, ethical standards, and meaning anchors for technology application, preventing it from falling into instrumental rationality traps. The interactive fusion of these dual capabilities influences students' ideological identification through three pathways: ① precise identification enhances targeted guidance; ② human-machine collaboration improves practical effectiveness; ③ technological reflection deepens critical thinking.

The model diagram shows that data technology literacy and value judgment ability constitute a dual core, which have a bidirectional interaction path. The dual core affects the three dimensions of students' ideological identification through three intermediary paths: accurate identification, human-machine collaboration, and technology reflection.

Table 1. Model Variable Settings in This Study

Type of variable	Variable name	Variable symbol	Variable definition
Extrinsic latent variable	Data literacy	X1	Counselors' Ability to Carry out Ideological Work by Using Data Tools and Public Opinion Analysis Technology
Extrinsic latent variable	Judgment of value	X2	The Ability of Counselor to Control the Direction, Ethics and Significance in Ideological Work
Regulated variable	Professional Background & Work Experience	M	Contextual factors such as the academic background (science/technology / humanities and social sciences) and years of experience of the counselor
Intermediary latent variable	Accurate Identification	Z1	Enhance the Targeted Guidance Based on the Dynamic Perception of Data Technology and the Ability of Risk Signal Identification
Intermediary latent variable	Man-machine coordination	Z2	The Guiding Practice Mode of Combining Technical Tools with Value Judgment to Improve the Effectiveness of Guidance
Intermediary latent variable	Technical reflection	Z3	Ethical Review and Optimization Ability of Technology Application, Deepen the Guidance of Criticism
Endogenous latent variable	Student ideological identification	Y	It includes three dimensions: political identity, value identity, and cultural identity.

2.3. Research Hypotheses and Theoretical Basis

Based on the dual-core model, this study proposes the following research hypotheses and their theoretical foundations:

H1: Counselors' data literacy significantly enhances their value judgment capabilities.

Theoretical Basis: According to the Technology Enablement Theory [8], the application of new technologies can enhance individuals' cognitive and behavioral capabilities. In ideological work, improving data technology literacy enables counselors to more accurately perceive ideological trends, identify risk signals, and evaluate intervention effectiveness, thereby providing a richer and more precise information foundation for value judgments. Particularly, technologies such as artificial intelligence-based sentiment analysis and online public opinion monitoring can help counselors transcend the limitations of experiential intuition, achieving "data-enhanced" value judgments.

H2: Counselors' value judgment ability has a reverse shaping effect on their data technology literacy.

Theoretical Framework: Sociotechnical Systems Theory (SST) posits that technology and societal factors mutually shape each other [9]. In ideological education contexts, counselors' value judgment capabilities determine their selection, application, and adaptation of technological tools. Those with strong value judgment are more likely to guide instrumental rationality through value rationality, preventing value distortions in technology use. Through adaptive modifications of technological tools during implementation, they substantially enhance both the practical proficiency and ethical standards of data technology literacy [3].

H3: The ability to make value judgments mediates the relationship between data literacy and students' ideological identification.

Theoretical Framework: The "black box" theory of competency transformation posits that the conversion of foundational skills into work outcomes typically requires decoding and translation by higher-order competencies [10]. In ideological guidance for counselors, data literacy-as a fundamental and instrumental skill-must undergo value filtering and meaning-making through value judgment to become effective ideological practice. This mediating mechanism demonstrates the core logic that educational efficacy in technology empowerment can only be achieved through value-driven leadership [2].

H4: Data literacy and value judgment demonstrate synergistic effects, where their combined influence on students' ideological identification outweighs the impact of either ability alone.

Theoretical Basis: Complementary Assets Theory posits that when two capabilities are mutually reinforcing, their synergistic value exceeds the sum of their individual values. In the age of artificial intelligence, data technical literacy and value judgment ability exemplify such complementary combinations: technical literacy addresses "how to do it," while value judgment ability tackles "why to do it" and "for whom to do it." Their organic integration generates a "1+1>2" synergistic effect, which cannot be achieved by any single capability alone.

H5: Professional background and work experience mediate the impact of dual-core competencies.

Theoretical Framework: Situational learning theory posits that competence development and application are inherently embedded within specific socio-cultural contexts. A counselor's technical expertise, disciplinary training, and professional experience constitute critical situational factors for competence implementation. Counselors with STEM backgrounds may demonstrate stronger advantages in technology adoption and application, while those with humanities and social sciences backgrounds may exhibit greater sensitivity in value analysis and interpretation. New counselors might rely more heavily on technical tools, whereas experienced counselors tend to emphasize the integration of technology and practical experience. These contextual variations result in differing pathways and intensities of dual-core competencies.

Based on the above description, we construct a theoretical research model of the dual-core structure of counselors' ideological capacity, as shown in Figure 1.

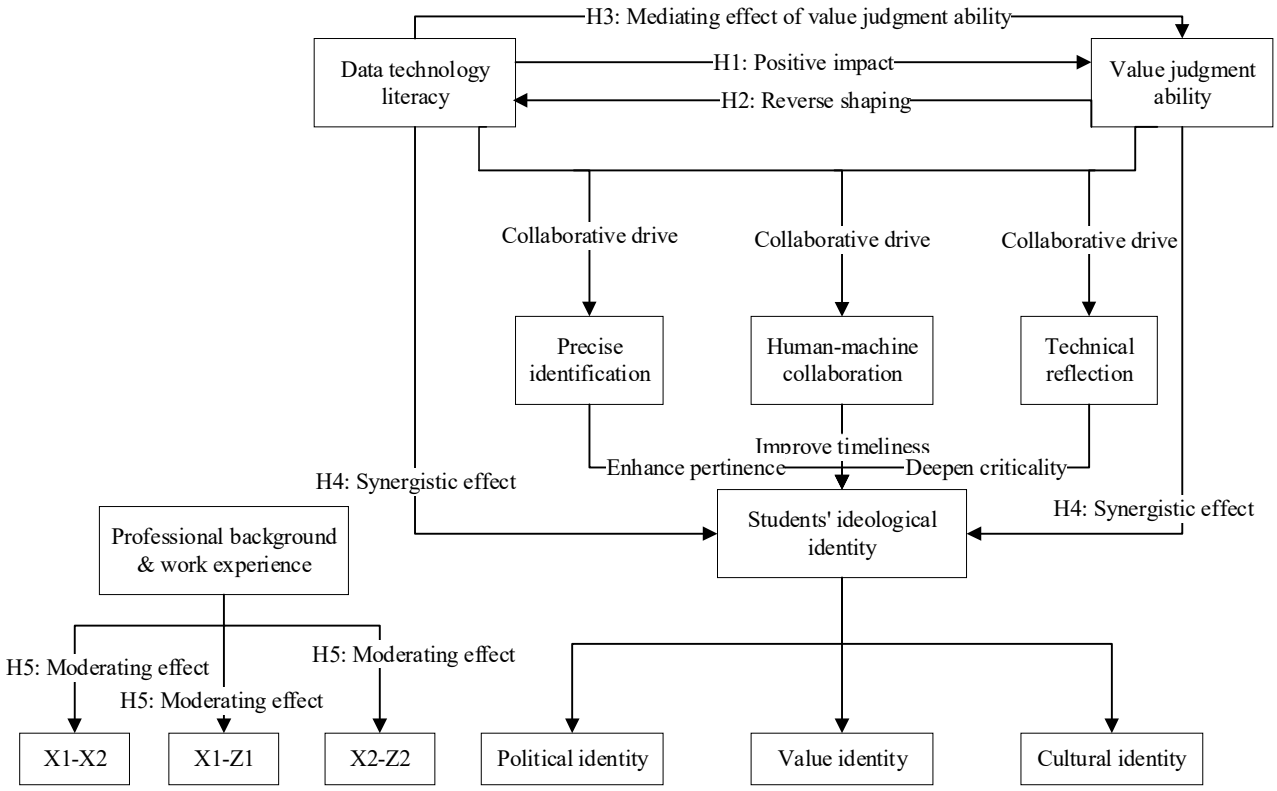


Figure 1. Theoretical Model of Dual-Core Structure of Counselor's Ideological Competence

The model diagram shows that data technology literacy and value judgment ability constitute a dual core, which have a bidirectional interaction path, and the two cores affect the three dimensions of students' ideological identification through three intermediary paths: accurate identification, human-machine collaboration, and technology reflection.

3. Research Methods and Design

3.1. Study Sample and Data Collection

This study employed a stratified random cluster sampling method to select 35 universities nationwide as the sample source. The sampling criteria included: ① Geographical distribution: covering eastern (12), central (11), and western (12) regions; ② Institutional types: comprising comprehensive universities (15), science and engineering institutions (10), teacher-training colleges (6), and other specialized institutions (4); ③ Educational levels: "Double First-Class" universities (13), local undergraduate institutions (16), and vocational colleges (6).

The data collection process comprised two phases. In the first phase, 460 questionnaires were distributed to counselors, with 412 valid responses collected, yielding an 89.6% response rate. The second phase involved surveying students in counselors' classes, with 2,500 questionnaires distributed at a ratio of 5-8 students per counselor. This phase yielded 2,168 valid responses, achieving an 86.7% response rate. The final analysis produced 412 counselor-student pairing samples.

The sample demographics indicate that counselors are 38.1% male and 61.9% female, with an average age of 31.5 years (SD=6.2). Career experience distribution shows 47.3% with 5 years or less, 36.2% with 6-10 years, and 16.5% with over 10 years. Academic backgrounds are predominantly STEM (31.3%) and humanities/social sciences (68.7%). Student demographics are 45.6% male and 54.4% female, with 72.3% undergraduates and 27.7% postgraduates. Party membership includes 23.5% CPC members (including probationary members), 68.9% Communist Youth League members, and 7.6% general members.

3.2. Development and Validation of Measurement Tools

3.2.1. Data Technology Literacy Scale

Building upon the educational data literacy framework proposed by Mandinach and Gummer, and tailoring it to the unique characteristics of counselor work, this study developed a data technology literacy scale consisting of 4 dimensions and 16 items [4]. The scale employs a 5-point Likert scale (1=strongly disagree, 5=strongly agree).

Exploratory Factor Analysis (EFA) revealed a KMO value of 0.912, a significant Bartlett's test (χ^2=2031.42, $p<0.001$), and a cumulative variance explained of 68.73%. Confirmatory Factor Analysis (CFA) demonstrated good model fit: χ^2/df=2.13, CFI=0.96, TLI=0.95, RMSEA=0.052, and SRMR=0.038. The Cronbach's α coefficients for each dimension ranged from 0.81 to 0.88, with composite reliability (CR) between 0.83 and 0.89, and average variance extracted (AVE) ranging from 0.56 to 0.64, indicating that the scale possesses strong reliability and validity.

3.2.2. Value Judgment Ability Scale

Based on the theoretical framework of value judgment ability and considering the characteristics of the artificial intelligence era, a value judgment ability scale comprising 3 dimensions and 12 items was developed. Exploratory factor analysis revealed a KMO value of 0.894, accounting for 71.25% of the total variance. Confirmatory factor analysis yielded favorable results: χ^2/df=1.97, CFI=0.97, TLI=0.96, RMSEA=0.047, and SRMR=0.035. The internal consistency coefficients for each dimension ranged from 0.82 to 0.87, the composite reliability from 0.85 to 0.90, and the AVE values from 0.58 to 0.66.

3.2.3. Student Ideological identification Scale

Building upon the Ideological identification Scale developed by Liu Jianjun and adapted to the characteristics of the AI era, a revised version comprising 3 dimensions and 10 items was created [9]. Confirmatory factor analysis demonstrated excellent model fit: $\chi^2/df=2.05$, CFI=0.95, TLI=0.94, RMSEA=0.049, SRMR=0.041. The overall Cronbach's α coefficient reached 0.885, with each dimension coefficient ranging from 0.79 to 0.86.

3.2.4. Control Variables

Based on existing research, variables potentially influencing study outcomes were selected as control variables: at the counselor level, these included gender, age, educational background, professional expertise, years of service, and technical training experience; at the student level, they comprised gender, grade level, political affiliation, and academic discipline. These variables were controlled as covariates in the analysis.

3.3. Data Analysis Methods

This study employed a multi-level data analysis strategy, utilizing SPSS 26.0 and Mplus 8.3 software for statistical analysis:

First, a common method bias test was conducted. Using the Harman single-factor test, the unrotated exploratory factor analysis revealed that the first factor accounted for 28.73% of the variance (below the critical threshold of 40%), indicating that the common method bias was not significant.

Secondly, descriptive statistics and correlation analysis were conducted to preliminarily understand the concentration trend, dispersion degree and mutual relationship of each variable.

Third, construct a structural equation model to test the research hypotheses. A two-stage analysis approach is adopted: the first stage evaluates the quality of the measurement model, including reliability, convergent validity, and discriminant validity; the second stage tests the structural model, examining direct effects through path coefficients and mediating effects via the Bootstrap method (repeated sampling 5000 times).

Fourth, perform multigroup analysis to test the moderating effects of academic background (science vs. humanities) and work experience (≤5 years vs.>5 years). Determine whether there are significant between-group differences in path coefficients by comparing the chi-square differences between constrained and unconstrained models.

Finally, a simple slope analysis was performed to visually present the specific pattern of significant interaction effects.

4. Research Findings and Analysis

4.1. Model Testing

The confirmatory factor analysis demonstrated that the three-factor model (data literacy, value judgment ability, and student ideological identification) exhibited strong fit, with $\chi^2/df=2.28$, CFI=0.94, TLI=0.93, RMSEA=0.056, and SRMR=0.043. This model significantly outperformed both the single-factor model ($\Delta\chi^2=387.26$, $\Delta df=3$, $p<0.001$) and the two-factor model, confirming the variables' strong discriminant validity. Furthermore, the square root of the average variance extracted (AVE) for each variable consistently exceeded its correlation coefficient with other variables, further validating the discriminant validity.

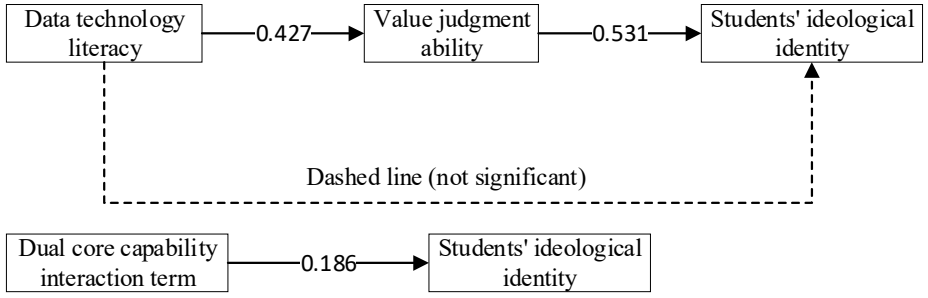
Table 2. Descriptive statistics, correlation coefficients, and discriminant validity test (N=412)

Variable	M	SD	1	2	3	4	5	6	7	8
1. Data Technology Literacy	3.42	0.78	0.79							
2. Value judgment ability	3.87	0.69	0.512**	0.81						
3. Students' Ideological identification	4.05	0.64	0.398**	0.623**	0.77					
4. Gender of Counselors	0.38	0.49	0.032	0.041	0.027	-				
5. Years of experience as a counselor	6.52	4.37	0.187**	0.213**	0.176**	0.105*	-			
6. Science and Engineering Background	0.31	0.46	0.245**	0.118*	0.092	0.083	0.137*	-		
7. Student Gender	0.46	0.50	0.023	0.017	0.031	0.042	0.027	0.038	-	
8. Student Political Status	0.24	0.42	0.087	0.132*	0.203**	0.056	0.091	0.047	0.062	-

Note: *p<0.05, p<0.01, *p<0.001; diagonal bold numbers represent the square root of AVE.

4.2. Structural Equation Modeling Analysis

Structural equation modeling analysis demonstrated excellent fit between the theoretical model and data, with the following parameters: $\chi^2/df=2.34$, CFI=0.93, TLI=0.92, RMSEA=0.057, and SRMR=0.041. The path coefficient analysis results are presented in Figure 2 and Table 3.



Goodness of fit: $\chi^2/df=2.34$, CFI=0.93, TLI=0.92, RMSEA=0.057, SRMR=0.041

Figure 2. Structural equation model path coefficient diagram

Table 3. Path coefficients of structural equation model and hypothesis testing results

Hypothesis	Path relationship	Path coefficient	SE	t price	Hypothesis test
H1	Data literacy→value judgment ability	0.427	0.067	6.373***	support
H2	Value Judgment Ability→Data Technology Literacy	0.103	0.071	1.451	nonsupport
H3a	Data literacy→Students' ideological identification (directly)	0.127	0.075	1.693	nonsupport
H3b	Data literacy→value judgment ability→students' ideological identification (indirect)	0.227	0.042	5.405***	support
H4	The Interaction Item of Dual Core Ability→Students' Ideological identification	0.186	0.058	3.207**	support

Note: *p<0.05, *p<0.01, *p<0.001

The data analysis shows that:

Data literacy has a significant positive impact on value judgment ability (β=0.427, p<0.001), supporting Hypothesis 1. This indicates that enhancing counselors' data literacy can significantly improve their value judgment ability, demonstrating the empowering role of technology in value judgment.

The impact of value judgment ability on data technology literacy was not significant (β=0.103, p>0.05), and Hypothesis 2 was not supported. This may indicate that in the early stages of artificial intelligence technology application, the shaping effect of technology on values is more pronounced, while the reverse shaping effect of values on technology requires longer time accumulation and more complex conditions.

The direct effect of data literacy on students' ideological identification was not statistically significant (β=0.127, p>0.05), but its indirect effect on value judgment ability was significant (β=0.227, p<0.001). The Bootstrap test revealed that the 95% confidence interval for this indirect effect was [0.163,0.301], excluding zero. This indicates that value judgment ability fully mediates the relationship between data literacy and students' ideological identification, thereby supporting Hypothesis 3 (H3).

The interaction between data literacy and value judgment ability significantly enhances students' ideological identification (β=0.186, p<0.01), supporting Hypothesis 4. Simple slope analysis reveals that data literacy's impact on ideological identification is more pronounced when value judgment ability is high (β=0.402, p<0.001), whereas it becomes weaker when value judgment ability is low (β=0.178, p<0.05), confirming the synergistic effect of dual-core competencies.

4.3. Mediation Effect Testing and Path Analysis

Using the Bootstrap method (with 5,000 repeated sampling), we further examined the mediating effect. The results demonstrated a significant full mediation effect of value judgment ability (effect size = 0.227, SE = 0.042,95% CI= [0.163,0.301]). Specifically, data technology literacy influences value judgment ability through three sub-pathways, which subsequently affects students' ideological identification.

The first approach is the "Tool Empowerment-Cognitive Deepening" pathway: Data technology literacy enhances counselors' precision in perceiving ideological trends and deepens their cognitive understanding by providing accurate data analysis tools, thereby improving the accuracy and foresight of their value judgments. The indirect effect of standardization for this pathway is 0.132 (95% CI= [0.088,0.184]).

The second approach is the "Model Innovation-Situation Adaptation" pathway: Data technology literacy enhances counselors' flexibility and adaptability in value judgment across different scenarios by supporting personalized and precise ideological work model innovation. The indirect effect of standardization for this pathway is 0.068 (95% CI=[0.032,0.116]).

The third approach is the "risk warning-critical reflection" pathway: Data literacy, by identifying risks such as algorithmic bias and information cocoons, prompts counselors to critically evaluate the value of technology applications, thereby enhancing the criticality and depth of their value judgments. The standardized indirect effect of this pathway is 0.027 (95% CI= [0.008,0.059]).

The three paths together constitute the complete intermediary mechanism of data technology literacy influencing students' ideological identification, revealing the internal logic that "the educational effectiveness of technology empowerment can only be realized through value transformation".

4.4. Multi-group Analysis and Moderation Effect Testing

The results of multigroup analysis show that the professional background and work experience have a significant moderating effect on the influence path of dual-core ability.

4.4.1. The Regulatory Role of Professional Background

For counselors with STEM backgrounds, data literacy has a stronger impact on value judgment (β=0.502, p<0.001), while its influence on students' ideological identification is weaker (β=0.493, p<0.001). Conversely, for counselors with humanities and social sciences backgrounds, data literacy's effect on value judgment is weaker (β=0.386, p<0.001), whereas its impact on ideological identification is stronger (β=0.571, p<0.001). Multiple group comparisons revealed significant intergroup differences in both path coefficients ($\Delta\chi^2$=8.73, Δdf=2, p<0.05). This finding indicates that counselors with different professional backgrounds exhibit distinct mechanisms in the dual-core competency framework, manifesting as either a "technical advantage pathway" or a "value advantage pathway".

4.4.2. The Regulatory Role of Work Experience

Among counselors with less than 5 years of experience, data technology literacy showed a significant direct effect on students' ideological identification (β=0.201, p<0.05), while its indirect effect through value judgment ability was relatively weak (β=0.183, p<0.01). In contrast, for counselors with over 5 years of experience, the direct effect of data technology literacy was not significant (β=0.089, p>0.05), whereas the indirect effect through value judgment ability became more pronounced (β=0.314, p<0.001). Multiple group comparisons revealed significant intergroup differences in the indirect effect ($\Delta\chi^2$=6.94, Δdf=1, p<0.01).

This indicates that as counselors accumulate work experience, they gradually shift from "direct application of technology" to "technology value transformation," with the mediating role of value judgment ability becoming increasingly prominent.

4.4.3. Simple Slope Analysis Visualization

The simple slope analysis visually illustrates the specific interaction pattern between the dual-core competencies. When high-value judgment ability is present, each one-standard-deviation increase in data technology literacy elevates students' ideological identification by 0.402 standard deviations. Conversely, under low-value judgment ability conditions, the same literacy improvement only contributes 0.178 standard deviations to ideological identification. These findings further validate the theoretical hypothesis of synergistic effects between dual-core competencies.

5. Discussion and Theoretical Contributions

5.1. Theoretical Explanation of the Dual-Core Capability Interaction Mechanism

This study demonstrates that data technology literacy significantly enhances value judgment capacity, with the latter fully mediating the relationship between data literacy and students' ideological identification. These findings reveal unique patterns in developing ideological capabilities for counselors in the AI era. The results can be interpreted through three theoretical lenses:

From the perspective of philosophy of technology, this study demonstrates the tension between Heidegger's "instrumentalism" and "scaffolding theory" in technological systems. On the one hand, data literacy's enhancement of value judgment capabilities validates technology's role as a "deconstruing" tool that improves human understanding and decision-making (instrumentalism). On the other hand, the core mediating function of value judgment highlights the need to avoid technological applications being dominated by "scaffolding" -a mindset that reduces all existence, including human thought, to mere "sustained entities" (scaffolding theory). Counselors must leverage technology's "deconstructive" power while remaining vigilant against its "scaffolding" tendencies, which embody the profound philosophical implication of the dual-core capability interaction.

From an educational perspective, the findings validate the applicability of the "technology-enhanced learning" theory in ideological and political education. Previous research has demonstrated that technology can improve the efficiency and effectiveness of cognitive processes (Hwang et al., 2020). This study reveals that in ideological work, technology not only boosts cognitive efficiency but, more importantly, enhances the accuracy and relevance of value judgments by providing richer and more precise data support. This "technology-enhanced value judgment" represents a new feature of ideological work in the AI era.

From a sociological perspective, Giddens' structural theory provides a framework for understanding the interaction of dual-core competencies. Data literacy can be viewed as the "resources" for counselors in ideological work, while value judgment ability serves as their "rules." Research indicates that resources (technical literacy) can transform and reinforce rules (value judgments), but the transformative effect of rules on resources remains insignificant at this stage, which may reflect the "technology-dominated" structural characteristics during the initial phase of artificial intelligence application. As technology becomes more deeply integrated and mature, the transformative and reconstructive role of rules on resources may gradually become apparent.

5.2. Multidimensional Interpretation of the Core Role of Value Judgment Ability

The core role of value judgment in the dual-core structure has multiple theoretical implications:

First, this finding challenges the simplistic application of "technological determinism" in ideological work. Technological determinism posits that the development and adoption of new technologies directly lead to changes in social relations and ideologies. Our research demonstrates that in the realm of ideological work, technology's influence on thought is neither direct nor linear, but must be mediated through human value judgments. Merely applying technology does not automatically enhance ideological guidance; in some cases, improper use may even produce counterproductive effects. This highlights the necessity to adhere to the principle of "technology for utility, values as the core" when advancing the intelligentization of ideological work.

Secondly, this finding reinforces the educational philosophy that "value rationality takes precedence over instrumental rationality." Weber's distinction between instrumental and value rationality highlights the risks of instrumental rationality's overreach in modern society. In the age of artificial intelligence, this warning becomes particularly urgent. The core mediating role of value judgment in this study essentially reflects value rationality's guidance and regulation of instrumental rationality. Counselors' data technology literacy embodies instrumental rationality, while their value judgment ability embodies value rationality. In this relationship, value rationality holds a dominant and prioritized position, which is an essential requirement of educational work.

Ultimately, this discovery reveals the unique principles governing ideological work in the AI era. Unlike traditional approaches, contemporary ideological work confronts distinct technological challenges such as the "algorithmic black box," "filter bubbles," and "echo chamber effect." Addressing these issues requires more than conventional methods or merely mastering new technologies. The key lies in cultivating the ability to penetrate technical facades and discern the essence of values. This capability serves as the bridge connecting the strengths of traditional ideological work with the potential of new technologies.

5.3. Practical Implications of Group Differences

The study reveals that counselors with different professional backgrounds and work experiences exhibit distinct pathways in the application of dual-core competencies, which holds significant practical implications.

For counselors with STEM backgrounds, their "technological advantage pathway" suggests that training strategies should focus on "transforming technical strengths into value-based advantages" -specifically, helping them convert technical expertise into strengths in ideological work. Specifically, this can be achieved through case-based teaching to demonstrate the value of technological applications, interdisciplinary dialogs to deepen understanding of technological value propositions, and ethical discussions to

enhance the ability to assess technological risks.

For counselors with a background in humanities and social sciences, their "value advantage pathway" suggests that training strategies should focus on "extending value advantages to technological advantages," which means helping them overcome technological anxiety while maintaining value sensitivity and enhancing their technical application capabilities. Specific approaches include hands-on technical training, simulation of technical application scenarios, and pairing with counselors with a technical background for mutual assistance.

For novice counselors, data indicate a significant "direct application pathway" of technology, with the training focus should be on "solidifying the foundation and standardizing application" to avoid misuse and abuse of technology. Standardized training, operational guidelines, and application templates can be utilized to help them establish correct technical usage habits.

For senior counselors, data indicate a significant "pathway of technological value transformation," with the training focus should be on "deepened integration and innovation-driven approaches." This can be achieved through advanced training, thematic research, and innovative experiments, supporting them in exploring new models and methods for ideological work based on the deep integration of technology and value.

6. Construction of Stratified Cultivation Strategy System

Based on the research findings, this study constructs a "three-tiered, four-directional, five-supported" stratified training system for counselors' ideological capabilities (as shown in Figure 3). Guided by the dual-core competency framework, the system designs differentiated and systematic training programs tailored to counselors at different developmental stages, with diverse professional backgrounds and varying technical foundations.

6.1. Cultivation Strategy for the Technical Adaptation Layer

The Technical Adaptation Layer training strategy targets all counselors, with particular emphasis on those with weaker technical foundations and experience. Its core objective is to systematically address "technical anxiety", establish a rational technical perspective of "technology as a tool, technology as a necessity, and technology as a caution", and master fundamental technical application skills. To achieve this goal, systematic development should focus on three core tasks: First, conduct technical literacy and awareness education emphasizing the fundamental principles of artificial intelligence and its relevance to ideological work, analyzing typical cases to demonstrate potential benefits and risk boundaries of technology applications. Second, develop standardized "Counselor AI Tool Application Foundation Modules" for hands-on training in common tools like learning analytics, public opinion monitoring, and intelligent Q&A systems, while introducing a "micro-certification" mechanism to ensure basic skill mastery. Third, strengthen technical ethics education through implementing the "Counselor AI Technology Ethics Code", clarifying fundamental norms such as data privacy, algorithm transparency, and human-machine responsibility. Implementation relies on three coordinated approaches: establishing a standardized "AI + Ideological and Political Education" basic curriculum system covering 6 modules and 24 class hours to ensure systematic training; regularly holding technical application workshops focusing on specific tools and scenarios to deepen practical skills; and creating a "Technical Counselor" peer support mechanism to enhance overall technical proficiency. To ensure training quality, a three-dimensional certification system comprising technical knowledge tests, tool operation assessments, and ethical scenario judgments must be established.

6.2. Convergence Application Layer Cultivation Strategy

The Applied Integration Level is designed for core counselors with established technical expertise, aiming to elevate their capabilities from basic technical operations to a deep integration of "technology application" and "value guidance". This level emphasizes developing their ability to integrate technologies and make critical judgments in practical work scenarios. The training focuses on three progressive directions: First, through thematic seminars on "the value behind technology", participants will deconstruct the value assumptions and cultural biases inherent in algorithmic recommendations and affective computing, cultivating critical thinking about technology. Second, a case library titled "Best Practices in Human-Machine Collaboration" will be developed to explore optimal cooperation models between humans and technology in diverse scenarios such as personalized guidance and risk alerts. Finally, an innovation fund called "Technology Empowering Ideological work" will support integrated application practices that must include technical solutions, value analysis, and effectiveness evaluation, promoting the unity of knowledge and action. Implementation relies on three specialized pathways: interdisciplinary research with computer science and ethics to enhance technical philosophy literacy; systematic development of a "Typical Cases Database for Ideological Work in the AI Era" covering technology application, value judgment, and effectiveness reflection to create replicable models; and establishing special funds to incubate 20-30 innovative projects for exemplary outcomes. Quality assurance requires a three-dimensional evaluation system covering technological innovation, depth of value judgment, and significant work effectiveness, with assessment results linked to professional development incentives.

6.3. Innovation Leadership Layer Cultivation Strategy

The Innovation Leadership Tier targets expert counselors with solid technical foundations and exceptional value judgment capabilities, aiming to achieve fundamental breakthroughs from technology application to paradigm innovation in work practices, ultimately forming theoretical achievements and practical models with distinctive personal characteristics and broad influence. The core tasks of this tier focus on three aspects: First, establishing a cutting-edge technology tracking mechanism to support exploratory application experiments in emerging technologies such as generative AI and metaverse, securing future technological leadership. Second, encouraging counselors to extract theoretical insights and build models from practice, transforming practical wisdom into academic knowledge through publications like papers and monographs. Third,

cultivating "AI Era Ideological work Masters" who will disseminate innovative paradigms through studio initiatives and lecture tours, leading industry-wide development. The implementation path features high-end and open characteristics, including a senior visiting scholar program for outstanding counselors to study at top domestic and international institutions; theoretical innovation workshops adopting the "case-extraction-writing" model to enhance academic output quality; and establishing a national "AI Era Counselor Development Alliance" platform to promote paradigm dissemination and collaborative innovation through summits and forums. To support this, an "Innovation Leadership" certification system must be established, focusing on technical application innovation, theoretical output, and industry influence, providing authoritative recognition for their career peak development.

6.4. Support and Guarantee System

To ensure the effective implementation and sustainable operation of the three-tiered cultivation system, it is essential to establish a systematic support framework comprising five pillars: institutional mechanisms, resource allocation, organizational structures, evaluation systems, and cultural cultivation. At the institutional level, data literacy and value judgment capabilities must be deeply integrated into the entire career development process of counselors, including recruitment, training, assessment, and promotion, forming a clear competency-oriented policy framework. For resource allocation, efforts should focus on building a comprehensive "AI + Ideological and Political Education" resource support system that integrates tool platforms, case study platforms, learning platforms, and experimental platforms. At the organizational level, universities may consider establishing an "Innovation and Development Center for Ideological work in the AI Era," with departments for training, research, and experimentation to coordinate planning and professional advancement. The key to evaluation lies in creating a precise competency assessment system based on multi-source evidence (such as technical application data, student feedback, and peer reviews), enabling evaluation-driven improvement. Ultimately, it is crucial to foster an innovative cultural atmosphere within organizations that "actively embraces technology while upholding value leadership." By promoting exemplary practices, sharing experiences, and encouraging exploration, a sustainable ecosystem for the deep integration of technology and values can be established.

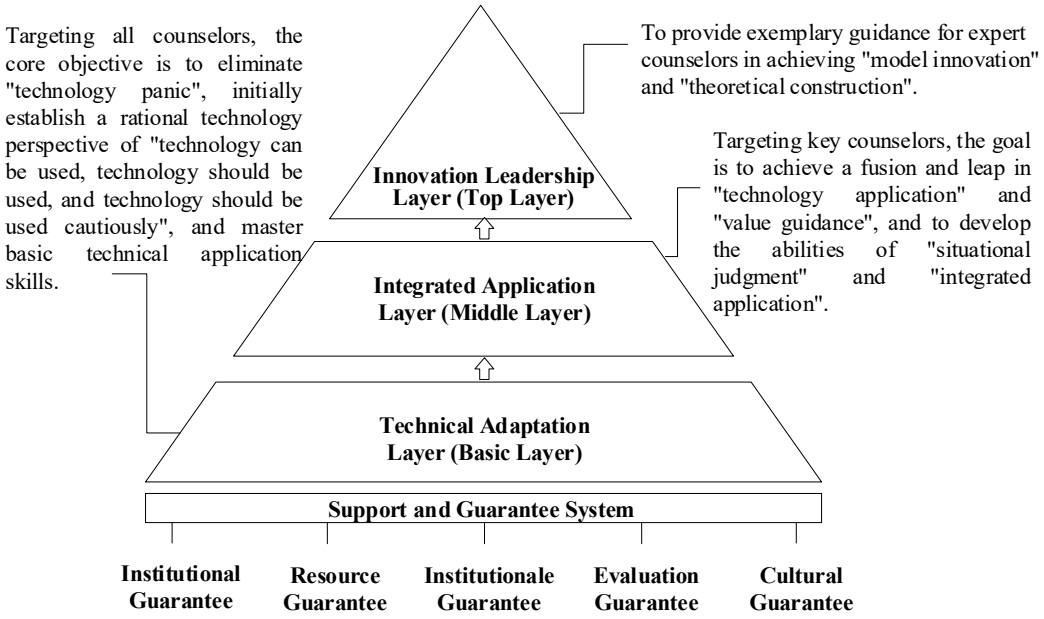


Figure 3. Framework of Stratified Training System for Counselors' Ideological Competence

7. Summary

This study constructs and validates a dual-core structural model of "data technology literacy and value judgment ability", revealing the internal structure and mechanism of ideological capacity of counselors in the era of artificial intelligence, and draws the following conclusions:

First, in the AI era, the ideological capabilities of counselors exhibit a dual-core, synergistic structure. Data literacy provides the technical foundation for value judgments, while value judgment guides the application of technology-both are mutually reinforcing and indispensable. Neglecting technical literacy will leave ideological work behind the times, while ignoring value judgment will lead to misguided technological adoption.

Second, value judgment ability serves as the pivotal hub in the dual-core framework. Data literacy must be mediated by value judgment to effectively shape students' ideological orientation. This complete mediating effect reveals the unique dynamics of ideological work in the AI era: technology functions as a tool while values serve as the ultimate goal; technology empowers while values guide.

Third, the pathways of dual-core competencies demonstrate group-specific variations. Science and engineering counselors predominantly follow the "technical advantage pathway," whereas humanities and social sciences counselors tend to adopt the "value advantage pathway." New counselors favor "direct technical application," while experienced counselors prioritize "technological value transformation." These differences suggest that counselor competency development requires stratified and targeted strategies.

Fourth, the tiered training system serves as an effective approach to enhance counselors' dual competencies. Built upon three tiers- "technological adaptation, integrated application, and innovation leadership" -and four pathways- "standardized training, interdisciplinary studies, and innovative research" -this framework addresses the diverse

needs of counselors at different career stages, ensuring systematic and sustainable capacity building.

The limitations of this study are as follows: First, the use of cross-sectional data makes it difficult to rigorously establish causal relationships between variables. The research primarily relies on self-reported data, which may introduce social desirability bias. Although the sample covers multiple regions and types of higher education institutions, it is predominantly composed of undergraduate colleges. Future studies could expand to include vocational colleges, private institutions, and other types of higher education to enhance sample representativeness. The deep integration of artificial intelligence with higher education is accelerating, presenting both challenges and opportunities for developing counselors' ideological capabilities. Future research should focus on tracking the dynamic evolution of counselors' competency structures amid rapid AI advancements, exploring supportive organizational environments for dual-core competency development, evaluating the effectiveness of tiered training strategies, optimizing training programs, and examining the impact mechanisms of counselors' capabilities on student development from a student perspective. This will help establish a complete causal chain of "counselors' capabilities → work behaviors → student development."

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