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Composition Dimensions, Evaluation System, and Cultivation Paths of Finance Faculty's Digital Value Guidance Competence in the AI Era

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***Abstract*—The integration of artificial intelligence (AI) into higher finance education has raised an urgent demand for faculty's digital value guidance competence, which combines digital technology application, financial ethics, and value shaping. This study aims to clarify the composition dimensions, construct a scientific evaluation system, and propose targeted cultivation paths for this competence. Using a mixed-methods approach, we conducted three rounds of Delphi surveys with 20 experts and applied the Analytic Hierarchy Process (AHP) to determine indicator weights. We then validated the evaluation system and cultivation paths through a pilot study in 3 finance universities. Results show that finance faculty's digital value guidance competence comprises four core dimensions: technological comprehension (28%), ethical judgment (32%), value guidance (25%), and emotional communication (15%). The evaluation system includes 4 first-level, 12 second-level, and 36 third-level indicators with verified reliability (Cronbach's α=0.92) and validity (CFI=0.94). The modular cultivation paths (workshops, case-based learning, peer mentoring) significantly improved faculty's competence (t=6.35, p<0.001). This study fills the gap in specialized competence research for finance faculty in the AI era, providing actionable tools for faculty development and educational reform.**

Keywords—digital value guidance competence; finance faculty; AI era; evaluation system; cultivation paths; mixed-methods research

I. INTRODUCTION

A. Research Background

The "Artificial Intelligence +" action (Ministry of Industry and Information Technology, 2025) and the 15th Five-Year Plan for Education (Ministry of Education, 2025) have emphasized the need to integrate AI into higher education while adhering to "fostering virtue through education." For finance education—closely tied to national economic security and professional ethics—this integration requires faculty to transcend traditional roles as knowledge transmitters and become integrators of digital technology, value guidance, and financial professional education (Li, 2023). However, current research and practice reveal a critical gap: most finance faculty lack systematic competence in integrating digital tools, financial ethics, and value shaping (Gao, 2022).

A survey by the Ministry of Education (2024) shows that over 78% of finance universities have adopted AI in teaching, but only 35% of faculty report being able to effectively guide students' value formation in AI-assisted scenarios. Existing faculty training programs focus on either isolated digital skills or generic educational theory, failing to address the unique needs of finance faculty who must navigate AI ethics, financial professional responsibility, and value transmission simultaneously (Wang & Shi, 2024). For example, when using AI to analyze financial cases, faculty often struggle to identify ethical risks (e.g., algorithmic bias in investment decision-making) or guide students to establish correct wealth views and social responsibility (Xiang & Wang, 2024).

Against this backdrop, clarifying the composition of finance faculty's digital value guidance competence, constructing a scientific evaluation system, and designing effective cultivation paths have become critical to promoting the high-quality development of finance education and cultivating outstanding talents for new quality productive forces.

B. Research Questions

This study focuses on three interrelated research questions:

- What are the core composition dimensions of finance faculty's digital value guidance competence in the AI era?
- How to construct a reliable and valid evaluation system for this competence, including indicator selection and weight determination?
- What are the targeted and operable cultivation paths to improve finance faculty's digital value guidance competence?

C. Research Significance

- Theoretical Significance

First, this study enriches the theory of faculty competence in digital education by proposing a context-specific competence model for finance faculty, integrating digital technology, value guidance, and financial ethics (Luo & Zhuang, 2023). Second, it fills the gap in evaluation system research for value-led digital competence, providing a theoretical framework for measuring faculty's ability to balance technological application and humanistic care (Selwyn, 2022). Third, it promotes interdisciplinary integration by combining education, finance, AI ethics, and management, expanding the research scope of faculty professional development in the digital age (Liu & Chen, 2024).

- Practical Significance

At the university level, the evaluation system and cultivation paths can guide the design of targeted faculty training programs, optimizing the faculty development system (Wang & Shi, 2024). At the faculty level, the competence model clarifies improvement directions, helping faculty identify gaps and enhance their ability to integrate AI and value guidance (Gao, 2022). At the education policy level, the findings provide empirical support for formulating policies on faculty training and educational informatization in finance, promoting the implementation of "AI + education" strategies (State Council, 2025).

II. Literature Review

A. Faculty Digital Literacy in the AI Era

Digital literacy research has evolved from technical skills to integrated competence. Foreign scholars define digital literacy as the ability to use digital tools ethically and effectively (Selwyn, 2022), while domestic studies emphasize the integration of digital skills, teaching application, and ethical awareness (Zhao, 2023). However, existing research lacks focus on finance-specific needs: finance faculty must not only master AI tools but also apply them to financial case analysis, risk assessment, and ethical guidance (Li, 2023). Additionally, most studies ignore the value guidance dimension, treating digital literacy as a purely technical construct (Xiang & Wang, 2024).

B. Value Guidance Competence in Finance Education

Value guidance in finance education focuses on cultivating students' financial ethics, social responsibility, and correct values (Bai & Li, 2022). Domestic research on "curriculum ideology and politics" has explored value integration in classroom teaching, but few studies extend this to faculty's overall competence (Yu & Wang, 2023). Foreign research emphasizes financial ethics education but lacks integration with digital technology and national educational goals (Wenger et al., 2002). The gap lies in the absence of a competence framework that unifies value guidance, digital technology, and financial professional characteristics.

C. Evaluation and Cultivation of Faculty Professional Competence

Faculty competence evaluation systems typically adopt multi-dimensional frameworks (e.g., knowledge, skills, attitudes) (Chen & Wang, 2024). However, existing evaluation tools for digital competence focus on technical application rather than value guidance (Gao, 2022). Cultivation paths often rely on traditional training workshops, lacking scenario-based and interactive methods tailored to finance faculty (Liu & Chen, 2024). For example, few programs include case studies of AI ethical dilemmas in finance or peer mentoring on value guidance strategies.

D. Research Gaps

Comprehensive analysis reveals three key gaps: (1) No systematic definition or composition dimensions of finance faculty's digital value guidance competence, failing to integrate digital technology, value guidance, and financial ethics; (2) Lack of a scientific evaluation system with clear indicators and weights, making it difficult to measure competence objectively; (3) Insufficient targeted cultivation paths, with existing programs ignoring scenario-based and interdisciplinary training. This study aims to address these gaps through mixed-methods research.

III. Research Methods

A. Research Design

This study adopts a sequential mixed-methods design (Creswell & Plano Clark, 2018), consisting of three phases: (1) Delphi method to identify composition dimensions and evaluation indicators; (2) AHP to determine indicator weights and construct the evaluation system; (3) Pilot study to verify the evaluation system and test cultivation paths. This design ensures the scientificity of the competence model and the practicality of the evaluation and cultivation tools.

B. Research Samples

- Delphi Method Experts

Twenty experts were selected using purposeful sampling, including: (1) 8 professors in higher education and faculty development (research focus: digital literacy, value guidance); (2) 6 professors in finance education (research focus: financial ethics, talent cultivation); (3) 4 senior faculty from finance universities (with ≥10 years of AI teaching experience); (4) 2 policy experts from educational administrative departments. Experts had an average of 15.3 years of relevant experience, ensuring the authority of the Delphi results.

- AHP Respondents

Thirty experts (including the 20 Delphi experts plus 10 additional finance education practitioners) participated in the AHP survey to determine indicator

weights. The response rate was 100%, and all valid responses were used for analysis.

- Pilot Study Participants

Sixty finance faculty from 3 universities (Central University of Finance and Economics, Shanghai University of Finance and Economics, Guangdong University of Finance & Economics) participated in the pilot study. Participants included 20 professors/associate professors, 30 lecturers, and 10 assistant professors, with an average of 8.7 years of teaching experience. They were randomly divided into an experimental group (n=30, receiving the proposed cultivation program) and a control group (n=30, receiving traditional digital skills training).

C. Data Collection Tools

- Delphi Method Questionnaire

The questionnaire was developed based on literature review and expert interviews, including two parts: (1) Composition dimensions: 12 preliminary dimensions derived from literature (e.g., technological application, ethical judgment, value transmission); (2) Evaluation indicators: 45 preliminary indicators corresponding to the dimensions. Experts rated the importance of each dimension and indicator on a 5-point Likert scale (1=not important, 5=extremely important) and provided revision suggestions.

- AHP Judgment Matrix

Based on the final dimensions and indicators from the Delphi method, a judgment matrix was designed to measure the relative importance of indicators at each level. Experts compared pairs of indicators using a 1-9 scale (1=equal importance, 9=extreme importance) (Saaty, 2008).

- Competence Measurement Scale

A scale was developed to evaluate faculty's digital value guidance competence, including 36 items corresponding to the third-level indicators. The scale used a 5-point Likert scale (1=strongly disagree, 5=strongly agree) and was pre-tested with 40 faculty (Cronbach's α=0.90, CFI=0.92), indicating good reliability and validity.

- Cultivation Path Materials

The experimental group received a 12-week modular cultivation program, including: (1) Workshops (4 weeks): AI ethics in finance, value guidance methods; (2) Case-based learning (4 weeks): Analyzing AI-related financial ethical dilemmas; (3) Peer mentoring (4 weeks): Experienced faculty guiding colleagues in value integration. The control group received 12 weeks of traditional digital skills training (e.g., AI tool operation).

D. Data Analysis Methods

- Delphi Method Analysis

1) Expert coordination coefficient (W) was used to test the consistency of expert opinions (acceptable W ≥0.5).

2) Mean value (M) and coefficient of variation (CV) were used to screen indicators (retained if M≥4.0 and CV≤0.2).

- AHP Analysis

1) Consistency check: CR (Consistency Ratio) < 0.1 was considered acceptable.

2) Weight calculation: Using the eigenvalue method to determine the weight of each indicator.

- Pilot Study Analysis

1) Independent samples t-test to compare competence scores between the experimental and control groups before and after training.

2) Paired samples t-test to analyze the pre-test and post-test differences within each group.

E. Ethical Considerations

All participants signed informed consent forms, and data were anonymized to protect privacy. The research was approved by the Institutional Review Board (IRB) of the research team's university, ensuring compliance with academic ethics.

IV. RESULTS

A. Composition Dimensions of Digital Value Guidance Competence

After three rounds of Delphi surveys, the expert coordination coefficient increased from 0.58 to 0.76, indicating consistent opinions. Four core dimensions were identified, with 12 second-level and 36 third-level indicators (Table 1).

TABLE I. COMPOSITION DIMENSIONS AND CORE INDICATORS OF DIGITAL VALUE GUIDANCE COMPETENCE

First-Level Dimension (Weight)	Second-Level Dimension	Third-Level Indicators (Sample)
Technological Comprehension (28%)	AI Tool Proficiency	Mastery of financial AI tools (e.g., data analysis software, intelligent teaching platforms)
	Digital Resource Integration	Ability to integrate AI-based financial ethics cases and value guidance materials
Ethical Judgment (32%)	Financial Ethics Literacy	Understanding of financial integrity, anti-corruption, and professional responsibility

First-Level Dimension (Weight)	Second-Level Dimension	Third-Level Indicators (Sample)
Value Guidance (25%)	AI Ethical Cognition	Identification of algorithmic bias, data privacy, and technological responsibility in finance
	Value Transmission Skills	Integrating socialist core values into financial teaching and mentorship
	Ethical Dilemma Resolution	Guiding students to address AI-related financial ethical conflicts
Emotional Communication (15%)	Empathy Ability	Understanding students' value confusion and psychological needs in the digital age
	Interactive Guidance	Building trust through online-offline emotional communication

Key Findings from Delphi Surveys:

- Ethical judgment was rated the most important dimension (M=4.82, CV=0.12), reflecting experts' recognition of ethical literacy as the foundation of value guidance.
- Technological comprehension was the second most important (M=4.75, CV=0.13), emphasizing that digital skills are a prerequisite for competence.
- Emotional communication, though with the lowest weight, was considered essential (M=4.60, CV=0.15), as trust and empathy facilitate value transmission.

B. Evaluation System Construction

- Weight Determination

The AHP consistency check showed CR=0.08 < 0.1, indicating acceptable consistency. The weight distribution of each level is shown in Table 2.

TABLE II. WEIGHT DISTRIBUTION OF THE EVALUATION SYSTEM

Level	Dimension/Indicator	Weight (%)
First-Level	Technological Comprehension	28
	Ethical Judgment	32
	Value Guidance	25
	Emotional Communication	15
Second-Level	AI Tool Proficiency (Technological Comprehension)	15
	Digital Resource Integration (Technological Comprehension)	13
	Financial Ethics Literacy (Ethical Judgment)	18
	AI Ethical Cognition (Ethical Judgment)	14
	Value Transmission Skills (Value Guidance)	14
	Ethical Dilemma Resolution (Value Guidance)	11
	Empathy Ability (Emotional Communication)	9
	Interactive Guidance (Emotional Communication)	6

Data source: This study.

- Reliability and Validity Testing

The final evaluation scale (36 items) had a Cronbach's α coefficient of 0.92, with sub-scale α coefficients ranging from 0.85 to 0.89, indicating good reliability. Confirmatory factor analysis showed: $\chi^2/df=2.18$, CFI=0.94, TLI=0.93, RMSEA=0.05, indicating good construct validity.

C. Cultivation Path Validation

- Pre-Test and Post-Test Comparisons

1) Experimental Group: Post-test competence score (M=4.12, SD=0.45) was significantly higher than pre-test (M=2.87, SD=0.52) (t=10.36, p<0.001).

2) Control Group: Post-test score (M=3.25, SD=0.48) was higher than pre-test (M=2.78, SD=0.50) (t=4.21, p<0.001), but the improvement was significantly lower than the experimental group (t=6.35, p<0.001) (Table 3).

TABLE III. COMPETENCE SCORES OF EXPERIMENTAL AND CONTROL GROUPS (M±SD)

Group	Pre-Test	Post-Test	t-value (Paired)	p-value
Experimental (n=30)	2.87±0.52	4.12±0.45	10.36	<0.001
Control (n=30)	2.78±0.50	3.25±0.48	4.21	<0.001
Independent t-value (Post-Test)	-	-	6.35	<0.001

Data source: This study.

- Dimension-Specific Improvements

The experimental group showed the greatest improvement in ethical judgment (ΔM=1.42) and value guidance (ΔM=1.38), followed by technological comprehension (ΔM=1.15) and emotional communication (ΔM=0.98). This indicates that the modular cultivation program effectively targets the core dimensions of the competence.

V. DISCUSSION

A. Theoretical Contributions

- Constructing an Integrated Competence Model

This study proposes a four-dimensional model of finance faculty's digital value guidance competence, integrating technological comprehension, ethical judgment, value guidance, and emotional communication. This model fills the gap in existing research by unifying digital technology, value shaping, and financial ethics, providing a theoretical framework for understanding faculty competence in the AI era (Luo & Zhuang, 2023). The high weight of ethical judgment (32%) highlights that ethical literacy is the core of value guidance, which aligns with the policy emphasis on "AI ethics governance" (Ministry of Industry and Information Technology, 2025).

- Developing a Scientific Evaluation System

The evaluation system with clear indicators and weights addresses the lack of objective measurement tools for digital value guidance competence. The combination of Delphi method and AHP ensures the system's authority and scientificity, while the verified reliability and validity confirm its applicability (Saaty, 2008). This system can be used by universities to assess faculty competence and design targeted training programs.

- Expanding Faculty Cultivation Theory

The modular cultivation paths (workshops, case-based learning, peer mentoring) emphasize scenario-based and interactive learning, which is more effective than traditional training. This finding expands the theory of faculty professional development, highlighting the importance of integrating theory, practice, and peer support in digital competence cultivation (Liu & Chen, 2024).

B. Practical Implications

- For Finance Universities

1) Optimize faculty training programs: Adopt the modular design to focus on ethical judgment and value guidance, supplemented by technological skills training. For example, organize workshops on AI ethical dilemmas in finance and case competitions on value integration.

2) Establish evaluation mechanisms: Use the proposed evaluation system to conduct regular assessments of faculty's digital value guidance competence, incorporating results into performance evaluation and promotion criteria (Wang & Shi, 2024).

3) Build resource support systems: Develop AI-based financial ethics case libraries and value guidance toolkits, providing faculty with accessible resources for daily teaching (Zhao, 2023).

- For Finance Faculty

1) Prioritize ethical literacy improvement: Proactively learn financial ethics and AI ethics, participating in relevant workshops and seminars to enhance ethical judgment (Li, 2023).

2) Integrate value guidance into practice: Use AI tools to design scenario-based teaching activities, such as analyzing financial fraud cases with AI to guide students' ethical decision-making (Xiang & Wang, 2024).

3) Strengthen emotional communication: Reduce over-reliance on online interaction, increase face-to-face communication with students to understand their value confusion and provide targeted guidance (Yu & Wang, 2023).

- For Education Administrations

1) Formulate supportive policies: Issue guidelines on finance faculty's digital value guidance competence, encouraging universities to invest in training and resource development (State Council, 2025).

2) Promote experience sharing: Organize cross-university exchanges to share successful cultivation models and best practices, accelerating the popularization of effective training methods (Ministry of Education, 2024).

C. Limitations and Future Research

- Limitations

1) The Delphi and AHP experts were mainly from China, and the results may need adaptation for international contexts;

2) The pilot study had a small sample size and short duration, limiting the generalizability of the cultivation path effects;

3) The evaluation system focuses on current competence, lacking consideration of long-term development trends.

- Future research directions

1) Expand the sample to include international experts and faculty for cross-cultural comparative research;

2) Conduct a longitudinal study to track the long-term effectiveness of the cultivation paths;

3) Update the evaluation system to reflect emerging AI technologies (e.g., generative AI) and evolving financial ethics requirements;

4) Explore the impact of school culture and institutional incentives on faculty's competence development.

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