Research on the Enhancement Pathways of Digital-Intelligent Literacy for "Dual-Qualified"Teachers in Intelligent Finance at Vocational Undergraduate Education

Jinling Zhao, Wen Chen*

Shenzhen Polytechnic University,Shenzhen, 518055,China
**Corresponding author: cw5963@szpu.edu.cn*

Abstract: *Against the backdrop of the deep integration of the digital economy and intelligent technologies, the cultivation of intelligent finance talents at the vocational undergraduate level places new and comprehensive demands on the digital-intelligent literacy of "dual-qualified" teachers. Based on the typological characteristics of vocational education and the talent cultivation needs of intelligent finance, this study analyzes the structural deficiencies in the current digital-intelligent literacy of "dual-qualified" teachers in intelligent finance at vocational undergraduate education. It proposes systematic enhancement pathways from the perspectives of institutional support, training systems, evaluation mechanisms, and ecosystem construction, aiming to provide theoretical references and practical guidance for the development of vocational education teaching staff.*

Keywords: *vocational undergraduate education; intelligent finance; dual-qualified teachers; digital-intelligent literacy; enhancement pathways*

1. Introduction

The revisedVocational Education Law of the People's Republic of China(2022) explicitly sets forth the strategic imperative of "building a high-quality, specialized teaching force." As new-generation digital technologies such as artificial intelligence, big data, cloud computing, and Robotic Process Automation (RPA) penetrate deeply and are widely applied in the financial field, the traditional accounting and bookkeeping paradigm is undergoing fundamental transformation. The function of finance is shifting from record-keeping and accounting towards supporting strategic decision-making, early risk warning, and intelligent control. Against this backdrop, enterprise demand for compound, innovative "field engineers" possessing both solid financial expertise and advanced digital technology application skills is exploding. As a crucial carrier for cultivating high-level technical and skilled talent, undergraduate vocational education shoulders the vital mission of supplying application-oriented talent adapted to the needs of intelligent finance development to society. The core guarantee of talent cultivation quality lies in the professional competence and pedagogical capability of the teaching force. Therefore, cultivating a "dual-qualified" teacher team proficient in financial business logic, skilled in utilizing digital technology tools, and capable of achieving the deep integration of these two in teaching, research, and social services has become an urgent task for promoting the high-quality development of intelligent finance majors at the undergraduate vocational education level.

However, the construction of the teaching force for intelligent finance majors in undergraduate vocational colleges is currently facing a severe "dual dilemma." On one hand, teachers from traditional accounting, finance, and economics/management backgrounds, while possessing rich theoretical teaching experience and solid accounting practical knowledge, generally have knowledge structures oriented towards traditional skills. They exhibit a significant deficiency in emerging digital technologies such as Python programming, big data analytics, BI visualization, RPA process design and automation, and machine learning applications in finance, making it difficult to competently teach the increasing number of "finance + technology" integrated courses. This results in a disconnect between teaching content and industry frontiers. On the other hand, financial experts or technical specialists from enterprises, who have rich practical experience in digitalization, often lack systematic pedagogical knowledge and effective abilities to transform practical experience into modular knowledge systems

suitable for classroom instruction. This leads to superficial cooperation between industry and academia, hindering deep integration and sustainable development. This structural contradiction severely restricts the quality of talent cultivation in intelligent finance.

Therefore, a systematic and in-depth study on the connotation, constituent elements, practical difficulties, and enhancement pathways for the digital and intelligent literacy of "dual-qualified" teachers in undergraduate vocational intelligent finance not only contributes to enriching the theory of vocational education teacher professional development, especially regarding competency construction for "dual-qualified" teachers in the context of digitalization and intelligence, but also holds significant practical guidance for solving current bottlenecks in teacher team construction, precisely empowering teachers' professional growth, and effectively improving the quality of intelligent finance talent cultivation. This research aims to clarify the core connotation of digital and intelligent literacy, analyze the main existing problems, and construct a set of systematic and operable enhancement pathways, providing decision-making reference for relevant institutions and educational administrations.

2. Defining the Connotation of Digital and Intelligent Literacy for "Dual-Qualified" Teachers in Undergraduate Vocational Intelligent Finance

2.1 Core Concepts

“Digital-intelligent literacy” is an integration of digital literacy and intelligent literacy, emphasizing intelligent application and creation on a digital foundation. According to the education industry standardTeacher Digital Literacyand the specific attributes of vocational education, the Ministry of Education has continued to revise the standards for identifying “dual-qualified” teachers in vocational education in 2024, incorporating digital literacy as a core evaluation indicator. The digital-intelligent literacy of “dual-qualified” teachers in intelligent finance at vocational undergraduate education can be defined as: a comprehensive competency that enables teachers to adapt to the intelligent era, possess both theoretical and practical teaching abilities, have digital-intelligent awareness and thinking, master the use of digital-intelligent tools in the intelligent finance field, deeply integrate financial expertise with digital-intelligent technologies, and effectively apply these in teaching, research, and industry-education collaborative innovation for talent cultivation.

2.2 Dimensional Composition

Based on research into the indicator system of digital-intelligent literacy for vocational education teachers and the characteristics of the intelligent finance discipline, this paper constructs a framework consisting of four dimensions:

2.2.1 Digital-Intelligent Cognition and Awareness

Possessing the sensitivity and proactive awareness to explore the deep integration of digital and intelligent technologies with financial operations; using data-driven and intelligent collaborative thinking to solve problems in financial teaching and research; understanding the strategic significance of intelligent finance for vocational education reform; and forming a value identity of "technology empowering education."

2.2.2 Digital-Intelligent Technology and Application

Mastering financial big data analysis tools such as Python, SQL, business intelligence software (Power BI, Tableau), RPA platforms, ERP financial modules, financial shared service centers, intelligent finance and taxation platforms, and other enterprise-level digital-intelligent systems. This includes the technical ability to acquire, clean, model, analyze, and visualize financial data, as well as AI application capabilities such as AIGC, RPA financial robot development and application, and financial large model scenario applications.

2.2.3 Digital Teaching Competency

Transforming real enterprise digital-intelligent financial projects into teaching courses; developing digital textbooks and resources; designing integrated teaching plans combining "finance + technology"; developing virtual simulation training projects; conducting intelligent teaching based on real business scenarios; guiding students to design financial digital transformation plans; and using data and AI tools to analyze student learning conditions and evaluate learning outcomes.

2.2.4 Digital Ethics Awareness

Understanding issues such as financial data security, algorithmic bias prevention, and the ethical boundaries of intelligent technologies; possessing awareness of cybersecurity and data security protection; integrating professional ethics and legal awareness into teaching; and cultivating responsible digital citizenship among students.

3. Main Existing Problems

3.1 Structural Shortcomings and "Knowledge Silo" Phenomenon in Teacher Competence

Currently, the main body of the teaching force for intelligent finance majors in undergraduate vocational colleges still consists of teachers from traditional accounting, finance, and economics/management backgrounds. These teachers generally hold master's or doctoral degrees and possess solid accounting theoretical foundations and traditional bookkeeping capabilities. However, their knowledge systems and competency structures were formed in the industrial economy era, showing significant "structural deficiencies" in the face of the digital economy's impact. Most teachers have not systematically studied core computer science courses such as programming, data structures, and database principles, leading to a vague understanding of the underlying logic of technologies like big data and artificial intelligence. Surveys indicate that the percentage of teachers proficient in using Python for financial data scraping, cleaning, analysis, and modeling is generally below 20%, while those mastering the entire process of RPA financial robot design, development, and deployment are even scarcer. This often results in teachers being limited to "teaching by the book" or staying at the surface level of software operation when instructing cutting-edge courses like "Python Financial Data Analysis," "RPA Financial Robot Applications," and "Intelligent Financial Decision-Making," unable to delve into the business logic, application scenarios, and potential risks behind the technologies, significantly compromising teaching effectiveness.

Furthermore, teachers' competencies are often "fragmented" and exist in "silos." Many teachers may have mastered the basic operations of specific software (e.g., Power BI) through short-term training but cannot deeply integrate data analysis skills with specific financial scenarios like budgeting, cost control, or risk warning. They may use interactive whiteboards in smart classrooms or post materials on online teaching platforms, but this belongs to the basic application level of technology. Higher-order, complex digital and intelligent capabilities—such as using machine learning algorithms to build financial forecasting models, applying natural language processing techniques to analyze annual report text sentiment, or designing secure financial data governance solutions—are generally lacking. Due to the inability to independently develop intelligent teaching resources (e.g., interactive visualization cases, virtual simulation experiments), teaching heavily relies on standardized products from vendors, leading to rigid teaching content and forms that struggle to meet the needs of personalized, inquiry-based teaching. This phenomenon of "knowledge silos"—where "those who understand finance don't understand technology, and those who understand technology don't understand teaching"—is the core bottleneck restricting the improvement of intelligent finance talent cultivation quality.

3.2 Imperfect Training and Development System, Lacking Systematicity and Foresight

Existing training programs for enhancing teachers' digital and intelligent literacy are mostly sporadically organized by university teacher development centers or departments, exhibiting significant "three-izations" problems: First, "fragmentation." Training content often consists of single-function demonstrations of software tools or explanations of isolated technical points, lacking logical connections and systematic design between courses. Teachers acquire scattered "points" of knowledge, difficult to connect into problem-solving "lines" and "planes." Second, "reactive nature." Training is often organized reactively to meet temporary needs, such as applying for a new major, opening a new course, or passing a certain teaching evaluation, lacking long-term, systematic planning based on teachers' career development. Third, "superficiality." Training often stops at the level of "what it is" and "how to operate," lacking deep training in the "why" and "how to innovate and apply" within real enterprise business contexts. This leads to difficulty in skill transfer for teachers, with knowledge being forgotten soon after training ends.

Simultaneously, the training system lacks precise, layered, and classified design. Whether for newly hired teachers, mid-career backbone teachers, or program leaders, they often attend training with similar content—a "one-size-fits-all" phenomenon is common. For new teachers, there is a lack of

systematic induction covering digital and intelligent teaching philosophy, basic tool use, and digital instructional design methods. For backbone teachers, there is a lack of advanced empowerment channels focusing on in-depth study of cutting-edge intelligent finance technologies, teaching reform research, and curriculum development. For program leaders, there is a lack of strategic vision and resource integration capacity cultivation for leading teams in industry-education integration innovation and connecting with high-end industry needs. Moreover, training content is disconnected from the actual needs and development frontiers of the intelligent finance industry. The technology stacks, project cases, and business pain points actually used in enterprises are not timely and systematically transformed into training resources, resulting in a "disconnect" between what teachers learn and what the industry uses, greatly reducing training effectiveness.

3.3 Insufficient Depth of Industry-Education Integration, Impeded Practical Application Channels

Although "industry-education integration and school-enterprise cooperation" is a fundamental model of vocational education, the depth and effectiveness of such cooperation in the intelligent finance field still face challenges. On one hand, opportunities for teachers to engage deeply in enterprise practice are insufficient, and mechanisms are not smooth. Many teachers, burdened with heavy teaching loads and assessment pressure, find it difficult to guarantee sufficient dedicated time (e.g., 1-2 consecutive months) to work full-time in enterprise financial shared service centers, financial digitalization departments, or technology companies. Even when opportunities exist, practice often takes the form of "visits" or "short-term observations," making it hard to deeply participate in real financial digital transformation projects, data governance projects, or intelligent system implementation processes. This leads to practice becoming a mere formality, unable to truly enhance technical application and problem-solving abilities.

On the other hand, the "teaching transformation" link in school-enterprise collaboration is weak. Cases and data provided by enterprises are often desensitized and simplified, losing the complexity and decision-making challenges of real business environments, making them difficult to use directly in teaching. In-school teachers, due to a lack of deep understanding of real enterprise scenarios, often struggle to independently complete the effective transformation and instructional design needed to convert enterprise projects into teaching cases and practical tasks. While enterprise mentors have practical experience, they are mostly unfamiliar with pedagogical principles and student learning characteristics. Their sharing is often fragmented, laden with excessive professional jargon, resulting in poor teaching effectiveness. This "transformation gap" between "practice" and "teaching" prevents valuable industry resources from being efficiently converted into educational resources, keeping school-enterprise cooperation at the superficial level of resource exchange without touching the core of capability co-construction.

3.4 Lack of Evaluation and Incentive Mechanisms, Failing to Effectively Stimulate Endogenous Motivation

Scientific and reasonable evaluation and incentive systems are the "guiding force" for motivating teachers to proactively enhance their digital and intelligent literacy. However, most undergraduate vocational colleges are currently underdeveloped in this regard. In terms of evaluation, first, the evaluation criteria are vague. Whether for new teacher recruitment assessments or in-service teachers' professional title evaluations, annual assessments, the evaluation of the "digital and intelligent literacy" dimension often lacks clear, specific, and operable competency indicators and grading standards. Evaluations mostly rely on simple quantitative metrics like whether online platforms are used or whether multimedia courseware is made, paying insufficient attention to teachers' higher-order abilities, such as deeply integrating digital and intelligent technologies into curriculum design, developing intelligent teaching resources, or guiding students to solve complex financial-technical problems. Second, evaluation methods are singular. They still predominantly rely on traditional material reviews and subjective reporting, lacking process-based, performance-based evaluations grounded in real teaching scenarios (e.g., a practical training class integrating RPA) or real project outcomes (e.g., a self-developed financial data analysis model). Evaluation results can hardly accurately reflect teachers' actual digital and intelligent teaching levels, let alone provide clear guidance for subsequent improvement.

4. Pathways for Enhancing the Digital and Intelligent Literacy of "Dual-Qualified" Teachers in Undergraduate Vocational Intelligent Finance

Addressing the above problems requires abandoning fragmented "quick-fix" strategies. Starting from the typological characteristics of vocational education and the systematic requirements of intelligent finance talent cultivation, a systematic and sustainable enhancement pathway model covering five dimensions—institutional guarantee, training system, practical application, evaluation and incentives, and ecological support—must be constructed.

4.1 Strengthen Top-Level Institutional Design to Provide Rigorous Support for Literacy Enhancement

Aligning with theTeacher Digital Literacyindustry standard and the requirements for identifying “dual-qualified” teachers in vocational undergraduate education, digital-intelligent literacy should be incorporated as a core indicator in teacher recruitment, professional title evaluation, job appointment, and performance recognition. Tiered and categorized competency standards for digital-intelligent literacy in intelligent finance should be established, specifying key technical thresholds such as Python financial data analysis, RPA process development, and intelligent finance and taxation system applications. Special funds for digital-intelligent literacy enhancement should be allocated to support teacher training, platform construction, and project R&D investment. A dual-track strategy of "specialized talent recruitment + local teacher cultivation" should be implemented to optimize the interdisciplinary teacher structure. A three-tier accountability mechanism at the university, school/department, and teaching-research section levels should be strengthened, incorporating the enhancement of teacher digital-intelligent literacy into departmental performance assessments to institutionalize and normalize literacy improvement efforts.

4.2 Build a Tiered and Categorized Training System to Achieve Precise Empowerment and Quality Improvement

The fragmented, emergency-response training model should be replaced with a systematic training system characterized by "tiered progression, categorized training, and industry-education alignment." According to teachers' career development stages, tiered training should be implemented: novice teachers focus on foundational digital abilities and digital teaching skills; mid-career core teachers focus on advanced technical competencies such as financial big data analysis, RPA application, and intelligent finance system operation and maintenance; program leaders focus on curriculum development, teaching innovation, and industry-education collaborative problem-solving, emphasizing teaching transformation, practical operation, and project implementation capabilities. Blended online-offline training, contextualized hands-on exercises, and case-based teaching methods should be adopted. Training content should be dynamically updated to align with industry frontiers, effectively addressing the disconnect between learning and application.

4.3 Deepen Industry-Education Integration and Practice to Facilitate the Transformation of Digital-Intelligent Competencies

Teachers' practical experience should be strengthened through real enterprise scenarios and projects, promoting the deep integration of digital-intelligent technologies and teaching abilities. Stable practice bases in intelligent finance enterprises should be established, implementing a system where teachers regularly engage in on-the-job practice at enterprise financial shared service centers, intelligent finance and taxation institutions, and digital technology enterprises, deeply participating in financial digital transformation, intelligent finance project implementation, and data governance. School-enterprise collaborative curriculum development and horizontal research projects should be advanced, transforming real enterprise digital-intelligent financial projects into teaching cases, training projects, and curriculum resources. A joint school-enterprise “dual-qualified” teacher cultivation alliance should be established, with enterprise digital technology experts hired as part-time mentors to partner with on-campus teachers, facilitating collaborative education and enhancing teachers' practical application abilities in digital-intelligent technologies and their teaching transformation capabilities.

4.4 Build a Digital-Intelligent Development Ecosystem to Foster a Synergistic Environment for Improvement

Hardware platforms such as intelligent finance laboratories, big data analysis centers, and RPA training studios should be strengthened to provide technical practice and teaching innovation support for teachers. High-quality school-enterprise resources should be integrated to build a shared digital-intelligent teaching resource library and teacher platform for intelligent finance, enabling the interchange and sharing of courses, cases, technical standards, and teaching resources. Regular activities such as digital-intelligent teaching competitions, academic salons, and skills showcases should be organized to cultivate a culture that values technology and excels in using digital intelligence. Education on digital ethics, data security, and professional norms should be strengthened to guide teachers in the responsible use of intelligent technologies and adherence to financial professional boundaries, thereby constructing a sustainable ecosystem for digital-intelligent literacy enhancement characterized by "technology empowerment, ethics protection, and innovation leadership."

Fund Projects

2026 Shenzhen Polytechnic University Quality Project: Teaching Quality and Teaching Reform Program. “Research on the Talent Cultivation Model for Intelligent Finance in Vocational Undergraduate Programs under the Background of New Quality Productive Forces”（Project Number: 7026310835）

“A Study on the Construction of a Vocational Education-Industry Alignment Model: An Empirical Study Based on Talent Cultivation in Big Data and Accounting”（Project Number: 7026310858）

References

[1] Feng, Y. (2021). Opportunities and challenges faced by accounting teachers in higher vocational colleges in the era of intelligent finance. Qilu Abacus Forum, (8).
[2] Liu, B., & You, L. (2026). Global educational collaboration in the era of digital intelligence: Practical insights from international organizations promoting digital transformation in education. Journal of Distance Education, (1), 11–21.
[3] Ni, L. (2022). Research on the improvement path of informationization ability of intelligent finance teachers in local skill-based universities for new liberal arts. China Township Enterprise Accounting, (8).
[4] Wang, G., Jin, Y., Fang, S., & Zhang, X. (2025). Empowering high-quality development of universities through management accounting digital intelligence: A case study of Shanghai Jiao Tong University. China Management Accounting, (2), 31–39.
[5] Zhang, G., Yang, Y., & Yan, E. (2021). Functional transition of government accounting and fiscal budget performance governance in the era of digital intelligence. Accounting Research, (10), 17–27.
[6] Zhang, X., Lu, Y., & Sun, G. (2025). Research on strategies for enhancing digital-intelligence literacy of vocational college teachers in the context of artificial intelligence. Journal of Wuhan Jiaotong Vocational College, 27(3), 53–61.