Research on the Implementation Path of the "1+X" Certificate for the Accounting Major in Vocational Education under Digital Transformation

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Abstract: *Digital transformation is profoundly reshaping the competency framework and job boundaries of the accounting profession, and it imposes new requirements on the implementation of the "1+X" certificate system for the accounting major in vocational education. This study focuses on the implementation path of the "1+X" certificate for the accounting major in vocational education under the background of digital transformation, and it systematically explores the value reconstruction of the certificate system, the construction logic of the implementation path, and the key elements and operating mechanisms that support effective implementation. The study proposes that the integration of digital technologies prompts a shift in the positioning of vocational skill level certificates in accounting from the validation of single skills to the representation of comprehensive vocational abilities. A multi-dimensional adaptation mechanism at the target level, structural level, and operational level needs to be established between talent cultivation objectives and certificate standards. In the digital context, the certificate system exhibits the dual characteristics of functional reshaping and value extension. At the level of implementation path construction, this study establishes a modular setup and a hierarchical structure for certificates based on digital job requirements, builds an embedded integration model between the curriculum system and certificates, and forms a collaborative configuration mechanism for digital teaching resources and certificate assessment requirements. At the level of supporting elements and operating mechanisms, this study proposes a multi-dimensional improvement path for the digital competency of the "double-qualified" teaching team, a digital assessment framework based on competency data, and an organizational mechanism for multi-stakeholder collaborative operation. This research provides a systematic path framework and theoretical support for the effective implementation of the "1+X" certificate system for the accounting major in vocational education under digital transformation.*

Keywords: *digital transformation; vocational education; accounting major; "1+X" certificate; implementation path*

Introduction

The advent of the digital economy era has driven the accounting field to undergo a profound transformation from a transaction-oriented model to a management-oriented model and from a process-based model to an intelligent model. New competency demands, such as financial data analysis, intelligent tool application, and business-finance integration, are constantly emerging, and these demands impose structural adjustment requirements on the cultivation of accounting professionals in vocational education. As an important initiative for reforming the talent cultivation model in vocational education, the "1+X" certificate system aims to enhance the alignment between talent cultivation and job requirements through the deep integration of academic education and vocational skill certification. However, under the background of digital transformation, the traditional implementation model of the "1+X" certificate faces practical difficulties, including competency standards lagging behind technological iteration, poor integration between the curriculum system and certification content, and insufficient matching between teaching resources and assessment requirements. Therefore, systematic reconstruction is urgently needed at the levels of value positioning, path construction, and operating mechanisms. Based on the actual context of digital transformation in the accounting major, this study explores the implementation path of the "1+X" certificate system, so as to provide theoretical references and practical guidance for the innovation of talent cultivation models in vocational education for the accounting major in the digital era.

1. Value Reconstruction of the "1+X" Certificate System for the Accounting Major under Digital Transformation

1.1 The Positioning Shift of Vocational Skill Level Certificates for Accounting under the Integration of Digital Technologies

The deep penetration of digital technologies is reshaping the competency composition of accounting positions. The traditional vocational ability framework centered on accounting skills is gradually expanding to include composite competency dimensions such as data analysis, process automation, and intelligent decision-making. Against this background, the positioning of vocational skill level certificates for accounting undergoes a fundamental shift. Their function is no longer limited to the validation of single operational skills; instead, it evolves into a structured representation of comprehensive vocational abilities in digital contexts. This shift manifests in the extension of certificate content from business recording to data governance, the iteration of certificate standards from job adaptation to technology integration, and the transition of certificate value from employment credentials to career development support. Certificate modules in emerging fields such as intelligent finance, business-finance integration, and digital auditing are constantly emerging, which reflects that the vocational skill level certification system is moving from a static list of abilities to a dynamic competency map, so as to adapt to the evolving role boundaries of the accounting profession under technological penetration. The positioning shift of certificates also drives an adjustment in the certification logic, moving from experience-based skill assessment to data-based competency modeling. This adjustment enables certification results to more accurately map learners' competency levels in emerging accounting positions.

1.2 The Adaptation Mechanism between Talent Cultivation Objectives of the Accounting Major in Vocational Education and Certificate Standards

The setting of talent cultivation objectives for the accounting major in vocational education directly determines the implementation effectiveness of the "1+X" certificate system, and a systematic adaptation mechanism needs to be established between the two to ensure that the cultivation process aligns with the certification standards. The digital reconstruction of cultivation objectives requires the integration of new elements such as financial data analysis, information system application, and digital risk control on the basis of the original accounting and management abilities, so that the talent cultivation positioning is intrinsically consistent with the competency standards carried by the certificates. The construction of the adaptation mechanism involves coordination at three dimensions: the target level, the structural level, and the operational level. At the target level, a clear correspondence needs to be established between cultivation specifications and certificate levels, so as to achieve an orderly connection between academic education positioning and vocational skill levels. At the structural level, a mapping of ability units is formed between the professional curriculum system and the certificate assessment content, which avoids a structural disconnect between curriculum design and certification requirements. At the operational level, the teaching implementation process incorporates the methods and standards of certificate assessment, thereby organically integrating daily teaching with certification training. The establishment of such a multi-dimensional adaptation mechanism can effectively resolve the possible goal dispersion and resource fragmentation between academic education and vocational certification, and it provides basic support for the implementation of the "1+X" certificate system in the accounting major[1].

1.3 The Functional Reshaping and Value Extension of the "1+X" Certificate System in the Digital Context

The digital context endows the "1+X" certificate system with functional connotations that go beyond certification itself, and it presents the dual characteristics of functional reshaping and value extension in the accounting major of vocational education. Functional reshaping is reflected in the transformation of the certificate system from a single skill evaluation tool into an organizational carrier for cultivating compound accounting talents, and it undertakes multiple functions such as guiding teaching reform, optimizing resource allocation, and bridging job requirements. Driven by digital technologies, the integration between the certificate system and the teaching process shifts from surface-level embedding to deep coupling. The certification standards become a common reference framework for curriculum development, instructional design, and quality assessment, thereby forming a virtuous cycle of "promoting teaching through certification and guiding learning through certification."

Value extension is manifested in the redefinition of the social and economic value of the certificate system in the digital context. Vocational skill level certificates are no longer merely proof of workers' skill levels; instead, they become information intermediaries connecting educational supply and job demand, and they achieve precise matching between competency data and job requirements through digital platforms. At the same time, the continuing education and lifelong learning functions of the certificates are strengthened. A modular, accumulable, and convertible certificate system provides flexible pathways for accounting practitioners to cope with career transformation under technological iteration, thus endowing the "1+X" certificate system with renewed institutional vitality in the wave of digitalization.

2. The Construction Logic of the Implementation Path for the "1+X" Certificate in the Accounting Major

2.1 Modular Setup and Hierarchical Architecture of Certificates Based on Digital Job Requirements

The penetration of digital technologies into the accounting field has given rise to new job types such as financial data analysts, intelligent financial operations specialists, and business-finance integration implementation consultants. The competency structures of these positions exhibit the coexistence of high compoundness and differentiation. The modular setup of certificates performs functional decomposition based on the job competency map, and it transforms ability units such as financial data processing, intelligent fiscal and tax tool application, digital internal control management, and financial shared services into independent and combinable certification modules. Each module corresponds to a clear domain of job competency. The core value of the modular architecture lies in breaking the single-ability certification model of traditional certificates. Through flexible combinations among modules, it enables dynamic responses to diverse job requirements, and it allows learners to accurately select certification combinations based on their career orientations, thereby avoiding a mismatch between certification content and actual job needs[2].

The hierarchical architecture constructs a progressive certification sequence based on ability depth and job context complexity, and it divides the certificates into three levels: the basic operation level, the specialized application level, and the comprehensive decision-making level. The basic operation level focuses on skills such as basic application of financial software and business document processing, and it corresponds to the operational execution ability during the initial entry period of a job. The specialized application level emphasizes data analysis and process optimization capabilities in business-finance integration scenarios, and it corresponds to the business processing and problem-solving abilities during the job maturity period. The comprehensive decision-making level targets strategic support and risk control capabilities in the digital transformation of finance, and it corresponds to the decision support and innovation leadership abilities during the advanced job period. This hierarchical design aligns with the patterns of job ability development, enabling the certificate system to meet the ability advancement needs of learners at different development stages. At the same time, it forms an orderly connection with the stage-specific objectives of academic education in vocational training, and it constructs a complete ability development chain from entry to mastery.

2.2 The Embedded Integration Model between the Curriculum System of the Accounting Major and Vocational Skill Level Certificates

The integration between the curriculum system of the accounting major and vocational skill level certificates needs to transcend the approach of simple addition, and it should construct a deeply embedded integration model. The core of embedded integration lies in establishing a mapping mechanism between curriculum modules and certificate units, decomposing the certificate assessment standards into quantifiable ability elements, and organically integrating these ability elements into the teaching units of professional courses through curriculum content reconstruction. At the level of core professional courses, it embeds the knowledge points and skill points corresponding to certificate modules such as intelligent finance and business-finance integration into the original curriculum framework, and it achieves an isomorphic design between the curriculum content and the certification content. This isomorphic design requires curriculum developers to simultaneously complete the coverage of certificate assessment content in the process of knowledge transmission and skill training, thereby merging the teaching process with the certification preparation process into one.

The embedded integration is also reflected in the hierarchical correspondence between the

curriculum structure and the certificate sequence, and it constructs a tiered integration framework. It aligns basic professional courses such as Basic Accounting and Financial Accounting with the primary certificate module, and it completes the cultivation and certification of entry-level abilities at the foundational stage. It connects core professional courses such as Financial Analysis and Management Accounting with the intermediate certificate module, and it achieves the enhancement and certification of specialized abilities at the professional deepening stage. It integrates expanded courses such as Financial Sharing and Digital Management with the advanced certificate module, and it accomplishes the integration and certification of comprehensive abilities at the ability expansion stage. This hierarchical correspondence enables learners to naturally meet the certification requirements of the corresponding level while completing their course learning, and it forms an integrated form where course learning and certification acquisition progress simultaneously. This approach effectively avoids the fragmentation and duplication between academic education and vocational certification during implementation, and it improves the overall efficiency of talent cultivation[3].

2.3 The Collaborative Configuration Mechanism between Digital Teaching Resources and Certificate Assessment Requirements

Digital teaching resources serve as a key supporting element for the implementation of the "1+X" certificate, and their configuration needs to form a precise collaboration with the certificate assessment requirements. The core of the collaborative configuration mechanism lies in the homologous design of resource development and assessment content. Based on the ability breakdown and assessment points in the certificate assessment standards, it systematically plans the type structure and functional positioning of digital teaching resources. Virtual simulation experiment resources correspond to process operation tasks in the certificate assessment, and they strengthen operational proficiency by simulating real work scenarios. Case base resources correspond to comprehensive application tasks, and they cultivate comprehensive analysis and decision-making abilities through typical business scenarios. Intelligent training platforms correspond to standardized testing tasks, and they use adaptive algorithms to achieve personalized practice and weak-point reinforcement. These three types of resources complement each other, forming a resource matrix that highly matches the assessment requirements, and they provide learners with a support system covering all assessment points.

The collaborative configuration mechanism also needs to establish a linkage response mechanism between resource updates and the dynamic adjustment of certificate standards, so as to ensure the timeliness and applicability of the resources. When the certificate assessment standards are updated due to technological iteration or job changes, the digital teaching resources can achieve synchronous iteration through the rapid retrieval and recombination of modular resource libraries, thereby avoiding the impact of resource lag on teaching effectiveness. The data exchange mechanism between the resource platform and the certification platform further enhances the collaborative efficiency. The learning trajectories, practice data, and training results of learners on the resource platform can be mapped to the certification platform, forming a dynamic association between the learning process and certification outcomes. This data-level interconnection enables teaching practitioners to accurately grasp the ability development status of learners, providing a basis for differentiated instruction. At the same time, it also provides certification bodies with learners’ process performance data, supporting a more comprehensive ability evaluation.

3. Key Elements and Operating Mechanisms Supporting the Effective Implementation of the "1+X" Certificate

3.1 The Improvement Path for the Digital Competency of the "Double-Qualified" Teaching Team in the Accounting Major

Under the background of digital transformation, the "double-qualified" teaching team in the accounting major faces a reconstruction of its competency structure, and the enhancement of its digital competency becomes the core human resource guarantee for the effective implementation of the "1+X" certificate system. The connotation of digital competency covers multiple dimensions, including the application of financial data analysis tools, the operation of intelligent financial platforms, digital teaching design and implementation, and the integration ability of information technology and the accounting major, thus forming a composite competency framework. The improvement path needs to be systematically advanced from three levels: knowledge updating, skill transfer, and ability integration. Through special training programs on typical application scenarios of financial digitalization, it enables

teaching team members to master the operational logic and application methods of new tools such as financial robots, business intelligence analysis, and financial shared service systems, thereby achieving a transition from traditional financial skills to digital financial abilities[4].

At the level of ability integration, it is necessary to construct a two-way channel for technological application and teaching transformation, and it links the teaching team's mastery of the certificate assessment content with their ability to develop digital teaching resources. By forming a teaching innovation team composed of information technology experts, enterprise technical backbone personnel, and professional teachers, it creates a collaborative mechanism between technical support and instructional design, so that teaching team members can, while mastering technical tools, transform technological applications into teaching scenarios and training tasks that align with the certificate assessment requirements. This multi-dimensional and progressive improvement path helps to build a high-level "double-qualified" teaching team that meets the needs of digital certification.

3.2 The Digital Assessment Framework for the Quality Assurance System of Vocational Skill Level Certificates

The quality assurance system of vocational skill level certificates needs to use digital technologies to achieve a transformation in evaluation methods, and it constructs a multi-dimensional assessment framework covering the entire certification process. The digital assessment framework takes competency data as its core. By embedding into a digital certification platform, it enables the automatic collection and analysis of process data such as learners' operation trajectories, task completion quality, and problem-solving efficiency, and it expands the evaluation dimension from a single outcome judgment to a comprehensive consideration of process performance and ability growth. In the construction of the assessment framework, it introduces adaptive testing technology, which dynamically adjusts the assessment content and difficulty levels according to learners' ability levels, so that the certification results can more accurately reflect learners' true ability levels and improve the discrimination and credibility of the evaluation.

The digital assessment framework also establishes a verification mechanism for multi-source data fusion, and it combines the operational data collected by the digital platform with the professional judgment of manual evaluation, thereby forming an evaluation conclusion in which subjective and objective evidence corroborate each other. The assessment framework further includes a capability growth tracking module. By continuously recording learners' performance data in certifications at different stages and across different modules, it generates a capability development trajectory map, and it provides learners with differentiated capability diagnoses and development suggestions. This digital technology-based assessment framework transforms quality assurance from post-hoc inspection to process monitoring and from a single dimension to multi-dimensional synthesis, and it enhances the credibility and adaptability of the certificates[5].

3.3 The Multi-Stakeholder Collaborative Operation Mechanism for Certificate Implementation from the Perspective of Industry-Education Integration

The multi-stakeholder collaborative operation mechanism serves as the organizational guarantee for the effective implementation of the "1+X" certificate system in the accounting major, and its construction needs to be carried out from three dimensions: stakeholder positioning, resource integration, and process coordination. At the level of stakeholder positioning, it clarifies the role division and the rights and responsibility boundaries of participants such as schools, evaluation institutions, and industry enterprises in the certificate implementation. Schools undertake the function of integrating certificate standards with talent cultivation, evaluation institutions are responsible for the formulation of certification standards and the implementation of assessments, and industry enterprises participate in standard updates and ability verification. At the level of resource integration, it establishes a multi-party co-construction and sharing model for resource allocation. It transforms cutting-edge industry technology platforms into teaching and training environments, and it desensitizes real enterprise business data before converting them into certification assessment cases, thereby achieving effective resource transfer and value transformation among different stakeholders[6].

At the level of process coordination, it constructs a collaborative operation system covering the entire process of standard formulation, teaching implementation, certification assessment, and ability certification. Through a digital collaboration platform, it achieves real-time information exchange and orderly task connection among all stages. In the standard formulation stage, multiple parties participate

in the discussion and revision to ensure the cutting-edge nature and applicability of the standards. In the teaching implementation stage, it integrates real job scenarios into the teaching process through joint teaching by enterprise experts and school teachers. In the certification assessment stage, it introduces industry technical personnel to participate in assessment design and result evaluation, thereby enhancing the industry recognition of the certification. This multi-stakeholder collaborative operation mechanism integrates scattered resources and functions into an organic whole, and it provides organizational support for the continuous operation of the "1+X" certificate system.

Conclusion

This study systematically explores the implementation path of the "1+X" certificate for the accounting major in vocational education under digital transformation, and it forms a complete research framework from three levels: value reconstruction, construction logic, and supporting mechanisms. At the level of value reconstruction, this study reveals that the integration of digital technologies prompts a shift in certificate positioning from skill verification to ability representation, establishes a multi-dimensional adaptation mechanism between talent cultivation objectives and certificate standards, and clarifies the dual characteristics of functional reshaping and value extension of the certificate system in the digital context. At the level of implementation path construction, this study proposes a modular and hierarchical certificate architecture based on digital job requirements, an embedded integration model between the curriculum system and certificates, and a collaborative configuration mechanism for digital teaching resources and assessment requirements, thereby forming an operational path framework. At the level of supporting elements and operating mechanisms, this study constructs an improvement path for the digital competency of the "double-qualified" teaching team, a digital assessment framework, and a multi-stakeholder collaborative operation mechanism, which provide organizational support and quality assurance for the effective implementation of the certificate system. Future research can further explore the applicability differences of different types of digital certificate modules, deepen the study of personalized certification mechanisms based on learning analytics, and extend to comparative perspectives across multiple professional fields, so as to enrich the theoretical system and practical paradigms of the "1+X" certificate system in vocational education.

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References

[1] Xu Tanchunwen. "Research on the Talent Cultivation Model of Vocational Undergraduate Accounting Major under the '1+X' Certificate System." China Management Informationization 26.15 (2023): 219-222.

[2] Wang Dan. "Research on the Teaching Model Reform of Accounting Majors in Higher Vocational Colleges under the '1+X' Certificate System." China Management Informationization 26.10 (2023): 213-215.

[3] Fei Linqi, and Li Yunfei. "Research on the Collaborative Promotion Path of the '1+X' Certificate System and the 'Three Teachings' Reform for Accounting Majors in Higher Vocational Colleges." Journal of Liaoning Agricultural Technical College 25.01 (2023): 24-28.

[4] Chen Zhaofang. "Reflections on the Integration of Certificates and Courses for Accounting Majors in Higher Vocational Colleges under the '1+X' Certificate System." Commercial Accounting .23 (2022): 124-126.

[5] Feng Tianchu. "Innovation Research on the Talent Cultivation Model of Applied Undergraduate Accounting Majors under the '1+X' Certificate System." China Township Enterprises Accounting 10 (2022): 183-185.

[6] He Yubing, and Yang Ling. "Research and Practice on the Reform of Talent Cultivation Mode for Accounting Majors in Higher Vocational Colleges under the '1+X' Certificate System." Accountant .21

(2021): 96-98.