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Research and Practice on Curriculum-Certificate Integration in Vocational College Management Programs under the "1+X" Certificate System

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Abstract: *This article analyses the current implementation status, issues, and optimization paths for curriculum-certificate integration in vocational management programs under the "1+X" Certificate System. Employing qualitative research methodologies and case studies, this study combines Competency-Based Education (CBE) theory and industry-education integration theory to investigate practical approaches to curriculum-certificate integration in management programs. The study identifies common challenges in present procedures, such as curricular formalization, inadequate resource allocation, and gaps between academic institutions and enterprises. It proposes a "hierarchical-progressive + dynamic certification" integration model, emphasizing a three-tier curriculum system ("foundational competency layer—core skill layer—certification layer") reconstructed via job competency matrices, and advocates a collaborative optimization pathway involving government, schools, and enterprises. These findings provide both a theoretical framework and an actionable implementation paradigm for advancing the "1+X" policy's execution in vocational education systems globally.*

Keywords: *"1+X" Certificate System; Curriculum-Certificate Integration; Competency-Based Education (CBE); Industry-Education Integration; Management Programs in Higher Vocational Education*

1. Introduction

To implement the policy directives of the National Implementation Plan for Vocational Education Reform (referred to as the "20 Measures for Vocational Education Reform") (2019) and establish a high-quality technical and skilled personnel training system aligned with industrial transformation and upgrading needs, this study begins with the policy evolution of the "20 Measures for Vocational Education Reform." It focuses on the structural contradictions arising from six years of implementing the "1+X" certificate system (2019-2024) and conducts systematic research on the innovation of the course-certificate integration mechanism. Currently, the certificate system covers 447 vocational skill level certificates (VSIC, 2022), with expanding coverage, a gradually clarified overall institutional framework, and increased pilot participation. However, the sector faces persistent practical challenges, including overly condensed curricula, a lack of industry recognition for certificates, and ineffective school-enterprise collaboration.

Conversely, a systemic misalignment exists in management-focused liberal arts programs, where curriculum development fails to keep pace with professional qualification standards. Thus, the integration of coursework and certification stands as a pivotal issue for higher vocational institutions undergoing reform. This study examines four majors—Tourism Management, Business Administration, Big Data and Accounting, and Marketing—from the School of Management at Shanwei Institute of Technology. Guided by Competency-Based Education (CBE) and industry-education integration theory, it employs qualitative research. Data were collected and analyzed through semi-structured faculty interviews and observation techniques, resulting in Table 1: Analysis of the Implementation Status of the "1+X" Curriculum-Certificate Integration Program for Higher Vocational Management Majors. Data collection focuses on three key propositions: (1) The mapping validity between the "1+X" certificate standards and course modules; (2) The institutional effectiveness of government-school-enterprise collaborative education mechanisms; (3) The degree of coupling between vocational qualification certification and teaching evaluation.

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2. Theoretical Foundations and Practical Implications of Integrating the "1+X" Certificate System with Higher Vocational Management Specialty Courses

2.1 Core Elements and Applied Value of Competency-Based Education (CBE) Theory

CBE (Competency-Based Education) theory emerged in the North American vocational education field during the mid-to-late 20th century. Its core principle centers on cultivating professional competencies, emphasizing that education should be structured around job requirements. It employs a "knowledge-skills-attitude" competency matrix framework, utilizing modular curriculum design and personalized learning pathways to achieve instructional objectives (Yue, 2008). CBE theory provides a competency-centered practical pathway for vocational education. It establishes job competency standards based on occupational role analysis; adopts a student-centered approach supplemented by teacher guidance, with modularized teaching materials and curriculum content; and implements a practice-oriented teaching model utilizing modern teaching methods for dynamic management (Li, 2021). Applying CBE theory in the integration of vocational management-related professional courses and certifications enables the reconstruction of the curriculum system based on job competency requirements, making course content more closely aligned with practical work demands. Under the "1+X" certification system, CBE remains a theoretical tool for achieving "course-certification integration," but it requires localization tailored to the realities of China's vocational education system.

2.2 The Driving Mechanisms for Curriculum-Certificate Integration under the Theory of Industry-Education Integration

The theory of industry-education integration plays a pivotal role in curriculum-certificate integration within higher vocational management majors, primarily manifested through two aspects: reciprocal symbiosis between education and industry and social capital synergy. From the perspective of enterprises, enterprises provide schools with practical resources, industry insights, and real-world project cases, enabling institutions to promptly adjust curricula and teaching content to cultivate students better aligned with industrial demands. (Shi & Chen, 2007) From the school's perspective, institutions cultivate high-caliber talent, meeting job requirements and alleviating enterprises' talent shortages. The establishment of industry-academia-enterprise tripartite colleges represents a classic example of collaborative social capital. For higher vocational management majors, co-building such colleges generates a cyclical model of "demand flow - resource flow - value flow."

2.3 The "1+X" Certificate System and the Collaborative Mechanism for Curriculum-Certificate Integration

Integrating curriculum and certification represents a significant reform initiative in vocational education under the "1+X" certificate system. It involves aligning academic diplomas with "X" certificates to achieve deep integration between academic education and vocational qualification training. "Curriculum" refers to course design, development, content, standards, assessment, and teaching processes; ''certificates'' denotes vocational skill level certificates developed with industry and enterprise participation. This integration requires curriculum standards to align with certificate standards, incorporating the vocational skill level criteria of "X" certification into professional course standards to synchronize teaching content with occupational requirements. Secondly, course content must connect with key knowledge points for certification exams. Finally, it is required that practical training be integrated with on-the-job training. This is achieved through real-world workstations within enterprises and a work-study integrated teaching environment, thereby simulating professional scenarios and reinforcing skills training (An & Ma, 2022). This model addresses the traditional vocational education challenge of "disconnect between teaching and production, resulting in graduates failing to meet societal needs." Organically integrating curricula and certifications enhances students' comprehensive professional competencies and employment competitiveness.

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3. Implementation Challenges in Integrating Professional Certificates with Management-Related Courses in Higher Vocational Education under the "1+X" Certificate System

3.1 Inadequate Alignment between Curriculum Systems and Occupational Competency Standards

3.1.1 Inadequate modular course design leads to fragmented competencies.

Competency-Based Education (CBE) theory advocates building modular curriculum systems centered on job competencies. However, research reveals that some higher vocational institutions have implemented only superficial adjustments to their curricula during the integration of courses and certifications. For instance, programs like Big Data and Accounting directly link courses such as "primary accounting practice" to the assessment content of the "1+X" Digital Management Accounting Certificate. This results in teaching becoming overly focused on exam preparation, thereby weakening the development of comprehensive competencies such as budgeting and financial analysis. This rigid "teaching only what's tested" approach violates the CBE theory's principle of integrating "knowledge-skills-attitudes", resulting in fragmented competency development. A typical manifestation is students excelling in exam techniques while lacking practical accounting skills.

3.1.2 Compression of Foundational Courses Leads to Skill Gaps

To integrate with certification programs, the Tourism Management program has adjusted its curriculum-certificate integration, such as adding study-travel courses. However, the "1+X" Study-Travel Guide certification corresponds to a 50% reduction in course hours for the "Study-Travel Course Design" module. In practice, the lack of foundational courses has resulted in fragmented skills among students. This practice of sacrificing foundational skill development to boost certification pass rates violates the progressive logic of CBE theory: "Foundational competency layer → Core skill layer → Certification layer." The Marketing program similarly suffers from superficial integration of certificate courses, where skill training remains superficial, severely hindering students' sustainable career development.

3.2 Inefficient Operation of Industry-Education Integration Collaboration Mechanisms

3.2.1 The forms of School-Enterprise Cooperation are monotonous

The theory of industry-education integration calls for establishing a closed-loop system encompassing "demand flow-resource flow-value flow," yet actual collaborations often remain confined to superficial resource matching. Taking the Marketing program as an example, while training utilizes a digital marketing simulation system provided by enterprises, it lacks real-world live-streaming marketing projects. Students thus cannot master practical skills such as market research. Tourism Management relies on study tour agencies for enterprise partnerships, but the collaboration model is monotonous, training bases are scarce, and off-campus practice is weak. The Business Administration program overrelies on online corporate resources while offering scarce internship opportunities. This indicates limited engagement of enterprises in curriculum development and evaluation, underutilized enterprise resources for enhancing instructional quality, and a lack of mechanisms for collaborative education. Consequently, the curriculum is disconnected from the actual needs of the industry.

3.2.2 Lagging technological equipment upgrades constrain skill development

Effective industry-education integration hinges on technological alignment between the educational and industrial sectors. However, studies reveal that the hands-on training within the Business Administration program still relies on outdated ERP systems that are decades old. Consequently, students are deprived of exposure to contemporary management platforms such as SAP. This technological disconnect results in a significant gap between students' skills and industry demands, contradicting the CBE theory's requirement for "dynamic updating of competency standards." Additionally, outdated equipment in Big Data and Accounting practical training facilities reduces the efficiency of cultivating business-finance integration capabilities.

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Table 1: Analysis of the Implementation Status of the "1+X" Curriculum-Certificate Integration Program for Higher Vocational Management Majors

Analysis Dimension	Big Data and Accounting	Business Administration	Tourism Management	Marketing
Overall Attitude	Neutral to Negative (Low Value)	Critical (Mismatch Between Supply and Demand)	Affirmative Value (Employment Bargaining Chip)	Strongly Negative (Low Recognition)
CBE Manifestation	Skill Fragmentation	Mismatched Competencies	Incomplete Foundational Knowledge Structure	Core Marketing Capabilities Not Supplemented
Curriculum-Certificate Integrations	Test-oriented integration: Directly aligns with certification content	Loose integration, new courses, competition-based practice	Formal integration: certification courses with compressed hours	No integration: No substantive adjustments
Industry-Education Integration	Shallow collaboration: no enterprise role in standards/ teaching	Obsolete equipment, supply-demand gap, online dependency.	Inadequate practice bases; cognitive internships only.	Absence of industry-academia collaboration mechanisms.
Teaching Resources	Insufficient computer labs, outdated equipment	Outdated software	Weak industry connections	Adequate online resources

3.3 Weak Support from Teaching Resources and Evaluation Systems

3.3.1 The development of Dual-Qualified faculty is insufficient

The dual competency structure required by CBE theory—combining corporate practical experience with teaching ability—has yet to be effectively implemented. Accounting instructors primarily obtain certification through online training, lacking real-world corporate accounting experience. Marketing faculty engage insufficiently in corporate practice annually, with skill updates lagging behind industry technological advancements, making it difficult to meet modular teaching demands.

3.3.2 The evaluation system and ability certification are separated

Existing evaluation frameworks deviate from the "Ability Portfolio" mechanism advocated by CBE theory, relying heavily on standardized written examinations. For instance, Tourism management assesses students' research-based planning abilities solely through simple itinerary design tasks, excluding process-based outcomes like project proposal development and practical demonstrations. This results in competency certifications that fail to align with corporate demands. Big Data and Accounting course evaluations remain primarily focused on knowledge recall, failing to establish competency observation points such as the completion of industry-finance integration tasks or the application of digital tools. This diminishes the effectiveness of integrating coursework with certification.

3.4 Mismatch between Certificate Recognition and Employment Demands

3.4.1 The value of the certificate is being questioned by the market

While industry-education integration theory emphasizes industry-led certification standards, the current "1+X" certificates poorly align with corporate hiring needs. Marketing surveys reveal that most employers believe the "Digital Marketing Technology Application" certificate fails to accurately reflect graduates' practical skills. The absence of industry association involvement has caused certification standards to lag behind industrial frontiers, diminishing the certificates' employment competitiveness.

3.4.2 Students lack autonomy in their career planning

The CBE theory advocates personalized learning pathways, whereas the certificate programs for the Business Administration program are uniformly set by institutions, lacking career interest assessments and planning guidance. This passive learning approach hinders students' initiative and fosters a utilitarian tendency of "studying solely for certification."

3.5 Absence of Supporting Policies and Dynamic Adjustment Mechanisms

3.5.1 Rigid certificate directory update mechanism

Current policies lack an industry association-led dynamic certificate phase-out mechanism, resulting

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in teaching resources being occupied by certificates with low market demand. Taking the Marketing program as an example, its "1+X" Digital Marketing certificates have failed to effectively align with corporate hiring standards, yielding limited gains in social recognition and employment competitiveness. Insufficient professional resource support has hindered the in-depth application of digital marketing software.

3.5.2 Unbalanced distribution of regional education resources

Imbalances in regional fiscal investment lead to structural disparities in the allocation of educational resources. Higher vocational colleges in Eastern, Western, and Northern Guangdong operate under significant funding constraints. As a result, the cycle for updating their training equipment fails to keep pace with the rapid iteration speed of industrial technology. Current efforts to integrate professional coursework with certification in management disciplines at these institutions expose dual challenges: inadequate modular restructuring of CBE and ineffective industry-education collaboration.

4. Exploring Optimal Pathways for Curriculum-Certificate Integration Program for Higher Vocational Management Majors

4.1 Reconstruct the hierarchical and progressive modular curriculum system

4.1.1 The driving strategy of curriculum hierarchical design based on the post-ability matrix

A three-tiered curriculum system—comprising the "Foundational Competency Layer, Core Skill Layer, and Certificate Certification Layer"—must be established based on the Job Competency Matrix, aligning with Competency-Based Education (CBE) principles. At the foundational competency level, institutions must strengthen general education and disciplinary core courses to bridge theoretical gaps caused by compressed certificate coursework. For instance, the Tourism Management program offers a required course in Educational Psychology (36 class hours) to systematically impart the educational theory and psychological foundations required for the Study Tour Planning Certificate, preventing competency gaps due to reduced course hours. At the core skills layer, courses must be decomposed and restructured based on professional competencies. Taking the Accounting program as an example, the "Financial Management" course is deconstructed into three capability modules— "Cost Accounting—Tax Declaration—Financial Shared Services"—corresponding to the competency standards for budget management, tax processing, and information technology application in the "1+X" Digital Management Accounting certificate. This ensures precise alignment between course content and certification assessment requirements. At the certification level, real-world enterprise projects are integrated into teaching. For instance, the Marketing program incorporates "Live Streaming Marketing Practical Tasks" from e-commerce companies, tasking students to execute market research and design live streaming scripts. These practical components are assessed and certified by on-site enterprise mentors.

4.1.2 The dynamic adjustment mechanism ensures the suitability of the curriculum

Establishes a vocational skills standard mechanism (with cycles $\leq$ 2 years) led by industry associations. Institutions and enterprises jointly form "Curriculum Renewal Committees." For example, the Tourism Management program collaborates with China International Travel Service to establish a coordinated update mechanism. Each semester, the practical training components for the "Study Tour Course Design" module are updated and aligned with national standards, ensuring teaching content aligns with industry frontiers.

4.2 Deepening the Government-School-Enterprise Collaborative Education Mechanism for Industry-Education Integration

4.2.1 Jointly Establishing Industry Academies to Promote In-depth Resource Synergy

Transcend superficial school-enterprise collaboration models by constructing a closed-loop education system integrating "demand flow, resource flow, and value flow." Institutions can achieve deep resource integration through co-founded industry academies. For instance, establishing a Big Data and Accounting Industry Academy in partnership with enterprises—where companies lead curriculum design and directly incorporate certification standards into teaching content—significantly boosts job-field alignment rates. Governments should implement targeted incentive policies, such as offering tax deductions for R&D expenses to enterprises participating in collaborations and encouraging corporate donations of equipment or open access to technical interfaces. Taking the Business Administration program as an example,

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institutions can utilize SAP system modules donated by enterprises, allowing students to engage with modern enterprise resource management processes during practical training. This bridges the 20-year technological gap between outdated ERP systems and current industry practices.

4.2.2 Cross-regional Resource Sharing and Technological Reinvestment

To address regional imbalances in educational resources, establish a "school-enterprise cloud platform" for cross-regional resource sharing, for instance, by connecting via cloud to government-led financial shared service systems of counterpart assistance institutions, remote joint training can be conducted. This enhances equipment utilization rates and narrows the technological gap with institutions in the Pearl River Delta region.

4.3 Strengthen the Construction of Dual-Qualified Faculty and Digital Teaching Resources

4.3.1 Establishing a Two-Way Flow Mechanism for Faculty and Industry Professionals

Building a dual-qualified faculty is crucial for ensuring the effectiveness of the Curriculum-Certificate Integration program. Institutions should establish a two-way flow mechanism between faculty and industry professionals, requiring teachers to engage in at least two months of practical experience at enterprises annually to accumulate frontline work exposure. For instance, during joint curriculum development with enterprises, faculty can participate in corporate digital transformation projects, translating industry data analysis experience into teaching cases that bridge the gap between theory and practice. Furthermore, incorporating "1+X" certificate trainer qualifications into faculty career development evaluations incentivizes teachers to enhance their professional competencies.

4.3.2 Digital Transformation Solves Resource Lag Challenges

Regarding teaching resources, digital transformation is a crucial approach to solving equipment lag issues. Institutions can develop virtual simulation training systems. For instance, the Tourism Management program can introduce "field study scenario simulation platforms" to support students in practicing complex scenarios such as campsite planning and safety crisis response online, thereby compensating for the shortage of off-campus internship bases. Additionally, adopting loose-leaf textbooks and regularly integrating real-world industry cases into curricula—such as embedding enterprise cost control schemes and financial data analysis reports—ensures teaching content aligns with industry dynamics, enhancing the timeliness of vocational skills development.

4.4 Establishing a Dynamic, Competency-Oriented Evaluation System

4.4.1 Replacing Traditional Assessment Models with "Competency Portfolios"

Traditional evaluation models centered on written exams struggle to comprehensively reflect students' professional competencies. A dynamic assessment system based on process evaluation should be established. Institutions can implement a "competency portfolio" system to systematically document students' practical achievements in corporate projects, training logs, and evaluations from corporate mentors. For instance, in marketing courses, replacing standardized written exams with student-completed "live-stream marketing proposals" and "user behavior analysis reports" provides a more direct reflection of students' market insight and planning capabilities. Integrating "1+X" certificate assessment requirements into the course credit system enhances the authority of certificate recognition.

4.4.2 Enhancing Certificate Value through Third-Party Certification

Establish a co-governance model of "industry standard setting – enterprise assessment implementation – institutional teaching feedback" to boost the certificate's employment competitiveness. Industry associations will lead joint enterprise "dual-certification" assessments, using real-world project completion as the core metric. By integrating industry skill standards, this comprehensive evaluation will establish certificates as a robust credential, seamlessly bridging the educational and industrial sectors. A dynamic certificate exit mechanism will eliminate credentials that persistently deviate from market needs or have low enterprise adoption rates, ensuring the certification system continuously aligns with industrial technology upgrades.

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4.5 Improving Policy Support and Regional Coordination Mechanisms

4.5.1 Dynamic Exit Mechanism to Optimize Certificate Structure

Based on the dynamic adaptation principle of industry-education integration, a certificate catalog regulation mechanism guided by market demand must be established. The relevant certification authorities establish a comprehensive "monitoring-early warning-exit" operational system to dynamically phase out certificates with persistently low employment conversion rates. For instance, education authorities could utilize industry big data platforms to systematically evaluate the job market relevance and industrial contribution of professional certificates. To systematically optimize the certificate supply structure and prevent inefficient certificates from occupying teaching resources, exit procedures should be initiated for certificate types that consistently deviate from market demands.

4.5.2 Regional Support for Resource Balancing

Vocational education's regional coordination must transcend geographical constraints by forming cross-regional linkage mechanisms centered on "resource sharing, capacity building, and mutual benefit." Through collaborative development, institutions in Guangdong's eastern, western, and northern regions and the Greater Bay Area can leverage joint training platforms to conduct real-world enterprise projects. This approach substantially enhances students' practical skills in fields like smart tourism and intelligent finance.

5. Practical Implications and Future Outlook for Curriculum-Certificate Integration Program in Higher Vocational Management Programs

Optimizing the Curriculum-Certificate Integration in higher vocational management programs must center on competency development. This can be achieved through modular curriculum restructuring, deepened industry-academia collaboration, dynamic evaluation updates, and long-term policy safeguards, thereby ensuring comprehensive alignment between vocational education and industrial demands. This approach not only addresses current practical challenges in course-certification integration but also provides a replicable implementation framework for advancing the high-quality development of vocational education. A limitation of this study is that its sample was limited to full-time faculty from four disciplines and did not incorporate the perspectives of students or industry enterprises. Future research directions include exploring linkage mechanisms between the "1+X" certificates and credit banks to advance lifelong learning systems; Conducting satisfaction surveys among students and enterprises regarding the Curriculum-Certificate Integration to understand their needs and expectations; Strengthening international comparative studies to draw on advanced international experiences in the Curriculum-Certificate Integration, thereby providing reference for the Curriculum-Certificate Integration in China's higher vocational management programs.

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