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Exploration of the Integrated Education Model of 'Post, Curriculum, Competition, Certificate, Research, and Innovation' in Higher Vocational Colleges: A Case Study of Landscape Architecture

Chang Fu*, Ting Chen

School of design, Hainan Vocational University of Science and Technology, Haikou 571126, Hainan, China

**Author to whom correspondence should be addressed.*

Abstract: This paper deeply explores the integrated education model of "Post, Curriculum, Competition, Certificate, Research, and Innovation" in higher vocational colleges, addressing the current issue of disconnection between talent cultivation and industry needs in vocational education, particularly in practice-intensive professional fields such as landscape architecture. Taking landscape architecture as a case study, the research systematically analyzes the shortcomings of traditional teaching models and innovatively proposes a six-dimensional collaborative education mechanism centered on job competency, based on curriculum systems, driven by competitions and certificates, and extended through scientific research and innovation entrepreneurship. Through strategies such as reconstructing curriculum systems, implementing project-based teaching, building multi-dimensional evaluation systems, and deepening school-enterprise cooperation, it effectively achieves precise alignment between talent cultivation and industry demands. Practical cases verify the significant effectiveness of this model in enhancing students' professional skills, innovative capabilities, and vocational literacy, providing valuable experience for the reform of higher vocational education.

Keywords: Higher vocational colleges; "Post, Curriculum, Competition, Certificate, Research, and Innovation"; Integrated education model; Landscape architecture

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1. Introduction

In recent years, with the continuous upgrading of China's industries and the rapid development of technology, the innovation of education models in vocational education, an important cradle for cultivating high-quality technical and skilled talents, has become a core focus of educational reform. The newly revised Vocational Education Law of the People's Republic of China in 2022 explicitly emphasizes "promoting the integration of vocational education and general education, and deepening industry-education integration and school-enterprise

cooperation," pointing out the policy direction for the innovation of talent cultivation models in higher vocational colleges. Against this backdrop, the traditional four-dimensional integrated model of "post, curriculum, competition, and certificate" can no longer meet the urgent demand for composite talents in industries. Especially in highly practical fields such as landscape architecture, how to skillfully integrate research capabilities ("research") and innovation and entrepreneurship literacy ("innovation") into the education system to build a new six-dimensional collaborative mechanism of "post, curriculum, competition, certificate, research, and innovation" has become a critical issue to be addressed in higher vocational education.

The landscape architecture major, which combines artistry and engineering, requires its talent cultivation to closely align with the actual needs of industries such as urban and rural greening and ecological restoration. However, currently, this major in higher vocational colleges generally faces challenges such as curriculum content lagging behind industry standards, students' lack of innovative capabilities, and superficial school-enterprise cooperation. This phenomenon highlights the obvious shortcomings of the traditional model in the "research and innovation" dimensions, urgently requiring breakthroughs through systematic integrated reforms [1].

The "Post, Curriculum, Competition, Certificate, Research, and Innovation" integrated education model emerges to create a comprehensive, closed-loop cultivation system centered on job competency, based on curriculum systems, driven by competitions and certificates, and expanded through research and innovation entrepreneurship. Theoretically, it enriches the connotation of vocational education's "competency-based" theory, extending students' development from single skill training to comprehensive improvement of literacy [2]. Practically, it effectively addresses the disconnection between talent cultivation and industry needs through innovative measures such as deep school-enterprise collaboration and project-based teaching, providing a solid talent foundation for regional economic development [3].

Taking landscape architecture as a specific case, this study uses literature analysis, case verification, and other methods to deeply explore the construction path and implementation effects of the six-dimensional integrated model, aiming to provide a learnable and replicable experience for the reform and development of higher vocational education.

2. Theoretical research foundation

Tracing back to the origin of the exploration of the integration concept of "post, curriculum, competition, and certificate" in the field of foreign vocational education, Germany's "dual-system" training system serves as a model. This model achieves the organic unity of posts, courses, and certificates through the close integration of enterprise practice and school education [4]. Data shows that the average employment rate of students under Germany's dual-system training is as high as 85%, far exceeding that of graduates from the general education path [5]. Similarly, the UK has also established a mutual recognition mechanism between the National Vocational Qualifications (NVQs) and the General National Vocational Qualifications (GNVQs), directly integrating vocational standards into the curriculum content, enabling students to obtain both academic qualifications and industry-recognized certificates while studying [6]. Meanwhile, community colleges in the United States implement Competency-Based Education and incorporate the results of skills competitions (such as SkillsUSA) into the credit system, effectively enhancing students' practical abilities [7].

However, foreign research has relatively weak discussions on the "research and innovation" dimension. Although the EU explicitly proposed requirements to enhance the innovativeness of vocational education in its 2020 Policy Framework for Vocational Education and Training, specific implementations remain largely limited

to joint projects between corporate R&D departments and universities, without forming a universally applicable teaching integration model [8]. This research limitation provides a broad space for exploring a Chinese-style path of "post, curriculum, competition, certificate, research, and innovation" integration.

Domestic research on the integration of "post, curriculum, competition, and certificate" began around 2010 and has shown vigorous development in recent years. Visual analysis data indicate that as of 2024, the number of relevant literature has reached 1,877, with the proportion of core journal publications from 2021 to 2024 significantly increasing to 67%, fully reflecting the continuous improvement in research quality in this field [9]. Scholar Zeng Tianshan systematically expounded the core concept of the four-dimensional integration of "post, curriculum, competition, and certificate," pointing out that its key lies in setting curricula guided by job requirements, promoting learning through skills competitions, and verifying competencies through certificates [10]. Subsequent scholars have carried out rich practical explorations on this basis, such as Cui Ming and others who conducted case practices in agricultural IoT engineering courses at higher vocational colleges [11]; Wang Yi introduced the "innovation" dimension in the IoT major by establishing incubation bases through school-enterprise cooperation and incorporating student entrepreneurship projects into the curriculum evaluation system [12].

Notably, existing research has two shortcomings: On one hand, most studies focus on the three-dimensional or four-dimensional integration of "post, curriculum, competition, and certificate," and only Wu Dongxue and others have attempted a six-dimensional integration model in the pharmacy major, but a universally applicable framework system has not yet been formed [13]. On the other hand, research on landscape architecture is relatively scarce, as most current studies focus on other majors such as preschool education and rail transit, lacking in-depth discussion and analysis of interdisciplinary fields combining engineering and art [14,15].

3. Construction of the integrated education model of "Post, Curriculum, Competition, Certificate, Research, and Innovation" for landscape architecture

3.1. Model design principles

The construction of the "Post, Curriculum, Competition, Certificate, Research, and Innovation" integrated education model adheres to three core principles: industry demand orientation, systematic integration, and dynamic adaptability.

First, industry demand orientation serves as the cornerstone of model design. The landscape architecture industry plays a pivotal role in ecological civilization construction and urban-rural development, with talent demands shifting from single skills to composite capabilities [16]. Therefore, the model design must closely rely on the Occupational Standards for the Garden Industry and regional industrial planning. Through in-depth enterprise research (e.g., analyzing talent needs of Hainan's garden enterprises), a clear job competency matrix is established to ensure precise alignment between training objectives and industry demands.

Second, systematic integration emphasizes the collaborative advancement of six-dimensional elements. Studies show that fragmented integration of "post-curriculum" or "competition-certificate" alone cannot achieve overall optimization of talent cultivation [17]. This model forms a closed-loop system of "job competency → curriculum modules → competition projects → certificate assessment → research training → entrepreneurship incubation," creating a positive interaction mechanism among elements. For example, integrating skills competition evaluation criteria into the curriculum assessment system while using research project outcomes as topic sources for innovation and entrepreneurship competitions realizes deep integration and linkage across multiple dimensions.

Finally, dynamic adaptability ensures the model's sustainable development. With continuous industry technology iteration and policy adjustments, a dynamic update mechanism for curriculum content and evaluation standards is essential. For instance, the School of Design at Hainan Vocational University of Science and Technology updates and optimizes training projects each semester through school-enterprise joint teaching and research offices, ensuring teaching remains synchronized with industry development.

3.2. Specific implementation paths

3.2.1. Reconstruction of the curriculum system

The traditional landscape architecture curriculum has issues of excessive theoretical focus and fragmented modules. As shown in Table 1, the reconstructed curriculum system adopts a three-level modular design of "basic shared + job-oriented + research-innovation expansion."

Table 1. Modular curriculum system design for landscape architecture

Module type	Curriculum examples	Corresponding dimensions	Class hour proportion
Basic module	Garden Plants and Ecology	Post, Curriculum	30%
Core module	Residential Landscape Design (enterprise project)	Competition, Certificate	45%
Expansion module	Landscape Architecture Research Training (supervisor's research project)	Research, Innovation	25%

During the implementation process, the key is to integrate real corporate projects (such as the landscape design of a residential area in Sanya) into teaching tasks. Students are required to complete the entire process of work, from conceptual design to budget preparation, and their work results can be directly applied to actual corporate projects or used as entries for skills competitions. This project-based teaching model has significantly improved the matching degree between courses and jobs, representing a qualitative leap compared to traditional teaching models.

3.2.2. Implementation of project-based teaching

Project-based teaching serves as the core vehicle for model integration, designed to follow the "three combinations" principle:

3.2.2.1. Integration of competition and curriculum

Convert evaluation rules of vocational skills competitions (e.g., the "Garden Landscape Design" event in the National Vocational College Skills Competition) into teaching project assessment criteria. For example, in the Garden Architecture Design course, competition requirements such as "scheme innovativeness (30%)" and "construction drawing standardization (40%)" are directly used as assignment evaluation dimensions.

3.2.2.2. Integration of certificate and curriculum

Embed assessment content of "1+X" vocational skill level certificates (e.g., garden greening worker) into curricula. Through developing loose-leaf textbooks, skill points required by certificates—such as plant configuration and project supervision—are decomposed into unit tasks, allowing students to directly participate in certification exams after completion.

3.2.2.3. Empowerment through research and innovation

Open data collection, experimental analysis, and other links of horizontal research projects to students, with outstanding achievements convertible into college student innovation and entrepreneurship projects.

3.3. Construction of a multi-dimensional evaluation system

A "process-oriented + outcome-oriented" evaluation framework is established (**Table 2**). Evaluation subjects: Enterprise experts (40%), professional teachers (30%), competition judges (20%), peer evaluation (10%). Evaluation indicators: In addition to traditional assignment scores, quantitative indicators such as certificate acquisition rate (e.g., pass rate of "1+X" garden greening worker certification) and research participation (e.g., quality of research reports) are added.

Table 2. Multi-dimensional evaluation form for residential landscape design course

Evaluation Dimension	Evaluation Content	Weight	Data Source
Job Competency	Feasibility of the scheme	30%	Enterprise scoring
Competition Standards	Innovation of the design	25%	Competition judges
Research Level	Depth of data analysis	20%	Research supervisor
Professional Literacy	Performance in team collaboration	15%	Teacher observation
Certificate Relevance	Acquisition of "1+X" certificate	10%	Certification exam results

3.3. Guarantee mechanisms

3.3.1. Deepening school-enterprise cooperation

School-enterprise cooperation needs to break through the traditional internship-based model and advance toward deep-level collaboration featuring "shared resource investment, joint talent cultivation, and mutual achievement sharing." On one hand, through co-constructing training bases, actual projects from design units (such as residential landscape design) can be used as teaching cases, with enterprise designers invited as part-time teachers. Students participating in projects can earn internship credits and labor compensation. On the other hand, full-time college teachers can jointly develop loose-leaf textbooks with enterprises to ensure teaching content keeps pace with new industry technologies.

3.3.2. Enhancing teacher competencies

Teachers are key implementers of the integrated model, requiring a "three-stage cultivation" approach to achieve dual-professional transformation. First, in cultivating dual-professional qualities, teachers are required to accumulate at least 2 months of enterprise practice every two years. By 2025, the proportion of "dual-qualified" teachers in the School of Design at Hainan Vocational University of Science and Technology will have reached 92.86%. Second, in improving research capabilities, technical backbones from enterprises (such as senior engineers) are encouraged to jointly apply for research projects with in-school teachers. Finally, an "integrated six-dimensional" teaching management system is developed using AI technology to achieve intelligent matching of job tasks and data analysis of competition certificates, providing strong support for teaching.

4. Analysis of practical cases

As a higher vocational college specializing in landscape architecture design, the School of Design at Hainan Vocational University of Science and Technology has long faced challenges such as low student enthusiasm for professional learning and limited participation in competitions and research. These issues highlight the limitations of traditional teaching models in stimulating students' intrinsic motivation, creating a stark contradiction with the industry's demand for high-quality technical and skilled talents, particularly against the backdrop of Hainan Free Trade Port construction, where the landscape industry's demand for graduates with innovative capabilities and practical experience continues to grow. In response, the college has comprehensively promoted the reform of the six-dimensional integrated education model of "Post, Curriculum, Competition, Certificate, Research, and Innovation," focusing on practical exploration in three dimensions: curriculum reconstruction, resource development, and evaluation innovation.

In terms of optimizing the curriculum system, the college has reorganized the original courses into modular structures guided by job competencies. The newly added course, Small Space Design in Landscape Architecture, directly aligns with the requirements of the "Garden Landscape Design and Construction" event in the Hainan Provincial Vocational Skills Competition, transforming the competition's evaluation criteria into course assessment indicators. After completing module studies, students' works are jointly reviewed by the school and enterprises. Excellent plans not only earn course credits but are also recommended for competitions. This mechanism has significantly boosted students' learning motivation. In the 2023 Hainan Provincial Vocational Skills Competition, the team won the first prize in the "Garden Landscape Design and Construction" event, marking a historic breakthrough in award levels.

The construction of teaching resources has been strengthened through deepening school-enterprise cooperation. Taking the course Garden Architecture Design as an example, it adopts a "dual-tutor system" where in-school teachers are responsible for theoretical instruction and process guidance, while enterprise tutors (such as senior engineers from Hainan Yak Design Institute) lead the practical project segments. This closed-loop teaching model of "theory-practice-feedback" ensures that the curriculum remains synchronized with the latest industry technologies.

Notably, challenges such as weak research foundations among junior college students and insufficient long-term enterprise participation have emerged during practice. In the future, it is necessary to further optimize the gradient design of the "research and innovation" modules. For instance, team-based research training involving "supervisors, postgraduate students, and junior college students" can lower the entry barriers. Additionally, improving the benefit distribution mechanism between schools and enterprises and incorporating talent cultivation into enterprise performance evaluations will ensure the sustainability of cooperation. The case of Hainan Vocational University of Science and Technology demonstrates that through systematic integrated reforms, higher vocational colleges can cultivate technical and skilled talents who not only meet job requirements but also possess development potential, providing a replicable practical paradigm for similar institutions.

5. Conclusions and prospects

This paper reveals the remarkable effects of the integrated education model of "Post, Curriculum, Competition, Certificate, Research, and Innovation" in higher vocational colleges on improving talent cultivation quality, particularly in professional fields such as landscape architecture. Through systematic reforms, this model effectively addresses the issues inherent in traditional teaching models. In the future, with continuous industry

technology development and policy adjustments, the model requires further optimization and improvement. Meanwhile, efforts should be made to strengthen the cultivation of students' research foundations in higher vocational colleges and deepen the long-term mechanisms of school-enterprise cooperation to ensure that talent cultivation keeps pace with industry development. Additionally, exploring the applicability of this model in other professional fields will provide strong support for the comprehensive development of higher vocational education.

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Disclosure statement

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