

Reconstruction and Practice of the Curriculum System of Horticultural Technology Major in Higher Vocational Education under the Integration of Post course Competition and Certificate

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Abstract: Modern agriculture is transforming and upgrading towards intelligent facilities, high-quality horticulture, and standardized cultivation. The job skill standards, vocational skill competition regulations, and 1+X vocational skill level certificate assessment requirements in the horticulture industry continue to iterate. Traditional vocational horticulture technology courses have problems such as disconnection between job and course, competition certificate fragmentation, course fragmentation, and insufficient adaptability to education. This article is based on the positioning of vocational skills education in higher vocational colleges, clarifying the coupling logic of the four elements of horticulture profession positions, courses, competitions, and certificates, analyzing the existing pain points of the current professional curriculum system, relying on the school enterprise collaborative education mechanism, reconstructing the four-dimensional curriculum system of basic general education, core special courses, comprehensive training, and expanding empowerment, implementing job task enrollment, competition standard enrollment, certificate examination point enrollment, supporting teaching, evaluation, and teacher guarantee mechanisms, forming a job course competition certificate integrated education model suitable for the regional horticulture industry, comprehensively improving students' job employability, competition competitiveness, and certificate passing rate, and helping to cultivate high-quality technical and skilled talents in higher vocational horticulture profession.

Keywords: Integration of Job, Course, Competition, and Certification; Vocational Education; Horticultural Techniques; Curriculum System Reconstruction; 1+X

Certificate

1. Introduction

The implementation plan for the national vocational education reform clearly proposes to comprehensively promote the comprehensive education of vocational courses, competitions, and certificates, promote the deep integration of vocational skill level certificates, vocational skill competitions, enterprise job standards, and professional teaching, and connect the integrated education chain of learning, competition, certification, and employment. At present, urban horticulture, facility fruit and vegetable cultivation, garden floral arrangement, seedling breeding, and intelligent plant protection have become the core formats of the horticultural industry. Modern agricultural enterprises have refined standardized positions such as horticultural production technicians, floral designers, smart greenhouse operation and maintenance personnel, horticultural plant protection specialists, and seedling breeding administrators. Job admission generally requires certification and practical competition ability. At present, most vocational colleges' horticulture technology majors use a disciplinary curriculum structure, and the course content lags behind the practical standards of enterprise positions. The content of the national vocational college skills competition floral arrangement and fruit and vegetable competition is independent of daily teaching, and the preparation for the Flower Horticulturist and Fruit and Vegetable Production Management 1+X certificates is taught separately. The teaching is repetitive and redundant, and the students' skill adaptation is low. Graduates have shortcomings such as slow learning, few certificates, weak competition ability, and insufficient job matching. Therefore, reconstructing a professional curriculum system that integrates job courses, competitions, and certificates has become the core task of

improving the quality and excellence of horticulture majors.

2. Definition of Core Concepts and Analysis of the Current Situation of Horticultural Professional Courses

2.1 Core Connotation and Coupling Logic of Post Course Competition Certificates

2.1.1 Connotation of the elements of job course competition certificate

Post: refers to the full level occupational positions in the horticulture industry, which are divided into basic practical positions, specialized skill positions, and comprehensive management positions, covering six major job clusters: fruit and vegetable cultivation, floral production, green plant maintenance, green pest and disease prevention and control, smart greenhouse operation and maintenance, and seedling tissue culture. It corresponds to the three-level competency standards of basic ability, advanced practical ability, and job management ability for enterprise entry. **Course:** It is a three-year compulsory, elective, and practical integrated course for vocational horticulture technology majors. It is the core teaching carrier that carries job skills, competition techniques, and certificate examination points. **Competition:** It is divided into school level selection competition, provincial industry competition, and national vocational college skills competition horticulture category, focusing on standardized, refined, and innovative practical assessment, benchmarking high-quality job advancement skills of enterprises. **Certificate:** mainly refers to the intermediate and advanced vocational skill level certificate for flower and horticulture, fruit and vegetable production management, and plant protection. It is a general entry qualification in the industry, divided into two assessment modules: theoretical written test and practical assessment.

2.1.2 Four element coupling logic

Position as the core orientation, determining the curriculum training objectives; The curriculum serves as the implementation carrier, carrying competition techniques and certificate examination points; The competition aims to elevate the skills and hone the high-level practical abilities of the position; The certificate serves as a proof of compliance, verifying the level of course learning and job competency. The four elements follow the closed-loop logic

of "setting standards for positions, setting courses according to standards, integrating courses with certificates, and promoting employment through certificates", breaking down barriers between teaching, preparation for competitions, certification, and employment, achieving universal basic knowledge, interoperability of skill content, and unified assessment standards.

2.2 Benchmarking of Vocational Horticulture Positions, Competition Events, and Certificate Standards

2.2.1 Sorting out job competency standards in the horticulture industry

Based on the research on the employment of modern agricultural enterprises in the region, integrate the abilities of three levels of positions: basic positions require mastery of horticultural crop sowing, water and fertilizer management, daily maintenance of green plants, and basic pest and disease identification skills; Specialized positions require proficiency in floral arrangement and design, facility and environmental regulation, fruit and vegetable pruning, green pesticide application, and seedling grafting and breeding abilities; The comprehensive position requires the ability to coordinate horticultural projects, calculate costs, connect with customers, operate and maintain smart horticultural equipment, and manage fields in the park, while balancing practical skills and professional ethics.

2.2.2 Benchmarking of Professional Events and Certificate Assessment Points

The core assessment of the national horticultural competition includes four modules: floral creative design, fruit tree grafting, greenhouse cultivation plan design, and specimen production of pests and diseases; The assessment of 1+X Fruit and Vegetable, Horticulture Certificate is divided into three major sections: general theory, standardized practical operation, and comprehensive field operation. The difficulty of the assessment is in line with the entry requirements of special positions in the enterprise. After benchmarking, it was found that the competition focuses on creativity, speed, and standardized operations, the certificate focuses on process compliance, safety production, and basic practical operations, and the position focuses on mass production practical operations, cost control, and adaptation to production scenarios. The skill overlap of the

three is 72%, indicating the feasibility of integrating them into the curriculum.

2.3 Existing Problems in the Curriculum System of Traditional Horticultural Technology

2.3.1 The curriculum structure is subject based and lacks sufficient alignment with job requirements

Traditional courses are arranged in the order of plant basics, soil fertilizers, horticultural cultivation, and landscape aesthetics, with a high proportion of theoretical class hours and fragmented practical training projects. The teaching content focuses more on textbook theory and does not connect with the real workflow of annual production of enterprise greenhouses, flower arrangement order production, and batch breeding of seedlings. Students' semester training is disconnected from the production sequence of enterprise positions, and after graduation and employment, they need a second pre job training in the enterprise, resulting in low educational efficiency.

2.3.2 Independent certification teaching, serious waste of teaching resources

Colleges and universities offer separate competition training courses and certificate exam preparation classes, departing from regular classroom teaching; The difficulty of classroom teaching is lower than the assessment standards for competition certificates, and there is a lack of key and difficult techniques. Students' classroom learning cannot be directly used for preparation and certification, which not only increases the academic pressure on teachers and students, but also leads to the problem of repeated teaching of theoretical knowledge points and repeated consumption of practical training consumables. Classes, competitions, and certificates are incompatible with each other, and credit and content exchange have not been achieved.

2.3.3 Lack of course stratification and poor ability to adapt to learning situations

Vocational horticulture students are divided into general high school students and vocational school students related to agriculture. There are significant differences in students' horticultural foundations, and traditional courses have unified progress, content, and assessment, without setting up hierarchical expansion content. Students with weak foundations are unable to meet the basic exam requirements for certification, while students with strong abilities

lack competition and high school training content, making it difficult to achieve the triple educational goals of certification for all, competition for excellent students, and employment for all.

2.3.4 Single assessment and evaluation, not integrated into the competition certificate evaluation rules

The original course assessment mainly consisted of final written exams and simple practical training, with subjective scoring standards and the use of a single scoring model for teachers within the school. It did not introduce enterprise job evaluation standards, quantitative scoring rules for competitions, or standardized scoring systems for certificates, and ignored core evaluation indicators such as safety production, process standards, product quality, and homework efficiency. The validity of skill evaluation was insufficient.

3. Reconstruction and Design of Horticultural Technology Curriculum System under the Integration of Post Course Competition and Certificate

3.1 Principles and Overall Objectives of Curriculum Restructuring

3.1.1 Principles of Curriculum Restructuring

One is the principle of job adaptation, based on the temporal production needs of regional horticultural industry positions, and reorganizing course modules with work tasks; The second is the principle of integration and co construction, with regular teaching embedded in the examination centers for the competition and certification, without additional class hours, to achieve multi class integration; The third is the principle of hierarchical progression, designing courses according to the levels of foundation building in the first year, specialization in the second year, and on-the-job learning in the third year, to adapt to students with different student situations; The fourth is the principle of joint research between schools and enterprises, which involves collaborating with horticultural enterprise technicians, competition judges, and certificate assessors to jointly develop course content and ensure that standards are of the same origin; The fifth is the principle of equal emphasis on literacy, integrating the spirit of agricultural craftsmanship, green production, and ideological and political elements of food safety, and meeting the requirements of

agricultural education.

3.1.2 Overall Objectives of Curriculum Restructuring

Refactoring the three-year four-dimensional modular curriculum system and establishing a channel for mutual recognition of credits in on-the-job courses, competitions, and certifications; Realize 100% integration of professional core courses into 1+X certificate examination points, and 80% integration of core courses into practical modules of skill competitions; The pass rate of intermediate horticulture 1+X certificates for graduating students shall not be less than 85%, the participation rate in school level and above skill competitions shall exceed 60%, and the adaptation rate of graduates to corresponding employment positions shall be increased to over 80%. We aim to cultivate compound horticultural technical and skilled talents who understand production, master skills, have certificates, and can compete.

3.2 Overall Architecture of Four Dimensional Layered Progressive Curriculum System

Combining with the three-year vocational education system, breaking the original subject course ranking, constructing a four-dimensional curriculum system of "general education foundation layer core specialized layer comprehensive training layer expansion empowerment layer", embedding job, competition, and certification elements throughout the entire academic stage, and adapting to the laws of student growth and advancement.

3.2.1 First year general education foundation course layer (foundation adaptation)

Targeting all students, we will connect with the entry requirements for basic horticulture positions, 1+X certificate general theory examination points, and competition basic literacy requirements, and offer public basic courses and professional basic integration courses. The course includes six major courses: Ideological and Moral Education and Rule of Law, Modern Agricultural Ideology and Politics, Plant Growth Environment, Horticultural Plant Identification, Fundamentals of Green Plant Protection, and Horticultural Safety Production. Teaching is integrated into the enterprise's entry safety regulations, certificate general knowledge question bank, and competition plant recognition basic question types, consolidating plant

cognition, soil water and fertilizer, and pesticide use general abilities. All staff complete the certificate theory general knowledge learning, select outstanding students to enter the school competition reserve team, and build a solid foundation for on-the-job course competition certificate general use.

3.2.2 Core Special Course Layer for Second Year Students (Deep Integration)

As the core module of the system, it connects with specialized horticulture positions, competition practical operations, and certificate practical operation examination points, modularizes and splits core courses, and implements project-based teaching. Set up six modular courses including facility horticulture production, standardized cultivation of fruits and vegetables, creative floral design, seedling breeding and grafting, smart greenhouse operation and maintenance, and green prevention and control of horticultural pests and diseases. Each course is divided into basic tasks, advanced tasks, and advanced tasks: basic tasks are benchmarked against daily job assignments in enterprises, advanced tasks are benchmarked against 1+X intermediate practical assessments, and advanced tasks are directly benchmarked against provincial national competition practical projects. For example, in the floral design course, the basic module completes the daily bouquet production of flower shops, the certification module completes the practical operation of certificate floral design, and the competition module completes the creative floral architecture production, achieving a layered adaptation of employment, certification, and competition requirements in one class.

3.2.3 Third year comprehensive training course layer (on-the-job integration)

Relying on the joint construction of horticultural industry parks and floral training bases by schools and enterprises, we offer three major courses: comprehensive on-the-job training for horticultural positions, competition certification training, and entrepreneurial project training. Promote the mentorship system in enterprises, where students can rotate and practice in corresponding positions within the company. The results of job assignments can be used to offset course training credits and certificate practical credits; Offering elective courses for specialized competition certification training, voluntary registration for credit system management, and striving for excellence in

provincial and national horticultural skills competitions; At the same time, students are allowed to directly apply for the 1+X certificate assessment during their on-the-job period, and the practical operation records of enterprises are equivalent to the training hours of the certificate, achieving the integration of on-the-job, certification, and competition preparation.

3.2.4 Characteristic Expansion Empowering Course Layer (Personality Development)

Offering elective empowerment courses that cater to students' differentiated development directions, divided into three types of elective courses: employment oriented, certification oriented, and entrepreneurship oriented. Offering courses on horticultural store operation and park field management in the employment sector; Special skills for competitions and advanced 1+X certificate training courses are offered in the certification category; Entrepreneurial courses such as courtyard gardening design and potted plant e-commerce marketing are offered to meet the diverse development needs of students for targeted employment, skill enhancement, and independent entrepreneurship, and to improve the full coverage system of the courses.

3.3 Implementation Path of Integrated Course Integration of Post, Course, Competition and Certificate

3.3.1 Curriculum based job tasks: Refactoring project-based teaching content

The school and enterprise jointly break down the annual work tasks of horticulture positions, reconstruct teaching units based on the production sequence of fruit and vegetable spring planting, summer management, autumn harvest, and winter care, and abandon chapter based teaching. Directly use enterprise green plant maintenance orders, floral commercial orders, and greenhouse quality improvement projects as classroom teaching projects, and relocate teaching venues to enterprise fields and floral workshops, achieving classroom as job, homework as product, and practical training as on-the-job training.

3.3.2 Competition Standards Classroom based: Benchmarking Competition Quantitative Teaching

Integrate the timeliness standards, craftsmanship standards, and finished product scoring standards of the Horticulture National Competition into daily training scoring, and

unify the specifications of training tools, homework processes, and finished product standards. Regularly conducting monthly class skill exams and school level horticultural skill competitions, replacing final practical training exams with on campus competitions, allowing students to adapt to the competition pace on a regular basis, and reducing the cost of later preparation and adaptation.

3.3.3 Certificate Examination Points and Learning Differentiation: Implementing Mutual Recognition of Competition and Certificate Credits

Establish a credit exchange mechanism in accordance with the credit recognition rules of the Provincial Department of Education: Obtaining an intermediate 1+X certificate in horticulture can be used to offset core professional training credits; Winning awards in horticultural skills competitions at or above the provincial level can be used to offset elective expansion credits; If the final assessment of the course is passed, the certificate corresponding to the general education subject can be exempted, reducing repeated learning and opening up a channel for credit exchange between learning, certification, and competition.

4. Implementation Guarantee, Practical Effectiveness, and Optimization Strategies of the Curriculum System

4.1 Diversified Guarantee Mechanism for Course Implementation

4.1.1 Dual teacher guarantee for teaching staff

Establish a four element teaching team consisting of full-time teachers on campus, enterprise horticulture technicians, competition referees, and certificate assessors. Regularly select on campus teachers to join horticultural enterprises for rotation and training, and obtain qualifications as 1+X assessors and competition judges; Hire senior floral designers and park technicians to be stationed in the classroom, responsible for practical teaching of the position; Hiring competition experts to conduct semester training guidance, filling in the gaps of full-time teachers' competition teaching, and building a composite teaching staff team for on-the-job course competition certification.

4.1.2 Integrated guarantee of training venue

Upgrade the smart horticulture greenhouse and flower arrangement standardization training room on campus, and upgrade the training

equipment to meet the standards of national competition venues and certificate assessment venues; Deepen the joint construction of off campus training bases between schools and enterprises, divide the venues into four areas: teaching and training area, certificate assessment area, competition and training area, and enterprise production area, achieve one multi-purpose venue, and simultaneously meet the needs of daily teaching, certification and evaluation, competition and training, and enterprise production, optimizing the utilization rate of training materials.

4.1.3 Integration guarantee of evaluation

Build a four-dimensional integrated evaluation system and change the single assessment mode at the end of the semester. Comprehensive score=practical job performance score (40%, scored by enterprise masters)+classroom coursework score (30%, scored by on campus teachers)+competition certificate participation score (20%, bonus points for participation and certification)+professional ethics score (10%, safety production and attendance compliance), fully benchmarking enterprise performance evaluation, competition scoring, and certificate evaluation rules, achieving integrated evaluation.

4.2 Effectiveness of Curriculum Reform Practice

4.2.1 Improving the Quality and Efficiency of Teaching

Selecting the horticulture major classes of the 2022 and 2023 levels in our school for comparative practice, after restructuring the curriculum system, the redundant class hours of the major were reduced by 12%, and the proportion of practical training projects that fit enterprise positions was increased to 91%. There is no need to separately set up pre exam and pre competition coaching classes, and the academic pressure of teachers and students is effectively reduced. The classroom practical training products can be directly supplied to enterprises for commercial use, achieving two-way empowerment of teaching revenue.

4.2.2 Steady improvement of students' comprehensive abilities

Since the implementation of educational reform one year ago, the pass rate of 1+X intermediate certificates in horticulture for class students has increased from 67% to 86%. The number of winners in school level and above skill competitions has increased by 42% year-on-year.

The probationary period for graduates entering horticulture related enterprises has been shortened by nearly one month, and the speed of job acquisition has significantly accelerated. The satisfaction of enterprise employees has significantly improved, and the employment salary of students has slightly increased compared to the same period in previous years.

4.2.3 The characteristics of professional education gradually become prominent

The specialty has formed the characteristics of "sequential production+layered teaching+competition certification empowerment" in horticulture education. The course resources and practical training standards can radiate to similar agricultural vocational colleges in the region, while helping the specialty to complete the construction of double high agricultural majors, deepen long-term cooperation between schools and enterprises, connect with local modern agricultural industrial park talent targeted training projects, and serve the revitalization of rural horticulture industry in the region.

4.3 Existing Practical Shortcomings and Optimization Strategies

4.3.1 Shortcomings in Existing Practices

One is the niche emerging horticultural industry, such as succulent tissue culture and courtyard micro landscape, which have limited competition and certification resources, and the pace of course updates lags behind the new industry formats; Secondly, some agricultural off campus bases have limited scale, making it impossible for all staff to rotate and train synchronously during peak seasons; Thirdly, it is difficult for a small number of vocational school students with zero foundation to adapt to the hierarchical high school curriculum, and the level of refinement in hierarchical teaching is insufficient.

4.3.2 Long term optimization strategy

Dynamically linking industry associations, updating course modules once a year, incorporating new formats of smart horticulture and horticulture e-commerce examination points and competition projects; Expand small and medium-sized horticultural workshops, cultural and tourism horticultural sites, expand off campus job rotation sites, and implement staggered job rotation teaching; Add zero foundation tutoring micro courses for first-year students in horticulture, establish a resource library for online on-the-job courses and

certification micro courses, and facilitate students to independently identify and fill in gaps; Hold school enterprise competition certification teaching and research meetings every semester, dynamically adjust the key and difficult points of the curriculum, and continuously optimize the adaptability of the curriculum.

5. Research Summary and Prospects

5.1 Research Summary

This study indicates that the traditional disciplinary curriculum system for horticulture technology majors in vocational colleges cannot meet the comprehensive education requirements of on-the-job courses, competitions, and certifications. There are common problems such as the disconnection between on-the-job courses, the fragmentation of competitions and certifications, and the single evaluation. Based on job orientation, a four-dimensional hierarchical progressive curriculum system is reconstructed, which embeds job tasks, competition standards, and certificate examination points into the curriculum of the entire academic stage in layers. It is equipped with dual teacher teachers, integrated venues, and integrated evaluation guarantee mechanisms, which can effectively solve problems such as teaching repetition, skill disconnection, and weak employment adaptation. It can simultaneously enhance students' core abilities in employment, certification, and competition, and adapt to the goal of cultivating high-quality skilled talents in higher vocational horticulture.

5.2 Research Prospects

In the future, we can rely on the digital vocational education platform to build virtual simulation training courses for horticultural post courses and certificates, and break the limitations of training during agricultural seasons and site weather; Developing

characteristic courses in local horticulture in conjunction with the rural revitalization horticulture to the countryside project; Collaborate with multiple vocational colleges related to agriculture in the province to jointly build and share a competition certificate question bank and teaching project resources, create a regional standardized horticultural post course competition certificate curriculum paradigm, and comprehensively empower the cultivation of modern agricultural vocational education talents.

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