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Teaching Reform and Practice of the "Valve Testing Technology" Course under the Integration of "Position Curriculum Competition Certificate"

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Abstract: In the context of building a "skills-oriented society" in vocational education, the integration of "position course competition certificates" is the core path to enhance the quality of education and align with industry needs. As a core course in valve design and manufacturing, the teaching quality of "Valve Testing Technology" directly affects students' job adaptability and industry competitiveness. Addressing issues such as the disconnection between courses and positions, lagging integration of new technologies, and single evaluation methods, this paper, based on the concept of integrating "position course competition certificates", conducts research on content normalization, teaching system reconstruction, ideological and political integration, and evaluation innovation. It sorts out the intrinsic connections between positions, competitions, and certificates, constructs a "four-in-one" reform framework, and provides practical references for curriculum reform in equipment manufacturing majors in higher vocational education.

Keywords: "Position Curriculum Competition Certificate", "Valve Testing Technology" Course, Curriculum Reform, Vocational Education, Integration of Industry and Education.

1. Introduction

The 2021 National Vocational Education Conference clearly stated the requirement to "deepen the integrated cultivation of 'position curriculum competition certificate'," providing a scientific framework for the cultivation of technical and skill talents in vocational education. As a core hub for the pump and valve industry, Wenzhou is undergoing a transformation towards high parameters, high precision, and intelligence, which poses higher demands on valve testing technical talents. "Valve Testing Technology," as a core course, faces issues such as a disconnect between content and positions, a single teaching mode, and a one-sided evaluation system in traditional teaching, leading to a long adaptation period for graduates. Therefore, this paper takes this course at Yongjia College of Wenzhou Polytechnic as the research object, relies on local industrial resources to carry out an integrated reform of "position curriculum competition certificate," and constructs an educational mode featuring "position orientation, competition leadership, certificate connection, and ideological and political empowerment," providing practical reference for the reform of engineering courses.

2. The Connotation and Advantages of the Integration of "Position Course Competition Certificate" in Vocational Colleges

(1) The Core Connotation

The "position course competition certificate" integration seamlessly combines elements such as enterprise job requirements, course teaching, vocational skill competitions, and professional qualification certificate assessments, forming an educational system that "sets courses based on positions, promotes learning through competitions, verifies learning through certificates, and integrates courses, competitions, certificates, and positions." The core logic is to break down barriers between various elements and achieve a deep connection between education and teaching, industry needs, and skill evaluation. In this system, "position" is the fundamental guide, corresponding to the actual job tasks, ability requirements, and professional standards of enterprises, and is the starting and ending point of curriculum reform; "course" is the core carrier, which, through content reconstruction and innovative models, meets job requirements, competition standards, and certificate requirements, achieving the unity of knowledge impartation and skill cultivation; "competition" is an important engine, which injects vitality into teaching and helps students improve their skills through the cutting-edge technologies, innovative thinking, and competitive standards it embodies; "certificate" is the evaluation yardstick, with the assessment standards of professional qualification certificates providing a standardized basis for curriculum evaluation and serving as a key proof of students' job competency. These four elements are interrelated and mutually supportive, forming a complete educational closed loop.

(2) The Practical Advantages

The "position course competition certificate" model possesses distinct practical advantages, comprehensively empowering the cultivation of vocational education talents. It starts from the actual needs of enterprise positions, surveys job tasks and competency requirements, and translates them into teaching content and evaluation standards. This achieves precise alignment between teaching and production in various aspects such as skills, professional ethics, and work norms, allowing students to be exposed to real-life corporate scenarios and requirements while still in school. Upon graduation, they can quickly adapt to their positions, effectively shortening the pre-job adaptation period. Simultaneously, this model innovates the talent cultivation path by integrating the competitive, challenging, and innovative aspects of vocational skills competitions into daily

teaching. Competitions promote practice and learning, helping students enhance their skills and fortitude through competition. The employment empowerment role of professional certificates clarifies learning goals, further stimulating students' learning motivation and enthusiasm[1]. Furthermore, practical skills training, as the core advantage of vocational education, is strengthened. By reconstructing practical content, innovating practical models, and increasing the proportion of practical class hours, students are encouraged to "learn by doing and do by learning," significantly enhancing their hands-on operation abilities and problem-solving abilities, highlighting the characteristics of vocational education types. It also promotes collaborative participation among schools, enterprises, and industry associations. Enterprises are deeply involved in curriculum design, teaching evaluation, and practical guidance, while industry associations provide vocational skills standards and competition resources. Schools are responsible for teaching implementation and talent cultivation, forming a "industry-education collaboration, multi-party linkage" educational community. While enhancing the quality of talent cultivation, it promotes resource sharing and complementary advantages between schools and enterprises, achieving effective multi-chain connection[2].

3. Teaching Reform and Practice of the "Valve Testing Technology" Course under the Integration Background of "Position Curriculum Competition Certificate"

Relying on the advantages of Wenzhou's pump and valve industry, Yongjia College of Wenzhou Polytechnic has partnered with local leading enterprises and industry associations to carry out the reform practice of "position curriculum competition certificate" integration and reform, with the "Valve Testing Technology" course as the carrier. The specific path is as follows:

(1) Reconstruct the course content system to achieve content normalization for "position course competition certificates"

The course content serves as the core carrier for the integration of "position curriculum competition certificate". The reform begins with the reconstruction of course content, following the path of "position demand research-competition content extraction-certificate standard alignment-content normalization and integration", to establish a scientific and reasonable course content system[3].

To achieve precise alignment between course content and job positions, competitions, and certificates, we have constructed a "three-dimensional and integrated" course content system through a three-step approach. Firstly, we conducted in-depth job demand research, employing the SWOP research method and practical expert workshops. We visited over 10 typical valve enterprises in Wenzhou, including Liangjing Group and Chaoda Valve, to systematically sort out six major core work tasks such as valve blank quality inspection, non-destructive testing (NDT), and pressure testing, as well as five core competency requirements in equipment operation, detection data analysis, and standard application. This led to the formation of the "Valve Testing Position Competency Analysis Report," laying a solid foundation for the reconstruction of course content. Secondly, we systematically extracted content related to competitions and certificates, selecting relevant events such as the Ministry of Human Resources and Social Security's NDT Technician Vocational Skills Competition and Instrument and Meter Manufacturing Technician Vocational Skills Competition. We analyzed the innovative content reflecting new industry technologies such as high-parameter valve testing technology and intelligent testing equipment operation. At the same time, we conducted an in-depth analysis of the assessment standards for vocational skill level certificates such as "NDT Technician" and "Material Physicochemical Analysis Technician," sorting out core knowledge points and skill requirements to ensure precise alignment between course teaching and certificate assessment core requirements. Finally, we integrated knowledge content, organically merging the same or similar knowledge points from job tasks, representative competition tasks, and certificate assessment tasks. The course content system was constructed according to the "basic module + core module + extended module" approach: the basic module covers general content such as basic testing knowledge and safety regulations, the core module focuses on core job tasks and incorporates key points for certificate assessment, and the extended module introduces innovative competition content and technologies required for industrial upgrading. These three modules correspond to basic job requirements, core competency development, and career development needs, respectively, comprehensively supporting students' skill improvement and professional growth.

(2) Innovate teaching modes and methods to enhance the effectiveness of teaching practice

To enhance the effectiveness of teaching practice, the curriculum innovatively adopts a teaching mode method that integrates "project-based + blended" approaches. With task-driven learning as the core, it combines online and offline resources with theoretical and practical teaching, integrating job engineering, competition innovation, and certificate standardization into the entire teaching process, achieving an integrated education of "teaching, learning, practicing, competing, and testing".

Project-based teaching takes the entire process of valve inspection as a clue, breaking down the core module into six teaching projects. Each project consists of several task units, organized in a "task-driven" manner. For example, the "Valve Non-destructive Testing" project includes tasks such as "Ultrasonic Testing Operation and Data Analysis" and "Radiographic Testing Process Design and Implementation", all of which simulate real-life corporate work scenarios. Students are required to work in groups to complete the entire process, including scheme design, equipment operation, data processing, and quality assessment, thereby cultivating their engineering practical abilities and team collaboration skills. The teaching emphasizes the engineering nature of job positions, the innovativeness of competition tasks, and the standardization of certificate assessments. By simulating real-life scenarios, students become familiar with job requirements, competition real questions are introduced to stimulate innovative thinking, and operational processes are standardized according to certificate standards. At the same time, a blended teaching approach of "online + offline" and "theory + practice" is implemented. Online, teaching videos, standard specifications, case analyses, and other resources are pushed through the Chaoxing Learning Platform to facilitate students' autonomous learning and consolidation; offline, case studies and situational teaching methods are used to

organize discussions and practical training. Taking the "Valve Pressure Test" teaching as an example, students first preview enterprise operation videos, national standards, and typical cases through the online platform. Then, practical training tasks set up in a simulated production scenario are arranged at the training base. Students work in groups to complete tasks such as scheme design, equipment debugging, and test operations. Finally, a simulated competition is organized, and certificate assessment requirements are aligned for commenting and guidance, comprehensively enhancing teaching effectiveness.

(3) Optimize the curriculum evaluation system to achieve diversified and multi-dimensional evaluation

To comprehensively evaluate students' professional abilities, the curriculum establishes a diversified and three-dimensional evaluation system centered on "tripartite integration". It implements process-based evaluation throughout the entire process and establishes a mechanism linking evaluation to compensation. This approach ensures the scientific and comprehensive nature of the evaluation, fully stimulates students' learning motivation, and achieves a win-win situation for schools, students, and enterprises[4].

The evaluation system is led by industry enterprises, collaborating with schools and industry associations to establish a ternary integration system of "enterprise job requirements+school teaching content+certificate assessment standards". It covers three dimensions: professional skills (60%), professional ethics (30%), and innovation ability (10%), respectively assessing practical operation and problem-solving abilities, daily performance and professional conduct, and innovative performance in practical training and competitions. At the same time, it breaks the "one exam determines one's fate" model, integrating evaluation throughout the entire teaching process. Classroom performance, online learning, practical training operations, simulated competitions, certificate acquisition, and final comprehensive assessment each account for a certain proportion. Among them, practical training operations are evaluated by a dual-mentor system of "enterprise mentors+school teachers", and simulated competitions are graded according to competition standards. In addition, an agreement has been reached with five valve enterprises in Wenzhou to link evaluation grades (excellent, good, qualified) with initial job salaries. Excellent candidates are given priority in hiring and a 20% higher salary, effectively connecting talent evaluation with employment incentives.

(4) Improve the construction of the support system to ensure the implementation and effectiveness of reforms

To ensure the implementation of curriculum reform, we will improve the support system from three aspects: teacher resources, practical training, and school-enterprise cooperation. We will create conditions for the integration of "position curriculum competition certificate" to lay a solid foundation for the quality of talent cultivation.

In terms of faculty development, a mechanism of "mutual appointment and two-way exchange between schools and enterprises" has been established. Teachers are sent to enterprises for temporary duty training, and enterprise experts are employed as part-time teachers. Teachers are encouraged to participate in competition guidance and certificate examiner training. Currently, two members of the research team have been awarded the title of National Technical Expert, one is a senior vocational skill certificate examiner, and two have front-line work experience in enterprises. In terms of practical training conditions, relying on the existing two major practical training bases for valve assembly and commissioning, as well as material physicochemical testing, and over 30 sets of professional equipment, various testing practical training projects are carried out. A training base is jointly established with the Zhejiang Special Equipment Inspection and Research Institute to achieve the integration of practical training, training, and certification. At the same time, real-world testing projects from enterprises are introduced to drive teaching through the production process. In terms of school-enterprise cooperation, a school-enterprise cooperation committee composed of representatives from three parties has been established to jointly develop curriculum standards and evaluation systems. Enterprise experts are regularly invited to campus to give lectures, and off-campus practical training bases are jointly established to provide internship positions. Enterprises are deeply involved in the evaluation of students' professional abilities to ensure that talent cultivation meets enterprise needs.

4. Conclusion

The integration of "position course competition certificates" is a key path for vocational education to enhance quality and foster excellence, as well as to align with industrial development. This article, taking the "Valve Testing Technology" course as a carrier, constructs a reform model from four dimensions: content reconstruction, teaching innovation, evaluation optimization, and guarantee improvement. The results are remarkable: there has been a significant increase in students' acquisition rate of vocational skill certificates and competition award-winning rates; the job adaptation period for graduates has been significantly shortened; satisfaction with enterprise and teaching evaluations has risen significantly; the course has been rated as a school-level ideological and political construction course, and its experience has been promoted.

Reform practices have shown that the integration of "position course competition certificates" requires multi-party collaboration and dynamic improvement. In the future, a dynamic update mechanism for elements will be established to deepen the integration of ideological and political education with professional education, enhance enterprise evaluation participation, expand the promotion and application of reform models in engineering majors, continuously optimize the talent cultivation model based on industry needs, and contribute high-quality technical and skilled talents to the construction of a "skilled society" and the transformation and upgrading of regional industries.

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References

[1] Zhang Xiaojin. Exploration of Professional Course Construction in Higher Vocational Colleges under the Integration of "Post, Course, Competition, and Certificate" [J]. Vocational and Technical Education, 2023, 44(02): 58-62

[2] Qin Guofeng, Li Guoshuai, Mi Peiwen, et al. Vocational Education Curriculum Development from the Perspective of Integrating "Post, Course, Competition, and Certificate":

Essentials, Strategies, and Paths [J]. Vocational and Technical Education, 2022, 43(32): 42-48

[3] Wei Shidong. Construction and Implementation Path of the "Post-Course-Competition-Certificate" Integrated Curriculum System for Higher Vocational Automobile Testing and Maintenance Major [J]. Education Observation, 2025, 14(25): 45-48

[4] Deng Ting. Research on Teaching Reform of "Single-chip Technology and Application" Course in Higher Vocational Education Based on the Integration of "Post, Course, Competition, and Certificate" [J]. Teachers, 2024 (29):120-122