WHIOCE PUBLISHING PTE. LTD.
PROVIDING
FIRST-CLASS SCIENTIFIC INFORMATION
FOR TOP SCHOLARS

2025 Volume 3, Issue 5
Lecture Notes in Education, Arts, Management and Social Science
ISSN(Online): 2705-053X

Research on the Implementation Path of the "Post-Course-Competition-Certificate" Integrated Education Model for the Industrial Robot Technology Major

Xiaofeng Li
Zhangjiajie Institute of Aeronautical Engineering, Zhangjiajie 427000, Hunan, China

**Author to whom correspondence should be addressed.*

Abstract: This paper deeply explores the implementation path of the "Post-Course-Competition-Certificate" integrated education model for the industrial robot technology major, aiming to improve the quality of talent cultivation and meet the needs of industrial upgrading. By accurately aligning with job requirements, optimizing the curriculum system, integrating skill competitions, promoting the certification system, and building a teaching staff, a comprehensive education system is constructed to provide references for relevant majors in higher vocational colleges.

Keywords: Industrial robot technology; Post-Course-Competition-Certificate; Integrated education; Implementation path

Online publication: June 26, 2025

1. Introduction

The "Post-Course-Competition-Certificate" integrated education model has been an important concept in the field of vocational education in China in recent years. It is of great significance for enhancing the influence of vocational education and promoting the high-quality development of vocational education. In October 2021, the General Offices of the Central Committee and the State Council issued the "Opinions on Promoting the High-Quality Development of Modern Vocational Education", further clarifying the necessity of the "Post-Course-Competition-Certificate" integrated education mechanism. The proposal of this model has pointed out the direction for the reform of the professional talent cultivation model.

As one of the core majors related to the intelligent manufacturing field, the industrial robot technology major faces the dual challenges of increasing talent demand and improving cultivation quality. Firstly, enterprises have increasingly higher requirements for the knowledge structure and skill levels of professionals in this major, and the traditional talent cultivation model in vocational colleges is difficult to meet enterprise needs. Secondly, vocational colleges have deficiencies in teaching staff construction, practical teaching conditions, and the depth of school-enterprise cooperation, which affect the improvement of talent cultivation quality. Therefore, deeply studying the implementation path of the "Post-Course-Competition-Certificate" integrated education model has important practical significance for breaking

through the development dilemma of the major and enhancing the ability of vocational education to serve industrial upgrading.

2. Interpretation of the "Post-Course-Competition-Certificate" integrated education model

The "Post-Course-Competition-Certificate" integrated education model is an important innovation in the field of vocational education in China. It aims to cultivate high-quality technical and skilled talents who meet the needs of industrial development through the organic combination of posts, courses, competitions, and certificates. "Post" refers to vocational posts and job requirements, clarifying the direction of education; "Course" refers to the curriculum setting and content design in colleges and universities, which is the carrier of education; "Competition" refers to various vocational skill competitions at all levels, providing a platform for practical training and skill demonstration; "Certificate" is a vocational qualification certificate or vocational skill level certificate, which is an authoritative certification of students' vocational skill levels. Although the four elements of "Post-Course-Competition-Certificate" are relatively easy to understand individually, the core lies in the overall grasp and understanding of the "Post-Course-Competition-Certificate" as a whole. The "Post-Course-Competition-Certificate" integrated education model shows diverse characteristics in the practice of the vocational education field. The existing models can be mainly summarized into the following types.

2.1. Multiple integration model

Based on their own school-running characteristics and professional advantages, colleges and universities selectively integrate two or three elements of "Post-Course-Competition-Certificate". The "Course-Certificate Integration" model focuses on integrating the assessment standards and content of vocational qualification certificates into the professional curriculum system, enabling students to obtain corresponding vocational qualification certificates while completing their studies. The "Competition-Teaching Integration" model introduces the projects and standards of vocational skill competitions into daily teaching, promoting teaching through competitions and improving students' practical operation skills[1].

2.2. Education chain model

Taking "Post-Course-Competition-Certificate" as the logical main line, a complete education path is constructed. "Post" serves as the starting point, clarifying the talent cultivation goals and directions; "Course", "Competition", and "Certificate" are successively regarded as intermediate links, which are interconnected and progressive, jointly supporting the whole process of achieving the education goals. Specifically, the curriculum system is designed and optimized around job requirements, the competition projects echo the curriculum content, and the vocational certificates serve as an important standard for measuring whether students meet the job requirements[2].

2.3. Curriculum-centered integration model

"Course" is regarded as the core and hub of the "Post-Course-Competition-Certificate" integration. Colleges and universities, based on curriculum construction, ensure that the curriculum content is closely aligned with job requirements through "determining courses according to posts"; "teaching according to certificates" integrates the assessment key points of vocational qualification certificates into curriculum teaching, enabling students to master the key skills required for the certificates; "promoting courses through competitions" utilizes the influence and orientation of vocational skill competitions to stimulate students' learning interests and enthusiasm, and promotes continuous innovation in curriculum teaching[3].

3. Difficulties in promoting the "Post-Course-Competition-Certificate" integrated education in the industrial robot technology major

3.1. Lack of coordination within each element of "Post-Course-Competition-Certificate"

The difficulty in implementing the "Post-Course-Competition-Certificate" integrated education in the industrial robot technology major lies in the different talent cultivation goals and emphases of employers, vocational colleges, competition organizing committees, and certificate evaluation organizations. Enterprises pursue "specialized and refined" skills and hope that graduates have "plug-and-play" capabilities. Vocational colleges focus on cultivating morality and people, emphasizing the cultivation of students' comprehensive qualities and sustainable development capabilities. The competition organizing committee emphasizes skill depth and proficiency, and the certificate evaluation organization pays attention to skill standardization to ensure that students have industry-recognized vocational qualifications. These differences make it difficult for the various elements to form a joint force in the actual education process, affecting the quality of talent cultivation. To promote the "Post-Course-Competition-Certificate" integrated education model, it is necessary to solve the internal coordination problem of each element on the basis of clarifying the talent cultivation goals.

3.2. Complexity of the "Post-Course-Competition-Certificate" integration

This is mainly reflected in the difficulties in determining courses according to posts, integrating courses and competitions, and integrating courses and certificates. The graduates of this major are engaged in posts such as industrial robot operation and maintenance, system integration, and visual application, and the skill requirements for each post are different. The skill requirements of enterprises of different scales and in different industries vary significantly. Generally, the teaching resources of schools are limited and it is difficult to cover all aspects. It is necessary to clarify the key cultivation directions and rationally allocate resources to solve the problem of determining courses according to posts. In terms of course-competition integration, vocational skill competitions are highly difficult and professional, and their standards are significantly higher than the regular curriculum teaching standards. The competition training requires concentrated time and energy, which conflicts with the schedule of daily curriculum teaching and is likely to cause students to interrupt the study of some courses, affecting the teaching continuity. In terms of course-certificate integration, the assessment standards of various certificates are highly practical and industry-oriented. For example, the assessment of the industrial robot system operator certificate covers a wide range of contents. Integrating the certificate examination into the curriculum system requires a significant adjustment and optimization of the curriculum structure, which is a difficult task. In addition, the assessment time, form, and standards of the two are inconsistent, posing challenges to students and school teaching management, and it is difficult to replace the certificate examination with the curriculum assessment.

3.3. Insufficient ability of students to plan their learning paths

To promote the "Post-Course-Competition-Certificate" integrated education, students are the implementation objects, and their adaptability to this model needs to be considered. In the traditional model, the curriculum system has a single path, and students can follow the steps. However, in the "Post-Course-Competition-Certificate" integrated model, multiple learning paths are provided, covering aspects such as job internships, course learning, skill competitions, and certificate examinations, requiring students to have clear career planning and learning path planning abilities. When facing diverse career development paths, students are prone to confusion, difficult to quickly clarify their goals, and unable to concentrate their energy on in-depth learning and practice in a specific field. For example, when choosing a learning direction, students may want to master both industrial robot operation and maintenance skills and system integration knowledge, but end up dabbling in multiple directions without mastering the core skills deeply. This lack of planning ability makes it difficult for students to reasonably allocate their learning energy in the "Post-Course-Competition-Certificate" teaching model, difficult to achieve the expected teaching results, and is not conducive to

improving the quality of talent cultivation in schools.

3.4. Weak professional teaching staff

The implementation of the "Post-Course-Competition-Certificate" integrated education model for the major requires a higher level of teaching staff, but the current problem of a weak teaching staff is prominent. On the one hand, teachers of this major need to master rich interdisciplinary knowledge and practical skills. However, among the existing teaching staff, some teachers have long been engaged in theoretical teaching, lack enterprise practice experience, and have limited knowledge of cutting-edge industry technologies, making it difficult to meet the needs of practical teaching in the "Post-Course-Competition-Certificate" model. On the other hand, teachers lack the strength to promote teaching reform. To promote the "Post-Course-Competition-Certificate" model, teachers need to deeply study job requirements, integrate actual enterprise projects and competition standards into curriculum teaching, and carry out innovative reforms in teaching content and methods. However, currently, teachers have limited energy and ability in teaching reform, resulting in slow progress in teaching reform and affecting the overall effect of the education model.

4. Implementation paths of the "Post-Course-Competition-Certificate" integrated education

4.1. Establishing a talent evaluation standard and defining a unified education goal

In the "Post-Course-Competition-Certificate" integrated education model, different subjects have different understandings of talents. To achieve the education goal, it is necessary to coordinate the demands of all parties, form a unified understanding, and establish an open and diverse "talent standard". The "talent standard" for the "Post-Course-Competition-Certificate" integrated education should be jointly developed by multiple forces such as the government, schools, industries, and enterprises.

Taking the industrial robot technology major as an example, during the development of the "standard", colleges and universities can, according to the development characteristics of local enterprises and industries, connect with industry associations. The industry associations lead enterprises and colleges to jointly complete the development work, define a unified education goal, clarify the talent cultivation direction and specifications, and enable each education element to work in coordination around the common goal. Introducing the norms of vocational qualification certificates into the standard can improve the recognition of certificates by enterprises. Guided by the standard, colleges and universities can make curriculum construction more scientific and reasonable, closely integrate teaching content with enterprise needs, and improve teaching effectiveness. Students who meet the "talent standard" through learning have stronger job adaptation capabilities and professional qualities, and enhance their employment competitiveness. Finally, students participate in skill competitions organized by associations and enterprises, forming a talent selection mechanism. Ultimately, the "Post-Course-Competition-Certificate" integrated education is realized with the "talent standard" as the guide.

4.2. Constructing a modular curriculum system

The modular curriculum system can improve the utilization efficiency of teaching resources, flexibly arrange courses, and clarify the curriculum logic. It is an effective way to solve the implementation difficulties of the "Post-Course-Competition-Certificate" integration. The curriculum system is divided into basic quality module courses, industry foundation module courses, and career orientation module courses. The logical relationships between each curriculum module are clarified to avoid content repetition and disconnection. The curriculum content is more focused to avoid resource waste. According to job requirements and students' interests, the curriculum modules can be flexibly combined to meet the learning needs of different students.

Taking the industrial robot technology major as an example, the basic quality module covers public basic courses

and professional basic courses, laying a foundation for subsequent professional learning and helping students master basic scientific and cultural knowledge and professional theoretical knowledge. The industry foundation module includes the core courses of this major, such as Industrial Robot Technology Basics and On-Site Programming, cultivating students to master basic professional theories and core skills and providing support for subsequent career orientation learning. The career orientation module is connected with posts, competitions, and certificates, such as in the directions of industrial robot system integration, vision technology, fault diagnosis and repair, etc. Students can choose appropriate curriculum modules according to their own career plans, concentrate their energy on learning in a specific field, and improve learning effectiveness.

4.3. Establishing a comprehensive evaluation system

The evaluation system is an important means to guide students to plan their learning directions. By establishing a comprehensive evaluation system, students can be guided to carry out academic and career planning, clarify their learning directions, and achieve better learning results. The construction of the comprehensive evaluation system should include two aspects: the reform of the evaluation method and the expansion of the evaluation dimension. Establish a learning concept centered on vocational ability assessment, and strengthen process evaluation. For example, various methods such as project assessment, practical operation assessment, and group discussion assessment can be used to comprehensively evaluate students' learning results. In the "Industrial Robot Operation and Programming" course, through project assessment, students' work attitudes, teamwork abilities, and work quality during the project completion process are evaluated, guiding students to pay attention to the accumulation in the learning process. The expansion of the evaluation dimension incorporates all elements of "Post-Course-Competition-Certificate" into the evaluation system. For example, the results of skill competitions, enterprise practice results, and the acquisition of vocational qualification certificates are used as the basis for obtaining credits. For example, students who participate in various industrial robot technology application competitions and win awards can obtain corresponding credit rewards and be given extra points in the comprehensive quality evaluation, encouraging students to actively participate in competitions and practical activities and improve their comprehensive qualities.

4.4. Strengthening the integrated construction of the teaching staff

The teaching staff is the guarantee for implementing the "Post-Course-Competition-Certificate" integrated education. Considering the different requirements of the four elements of "Post-Course-Competition-Certificate" for teachers' abilities, talents from various aspects, including college teachers, enterprise mentors, and industry experts, should be integrated. They should work together through division of labor to jointly promote talent cultivation. Taking the industrial robot system integration post as an example, vocational school teachers are responsible for basic knowledge teaching and basic practical operation skill guidance, preparing students for obtaining vocational qualification certificates. Enterprise mentors guide students to participate in real enterprise practice project tasks, guiding students to complete project scheme design, equipment selection, system construction, programming and debugging, etc., improving students' practical abilities and problem-solving abilities. Industry experts give special lectures to broaden students' horizons, enhance students' understanding of the industry, and assist students in achieving breakthroughs in competitions.

5. Conclusion

The "Post-Course-Competition-Certificate" integrated education model for the industrial robot technology major is an important direction for the teaching reform of vocational education. By defining a unified education goal, constructing a modular curriculum system, establishing a comprehensive evaluation system, and strengthening the integrated construction of the teaching staff, teaching resources can be integrated, the quality of talent cultivation can be improved,

and the demand for high-quality technical and skilled talents in the industry can be met. The key to promoting this model lies in the true coordination of all elements. Colleges and universities need to continuously explore and practice to cultivate outstanding talents who adapt to industrial upgrading and provide strong skilled talent support for the development of the industry.

Funding

Research Project on the Exploration and Practice of the "Post-Course-Competition-Certificate" Integrated Education Path for the Industrial Robot Technology Major under the Background of Industrial Upgrading in Hunan Vocational Colleges in 2022 (Project No.: ZJGB2022185).

Disclosure statement

The author declares no conflict of interest.

References

[1] Zeng T, 2021, Practical Exploration of Cultivating High-Skilled Talents through the Integration of "Posts, Courses, Competitions, and Certificates". Chinese Vocational and Technical Education, 2021(08).

[2] Li X, Zeng X, Hu L, 2023, Construction of the Professional Curriculum System for the Integration of "Posts, Courses, Competitions, and Certificates" in Industrial Robot Technology. Education in the China Science and Technology Economy News Database, 2023(07).

[3] Zhang H, Wang H, Liu X, 2021, Practical Problems and Implementation Paths of the Integrated Education Model of "Posts, Courses, Competitions, and Certificates" in Higher Vocational Colleges. Education and Vocation, 2021(21).