



# Innovation and practice of talent cultivation model for the professional cluster of building equipment installation under the background of industry - education integration

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**Abstract:** Driven by technological advancements and industrial transformation, the building equipment installation sector is evolving toward comprehensiveness and intelligence, resulting in a surge in demand for composite technical talents. However, current talent cultivation systems struggle to meet industry needs due to the problems such as the mismatch between talent cultivation and job requirements and the disconnection between practical training and the construction site. In order to promote the high-level development of the professional cluster of building equipment installation and conform to the regional development strategies, the development directions of the industry, and the demands of market allocation, the professional cluster has taken measures such as leading the construction of the teaching team with "Great Craftsmen" and deepening school-enterprise cooperation based on the driving force of interests. It has proposed a school-enterprise dual-subject education mode led by "Great Craftsmen", which provides a model for exploring the school-enterprise education mode under the background of the deep integration of industry and education.

**Key words:** industry - education integration; professional cluster of building equipment installation; great craftsmen; collaborative education between schools and enterprises

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## 1 Research background

Driven by technological and industrial changes, the construction equipment installation industry is transforming towards comprehensiveness and intelligence, leading to a sharp increase in the demand for composite technical talents. However, the current talent supply cannot meet the needs of industry development. On the one hand, there are defects in the talent cultivation system. Practitioners find it difficult to possess both solid professional knowledge and interdisciplinary comprehensive qualities, resulting in insufficient technical complexity. On the other hand, the cooperation between schools and enterprises is not deep enough. Teaching is divorced from actual work scenarios, and practical teaching is scarce, which limits students' vocational abilities and employment competitiveness. In the face of this dilemma, the state has introduced policies such as the *Implementation Plan for National Vocational Education Reform* and *Made in China 2025*, emphasizing the deepening of integration of industry and education and promoting the digital transformation

of the construction industry [1] [2] [3]. This provides policy support for solving the talent dilemma and promoting the transformation and upgrading of the industry. Against this background, it is imperative to innovate the model of integrating industry and education.

After years of exploration, the building equipment engineering professional group has, based on the deep integration of industry and education, summed up a school - enterprise collaborative education model for the building equipment engineering technology major, namely "led by masters, simultaneously conducting talent cultivation and training". Through this model, the leading role of masters can be fully exerted, and talent training and skills training can be combined to improve the talent cultivation quality, meet the demand for compound talents in the building equipment installation industry, and promote the transformation and upgrading of the industry.

## **2 Main measures**

### **2.1 Optimize the teaching team**

It is necessary to actively strive for cooperation with the leading companies in China's construction industry, and set up Ding Rui's "Great Country Craftsman" studio, which will be equipped with a drone workstation, a BIM studio, and a smart installation studio. Ding Rui, a "Great Country Craftsman", will serve as the head teacher, guiding professional leaders and key teachers as studio students in the form of teachers and apprentices.

The country's first-class high-end electromechanical installation projects (such as China Zun and Shanghai Grand Theater) are modeled after the Chinese government. The world's leading electromechanical installation technology and concepts have enhanced teachers' professional ability and broadened their industry horizons. Under the guidance of "Great Country Craftsman", we have optimized the development layout of the electromechanical installation professional group, and revised the professional personnel training plan to provide guarantees for the cultivation of artisan talents.

### **2.2 Establish the practical training platform for the integration of industry and education**

After establishing a sufficient number of on-campus and off-campus training and internship bases, as well as a cluster of enterprises for student employment, the talent training program for the professional group strictly adheres to and optimizes the quantity and quality of practical teaching. This enhances the quality of professional talent cultivation, aligning it with the national standards of first-class professional groups.

In terms of teacher development, equal emphasis has been placed on academic education and training education. More than 10 professional teachers have been sent for in-depth learning of BIM.

Based on the first-class projects of the "Great Country Craftsman", collective discussions and improvements are carried out in the BIM Installation Studio, and the training of installation construction workers and installation quality inspectors is undertaken. The professional graduation design works of the students led by two team teachers won the first prize of the BIM installation graduation design, which confirmed the strength of the team. Due to the high degree of fit between the students training and the market, the students' technical skills have a certain degree of foresight, the employment rate and employment quality of students in the professional cluster are leading in the college. After graduation, they quickly grow into technical backbones of the installation units.

### **2.3 Based on the drive of interests, form a school-enterprise collaborative talent cultivation model**

Enterprises, teachers, and students are the actual participants and implementers of the integration of industry and education. Firstly, the needs of enterprises mainly include talent demand, economic benefits, and social benefits, which can be achieved through the school-enterprise collaborative talent cultivation model. Secondly, it is conducive to the development of teachers [4] [5]. Teachers' practical training in enterprises enables them to have a better understanding of the latest trends in the industry, improving their teaching skills, and ultimately achieving the goal of their professional

development. Thirdly, it is beneficial for the development of students [6] [7]. With the help of enterprises involved in the integration of industry and education, students can more conveniently and closely connect with businesses. By having close contact with society and the workplace, students can achieve an effective connection between learning and work practice, which can enhance their professional and employ ability skills, promote their employment, and ultimately help them achieve their growth and development goals.

The development needs of higher vocational teachers mainly involve establishing a stable school-enterprise cooperation mechanism based on the needs of three parties. With the support of the integration of industry and education, the training mode of "joint education by both the school and the enterprise with dual leaders" can be effectively implemented, which is mainly manifested in the following two aspects. The first one is complementary advantages. In school-enterprise cooperation, higher vocational colleges and enterprises can give full play to their respective strengths. Relying on its profound educational resources and professional teaching system, the school provides students with a systematic learning environment for theoretical knowledge. Enterprises, on the other hand, rely on their practical experience and cutting-edge technologies in the industry to build a practical operation platform for students. For example, in the automotive maintenance major, the school is responsible for teaching basic knowledge such as the structure and principles of automobiles, while the enterprise arranges for students to participate in actual vehicle maintenance projects, enabling them to get in touch with various advanced maintenance equipment and technologies. The two parties complement each other's advantages to help students grow. The second one is resource sharing. Based on the principle of resource sharing, both the school and the enterprise have constructed a training system model of "enterprise-based practical training + school-based practical training, curriculum textbooks + enterprise textbooks + X". The college provides practical training sites, infrastructure, and office spaces, while the enterprise continuously invests in and updates equipment to ensure the advancement of practical teaching. In terms of curriculum resources, based on new-type curriculum textbooks, enterprise textbooks are used to enhance students' professional skills. At the same time, high-quality online courses, massive open online courses (MOOCs), and network resources are introduced as supplements to broaden students' channels for obtaining knowledge and expand their horizons. For example, in the electronic information major, sharing resources such as enterprise research and development cases and technical materials has enriched the teaching content, allowing students to keep abreast of industry trends in a timely manner.

### **3 Conclusion**

In response to the technological and industrial transformation of the building equipment installation industry, which demands a surge in compound technical talents, this study highlights the critical role of deepening industry-education integration to address talent gaps and drive industrial upgrading. The current talent cultivation system faces dual challenges: practitioners lacking solid professional knowledge and interdisciplinary comprehensive qualities, resulting in insufficient technical complexity; insufficient practical teaching resulting from shallow school-enterprise cooperation. Supported by national policies, the study proposes an innovative "master-led, dual-track talent cultivation and training" model. This model integrates three core strategies including optimizing the teaching team, establishing the practical training platform for the integration of industry and education, and forming a school-enterprise collaborative talent cultivation model to achieve high-quality talent development, hoping to address the talent shortage in the construction industry and other fields, and promoting national digital transformation and industrial upgrading.

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## Conflicts of interest

The author declares no conflicts of interest regarding the publication of this paper.

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