

# CLOSE CONNECTION WITH SICHUAN RAIL TRANSIT INDUSTRY, STEP PROMOTION OF SCHOOL - ENTERPRISE COLLABORATIVE EDUCATION MODEL IN THE MIXED-OWNERSHIP INDUSTRIAL COLLEGE

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**Abstract:** To promote the development of the rail transit industry, this paper closely follows the development context of the regional rail transit industry and explores the education model of the mixed-ownership industry college. Taking the industry college as a link, it connects with the regional rail transit industry chain to form a professional group of urban rail vehicle application technology. Guided by the integration of industry and education, it has gradually explored an order-based school-enterprise cooperation model to form a cooperative foundation for joint talent cultivation, an elite co-education school-enterprise cooperation model to find a cooperation point for jointly cultivating highly skilled talents, and a joint-stock cooperative enterprise model to implement the industry-university-research cooperation and education model, which has effectively promoted talent cultivation quality.

**Keywords:** Higher vocational education; Industry college; Integration of industry and education; Education model

## 1 INTRODUCTION

The concept of the production and teaching integration entity comes from the practice of production and teaching integration, and gradually formed as the continuous deepening of people's cognition of the integration of industry and education activities. Experts like Monteiro believed that the production and teaching integration entity is a connector formed by schools, enterprises, and scientific research institutions based on their interest goals, which expresses the cooperative relationship among the participating entities [1]. The "education activity theory" believes that the production and teaching integration entity is a series of educational activities carried out by the participating entities to promote economic development and technological innovation [2]. Other experts like Lauritzen believed that production and teaching integration is a process of educational activities in which multiple entities interact to achieve knowledge transfer, technological research and development, and value creation [3]. There are three types: complete integration, partial integration, and false integration. Experts like Vasconcelos proposed that the production and teaching integration body is an organization in which enterprises, educational institutions, administrative agencies, etc. being cooperate to conduct knowledge production and dissemination [4]. In summary, production and teaching integration is an organization established to improve the quality of talent cultivation, serve regional economic development, and enhance enterprise competitiveness through a win-win policy, so as to promote deep corporation with education side and enterprise. Therefore, the integration of industry and education and school-enterprise cooperation are the basic school-running models of vocational education, which are the inherent requirements for cultivating high-quality workers and technical talents, as well as the key to running vocational education well.

Like Li Hongfeng proposed that the mixed-ownership school-running model of modern industry colleges refers to the in-depth cooperation in capital, knowledge, technology, and management between vocational colleges and social forces such as industry enterprises, through which to build and manage modern industry colleges, so as to jointly participate in vocational education through various forms [5].

Bao Jiguo believed that from a certain perspective, the industry college is a cross-boundary organization that combines the high-quality resources of universities and enterprises. It not only has a large number of high-end human resources and knowledge resources but also advanced institutional resources, which provides a sufficient material basis for the core competitiveness of the industry college [6]. Guided by the industry, the industry college combines the development trend of the industry with the innovation of subject professional knowledge, constructing a dynamic curriculum development mechanism with industry and trade experts, organically integrating the norms and elements such as vocational standards, enterprise standards, and school training standards into teaching materials and education and teaching, and forming a multiple talent cultivation quality evaluation mechanism with the participation of schools, industries, and third parties, realizing the transformation from a single evaluation subject to multiple evaluation subjects [7]. However, at present, most of the mixed-ownership industry colleges in China have problems such as unclear education models and ineffective implementation. To improve the ability to serve the regional industry and the quality of talent cultivation, Sichuan Vocational and Technical College of Communications has built a digital transportation industry college with regional railway industry enterprises. To solve the four problems in the school-running process (the disconnection between the professional group and the industrial chain, the disconnection between the talent

cultivation quality and the vocational post ability requirements of the industry and enterprises, the disconnection between the practical teaching conditions and the actual production situation of the industry and enterprises, and the disconnection between the teaching content and industrial front-line technology), it has taken theoretical research and two years of practical testing, forming a solution for step promotion of School- enterprise collaborative education path in the mixed-ownership industrial college.

## **2 IMPLEMENTATION PATH**

### **2.1 Formation of a Professional Group with the Connection of the Industrial Chain, Smooth the Channel between the Professional Groups and the Industrial Chain by Industry College**

The school-running purpose of mixed-ownership industry college established by vocational colleges and industry enterprises is to cultivate talents. Compared with ordinary vocational colleges, vocational mixed-ownership industry colleges pay more attention to the pertinence and adaptability of talent cultivation [8].

With the close connection of Sichuan regional rail transit industry chain, enterprise chain, and post group to the college form a professional group of urban rail vehicle technology. As the core major, the urban rail vehicle application technology drives the development of some majors such as urban rail transit electromechanical technology, urban rail transit operation management, mechanical manufacturing and automation, and track construction machinery application and maintenance. With common technologies as the core, it realizes a high degree of sharing among majors and effectively promotes the symbiotic growth of the professional group; Taking the industry college as a platform, enterprises provide the industry college with actual scientific research projects, training equipment on the production line, and technical experts, while schools provide enterprises with teaching sites, experienced teachers, teaching materials and curriculum resources, and research-oriented teachers, solving the problems of insufficient supply of structural talents and insufficient intellectual support for enterprises, as well as the problems of lack of actual scientific research projects, production line teaching conditions, and teaching funds for schools. The school and enterprise jointly build the council of the industry college to ensure the effective promotion of the school-running of the industry college and establish a long-term cooperation mechanism for the integration of industry and education; the school and enterprise jointly implement talent cultivation, jointly form a teaching team, jointly carry out scientific research projects, and jointly organize industry and enterprises to conduct technical training, realizing the synchronous development of majors and industries.

### **2.2 Order-Based School-Enterprise Cooperation with Rail Transit Operation Enterprises, Forming an Education System Based on "Post-Course-Competition-Certificate"**

The order-based talent cultivation model is a specific practical form of production and teaching integration concept, which more prominently reflects the talent cultivation concept under the guidance of market demand. The core of this model is that schools and enterprises jointly formulate talent cultivation programs and teaching plans based on actual post requirements and skill standards which ensures seamless connection between school teaching and market demand [9].

The college has carried out order-based school-enterprise cooperation with the Metro Operation Co., Ltd., and jointly formed an order class for the major of urban rail transit vehicle technology. Based on the job standards of rail vehicle mechanical maintenance workers and rail vehicle electrical maintenance workers, the school and the enterprise jointly built a set of talent training program and curriculum system.

It built a set of post standards and talent cultivation programs for the urban rail vehicle technology major with Chengdu Metro, CRRC Sifang, and CRRC Chengdu Changke, forming the core of professional construction; integrating the skill competition standards and skill guidelines with the "school-province-country-world" four levels into the curriculum, promoting learning through competitions to connect with the high-end skills of enterprises, and practicing skills through certificates to connect with the front-line posts of enterprises, forming a curriculum system closely connected with the front-line production posts of enterprises; integrating the competition content into the curriculum to realize the integration of competition and curriculum, developing enterprise-certified courses to realize the integration of curriculum and certificate, realizing the mutual embedding and symbiosis of curriculum-competition-certificate, forming an education system closely combining post-course-competition-certificate, improving the quality of professional talent cultivation, and the knowledge and skill levels of graduates, which have been unanimously recognized by the industry and enterprises.

### **2.3 Carry Out Elite Co-Education School-Enterprise Cooperation with Rail Transit Equipment Manufacturing Enterprises and Promote The Construction of Practical Teaching Resources through Competitions**

The college jointly carried out elite co-education school-enterprise cooperation with relevant enterprises of CRRC, teaching equipment manufacturing enterprises, and metro operation units to cultivate skill elites in the field of urban rail vehicle maintenance. The school and enterprise jointly hosted skill competitions, and enterprises donated competition technical equipment closely related to the production line of enterprises. The government, industry, and school jointly invested special funds to purchase competition technical equipment. After the competition, the competition equipment was transformed into teaching equipment, and a training teaching base closely related to the production line of

enterprises was built to provide practical teaching hardware guarantee for skill group cultivation; enterprise skilled experts and school teachers jointly formed a coaching team, jointly guiding and selecting competition contestants, jointly compiling competition technical standards, and jointly serving as referees for various competitions, cultivating a teacher team with skills on the production line of enterprises and providing a high-level teaching guarantee for skill group cultivation; through the joint training of skill elites, the accumulations of years of competitions were transformed into teaching materials construction, combining the maintenance manuals of enterprise production line posts and the test points of various skill competitions with the actual training courses, and jointly compiling a batch of training manuals and high-quality online open courses which closely related to the production line of enterprises to provide learning materials guarantee for skill group cultivation.

#### **2.4 Building Shareholding Cooperative Enterprise , Forming a Multi-Party Collaborative Education Mechanism for Industry-University-Research**

The college signed industrial investment agreements with scientific research institutes, the government, colleges and universities, and other units in order to jointly invest in the construction of a limited company serving industrial development, promoting the transformation of the industry to multi-modal. Taking the actual projects of the intelligent rail industry as the traction and the rail transit application technology collaborative innovation center as the operation platform, the school and enterprise jointly carried out research on topics such as intelligent rail vehicle maintenance technology and intelligent rail vehicle machine vision, jointly compiled standards such as the general technical conditions of intelligent rail express vehicles, jointly studied and explored the technological processes of the mechanical and electrical equipment of intelligent rail vehicles, transformed the cutting-edge technologies into teaching, formed teaching project cases and teaching curriculum resources, provided a technological atmosphere for students' innovation and entrepreneurship, opened up the channels from the forefront of industrial technology to scientific research project follow-up to the integration of new technologies into teaching, improved the timeliness and forward-looking of teaching content, provided qualified talents, standard specifications, and technical support for the industry, constructed a multi-party collaborative innovation mechanism for industry-university-research, helped the growth of the intelligent rail industry, and promoted the transformation and upgrading of the Sichuan rail transit industry.

### **3 IMPLEMENTATION EFFECT**

#### **3.1 The Depth of Production and Teaching Integration has Increased Significantly**

Relying on the linking role of the industry college, a long-term win-win cooperation mechanism between the school and enterprise has been formed. The school and enterprise have jointly built a number of national technical and skill platforms such as the training base for the rail vehicle technology project training , the rail transit application technology collaborative innovation center, the high-skilled talent cultivation base, and the productive training base. Through the construction of the center and platforms, the school and enterprise have jointly carried out talent cultivation, social services, scientific research, and other activities, significantly increasing the depth of production and teaching integration and improving the vocational education resources and talent cultivation ability of the college.

#### **3.2 The Ability to Serve the Industry has been Significantly Enhanced**

Based on the mixed-ownership industry college, the school and enterprise have jointly undertook scientific research projects, carried out technical research on the production line of enterprises, and enhanced the output and transformation of achievements of the industry college through patents, high-level papers, scientific research products, and other forms.

#### **3.3 The Teaching Effect has been Significantly Improved**

Through the collaborative education of the mixed-ownership industry college, the employment rate, the rate of working in the related major , employment quality of students, and the satisfaction of enterprises with the students have been greatly improved. Through the progressive competition system, students have achieved excellent results in skill competitions, won many national and provincial skill competition awards, from which promoted the teaching experience and applied in more areas .

### **4 EXPERIENCE SUMMARY**

With the development of the regional rail transit industry ,the college has explored the construction model and development path of the industry college, it has taken the industry college as a link to connect with the industrial chain forming a professional group, and carried out school-enterprise cooperation with enterprises in the industrial chain, and gradually exploring an order-based school-enterprise cooperation model to form a cooperative foundation for joint talent cultivation, an elite co-education school-enterprise cooperation model to find a cooperation point for jointly cultivating highly skilled talents, and a joint-stock cooperative enterprise model to implement the industry-university-research cooperation and education model, which has effectively promoted the improvement of talent cultivation quality.

## **COMPETING INTERESTS**

The authors have no relevant financial or non-financial interests to disclose.

## **FUNDING**

Sichuan Provincial Department of Education. Key Project for Vocational Education Talent Training and Educational Teaching Reform Research 2022-2024: "Research on the Matching Strategy between Sichuan's Vocational Education Resources and the Rail Transit Industry", Project Number: GZJG2022-493

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