

# Research on the Construction of Electronic Intelligent Manufacturing Specialty Group in Higher Vocational Colleges under the Background of "Double- High Plan"

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**Abstract:** Higher vocational colleges should build a high-level professional group from the perspective of professional group and Industrial Synergy according to the changes in the demand for technical talents due to economic, social and industrial development, so as to improve the adaptability and pertinence of talent training. The electronic intelligent manufacturing professional group of Chongqing C Vocational College explores the modern apprenticeship system and "1 + X" certificate system in the talent training mode. Build a "platform + module" curriculum system on the curriculum system. Curriculum resources: colleges and enterprises jointly build, open and share high-quality curriculum resources, virtual teaching resources and teaching resource library. Enhance the industry influence of professional group leaders, cultivate backbone teachers of technical experts, and build a team of high-quality part-time teachers. Build a productive training base and virtual factory with industry-leading enterprises, and build a practical teaching base combining education and training. Deepen the integration of industry and education by building a four party collaborative education management mechanism of "government, administration, enterprises and colleges", a college enterprise collaborative education management mechanism, promoting the coordinated development of professional chain and industrial chain, and creating a platform for the integration of industry and education. The construction scheme of professional group is effective.

**Keywords:** "Double-High Plan", Vocational Colleges, Professional Group, Industrial Chain.

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## 1. Introduction

The national economy is in a period of transformation and upgrading, and there is an urgent need for a large number of high-quality skilled talents in the electronic manufacturing industry. The Ministry of Finance and the Ministry of Education (2019) issued the opinions on the implementation of the plan for the construction of high-level higher vocational colleges and majors with Chinese characteristics (hereinafter referred to as the "Double- High Plan "). In the construction, we will vigorously support the development of high-quality higher vocational colleges and professional groups in terms of policies and funds through urgently needed technologies and talents based on high-end industries and high-end industries. Building a high-level professional group is one of the main construction tasks of high-level higher vocational colleges. The key to promoting the improvement of higher vocational education is to actively build a high-level professional group (Migao Lei and Guo Fuchun, 2019). Based on the actual situation of the college and in accordance with the requirements of the Ministry of education in the construction of double high colleges, promoting the connotation construction of high-level professional groups has become the key work actively engaged in by higher vocational colleges. The Chongqing municipal government of China has also launched the implementation plan for intelligent manufacturing (2019-2022), which clearly requires that local talents should be actively cultivated. Based on the construction tasks related to intelligent manufacturing, the specialty settings of relevant colleges and universities in Chongqing are adjusted adaptively. Promote the construction of school enterprise industry double bases, professional colleges, enterprise studios, practice bases and many other projects to the greatest extent. At the same time, we also need

to actively promote the cultivation of skilled talents to significantly strengthen their cultivation.

Compound skilled talents must be connected with the needs of regional advantageous industrial clusters. In accordance with the principle of "consistent service orientation, job-related, complementary professional advantages and professional resource sharing", they should take the core majors as the object, play their exemplary role and further drive the development of other majors (Tang Dan, 2010). The construction of professional groups in higher vocational colleges needs to innovate talent mode, form a new curriculum system, reform teaching materials and teaching methods, and create an intelligent teaching resource bank. The establishment of high-quality teacher team is the core of the development of professional groups, and the practical teaching base is the basis of the development of professional groups (Su Hong, 2021). Building a professional group needs to make it fit the attributes of occupation, openness, system, education and so on. It should be analyzed from the perspective of management and organization mode. Clarify the six construction tasks of professional group construction in professional structure, curriculum system structure, practical teaching base, structured teaching team, school enterprise cooperation service platform and multi-party collaborative development mechanism, so as to make the construction of professional group more systematic (Wu Shenggang and Guo Qingzhi, 2019).

The double high plan is to scientifically connect professional groups and industries, clarify the era logic between the two, and then give a scientific docking path. By strengthening the construction of professional groups, secondary colleges and departments can get a higher level of reform, so as to significantly enhance the vitality of colleges and departments. We should highlight the scientific

correspondence between industry and professional groups. In addition, the progress of higher vocational education, society and industry is also closely related. Different regions also need to jointly build different industrial structure layout according to the resource structure, and this structure will also affect the corresponding training specifications and systems (Nie Qiang, 2020). The key to creating a professional group is that higher vocational colleges should be based on the local economy and the logical relevance of industry and professional knowledge. They should better highlight the characteristics and positioning of the discipline. In addition, they should clarify the primary and secondary relationships of different majors in the group. The specific principles are: similar job groups, industry and discipline basis (Ding Zongsheng, 2014).

Through the study of literature, it is found that: with regard to the construction of professional groups, it emphasizes the construction level of teachers in Higher Vocational Colleges and the training conditions of college students; Specialty group is a collection of different specialties through many similar specialties, technologies and posts; Professional groups integrate industry and education in combination with relevant industries. "Core specialty driving" emphasizes the ultimate purpose of specialty group construction and the practical significance of specialty group construction. It is believed that one core specialty drives 3-5 specialties, so that different specialties can interact better. They promote and depend on each other, and can form a joint force well; Build a higher comprehensive quality teacher team (Double Teachers) guided by professional post needs and backbone majors; Carry out the training of skilled talents with the "double subjects" of enterprises, so as to improve the comprehensive strength of higher vocational colleges, further enhance the contribution of professional groups in the field of local economy and serve the social development well. Chongqing C vocational college mainly strengthens the construction of electronic intelligent manufacturing professional group from the aspects of talent training mode reform, curriculum system, teaching staff, practical teaching base, industry education integration and so on.

## **2. Reform of Talent Training Mode**

As the dual core and engine power of the construction of high-level higher vocational colleges, specialty construction and talent training, clarifying the relationship between them and promoting their coordination and unity should become the core thrust to clarify the motivation of the reform of talent training mode in high-level higher vocational colleges (Chen Enlun and Ma Jianyun, 2020). Under the background of the "Double- High Plan", the goal of higher vocational talent training mode is to vigorously promote industrial, regional economic and social development, and better meet the job requirements. According to the actual situation of students, we need to cultivate compound, personalized and forward-looking high-quality skilled technical talents who meet the needs of employment through the formulation of flexible school system, diversified learning paths and independent curriculum selection, Enable students to have strong career transfer ability and sustainable development ability, and maximize the influence of domestic higher vocational education. Facing the urgent need for talents in strategic innovative industries and advanced manufacturing business, we took the lead in introducing the pilot work of "1 + X" certificate from the three majors of microelectronics

technology, electronic information engineering technology and communication technology, and closely related it to the construction of courses, majors and teachers. When formulating the talent-training plan, we integrated the training contents, teaching related contents and optimized curriculum of the certificate.

### **2.1. Innovatively Implement the Talent-Training Mode of "Learning Post Integration and Gradual Progress By Stages"**

The college and enterprises jointly establish talent training objectives and talent training specifications, jointly build curriculum system, build teaching resources and implement talent-training plan, so as to realize the integration of teaching standards and production standards, professional technology and production technology, and professional culture and enterprise culture. According to the post ability, the teaching process is divided into four stages: Post recognition, post following, post rotation and post replacement. In the stage of post awareness, complete the basic humanistic quality, corporate culture and other courses in the college, carry out workplace experience learning in the enterprise, form the preliminary cognition of the enterprise post, form the production capacity of the basic post, and form the basic professional ability and quality. In the post following stage, teachers in the college are the main, supplemented by the implementation of enterprise masters, jointly implement teaching, and carry out skill training around the corresponding posts of students' majors to form professional post ability. In the stage of job rotation, enterprise masters and college teachers jointly implement teaching, and students rotate in various posts in the production process to comprehensively learn the technical skills of various posts. In the post placement stage, the technical training of production posts is carried out in the internship enterprise, focusing on the teaching of technical skills of the master of the enterprise and assisted by the teachers in the college, so that the students can master the professional and technical ability required to complete the work tasks in the post placement stage, improve the comprehensive professional quality, and become the prospective employee before graduation. Deepen the pilot work of modern apprenticeship talent training with Siemens, Haier and other enterprises.

### **2.2. Optimize Talent-training Programs and Establish A Dynamic Adjustment Mechanism for Talent Training Programs**

Track the post group, carry out the core task analysis of representative professional posts, and jointly establish and update the content of technology and knowledge with the enterprise. Optimize the talent-training plan of each specialty, revise it every academic year, and form a mechanism for dynamically adjusting the talent-training plan. We will promote the reform of the credit system. According to the requirements of the credit system, credit recognition and conversion standards are formulated and credit replacement is implemented from the dimensions of moral and intellectual education, 1 + X certificate, skill competition, scientific and technological innovation competition and scientific research ability. Students choose corresponding modules according to their majors. Explore cross specialty courses, minor in the second major, and implement a flexible college system.

### **3. Build A "Platform + Module" Curriculum System**

The core content of the professional group includes the way of curriculum system construction and the composition structure of curriculum resources. The construction of curriculum system should first analyze the technology and service fields faced by the professional group, clarify the talent needs and training objectives, and determine the professional group curriculum group by analyzing the job group tasks (Chen Xiuzhen, 2015). To build a professional group, we should comprehensively consider the applicable courses, disciplines and majors of logic, and also create it flexibly according to the needs of disciplines and professional development. The professional curriculum system mainly involves different modules such as expansion ability, comprehensive practice and professional direction (Li Zhonghua, 2020). Conduct scientific analysis on the ability requirements of the post group, so as to reasonably construct the relevant curriculum system combining each teaching module with the platform. Build three platforms: general courses, professional courses and expansion courses. According to different technical directions, students select corresponding modules to realize the mutual selection of top-level modules. The middle-level modules can be separated, while the bottom modules are shared by professional basic courses.

#### **3.1. Colleges and Enterprises Jointly Build, Open and Share High-quality Curriculum Resources**

Introduce national standards, foreign advanced vocational qualification standards and enterprise industry certification standards, effectively integrate new processes, technologies and norms, formulate modular curriculum standards, build teaching resources with MOOC as the core, and build information-based courses such as online open courses, high-quality resource sharing courses and online and offline hybrid courses. Build a course learning platform to provide better service support for students' autonomous learning and personal improvement.

#### **3.2. Colleges and Enterprises Jointly Build Modern Manufacturing Virtual Teaching Resources**

Taking the typical electronic intelligent manufacturing process as the main line, with the help of MR, AR and other related technologies, simulate the actual production process of enterprises, and build 3D visual and interactive virtual teaching resources and virtual scenes. Students can observe and experience, simulate operation, and teachers can set and complete assessment and evaluation according to teaching needs.

#### **3.3. Colleges and Enterprises Jointly Build A Teaching Resource Bank of High-level Professional Groups**

Break the boundaries of disciplines and curriculum structure, take modules as units, and bring the real production environment of enterprises into the construction of teaching resources. Construction of teaching resources for curriculum modules. Each course module produces granular resources such as short video, micro course, animation and virtual

simulation. The resource pool of the professional group can realize a higher level of sharing among the professional group, and create a learning environment free of time and space for students in the college, employees of cooperative enterprises and social learners.

### **4. Construction of Teaching Staff**

At the level of teacher team construction, based on the different post directions and curriculum module teaching composition of college teachers, scientifically optimize the composition structure of teachers, and select teachers with the same module and direction to form a scientific team. Provide teachers with better training opportunities in enterprises, make them have a more accurate judgment on the current industrial development, and significantly enhance their practical ability (Wu Shenggang and Guo Qingzhi, 2019).

#### **4.1. Enhance the Industry Influence of Professional Group Leaders**

Through research and academic exchanges at home and abroad, jointly carry out high-level academic research, scientific and technological research, technological reform and other projects with enterprises to improve business level and industry influence. Under the guidance of professional group leaders, focus on cultivating 1-2 skill masters who master the industry's top technology, and cultivate 2-3 experts who have extensive influence in the national vocational education industry and industry, so as to form a professional leader echelon.

#### **4.2. Training Technical Expert Backbone Teachers**

Formulate a training plan for key teachers, and select professional teachers with medium and senior professional titles and high academic qualifications for key training. Arrange key teachers to undertake the task of information curriculum development, participate in teaching and skill competitions, and guide students to participate in skill competitions. Within the closely cooperating enterprises, build special teacher workstations, arrange backbone teachers to go deep into the front line of the enterprise, cooperate with enterprise scientific and technological personnel to carry out scientific research, technical services and product innovation, and undertake the task of enterprise technological innovation.

#### **4.3. Introduce Skillful Craftsmen and Build A Team of High-quality Part-time Teachers**

Colleges and enterprises jointly build skill master studios, and hire enterprise masters and industry masters to take part-time courses in colleges; Hire highly skilled talents and skillful craftsmen to serve as professional course teachers in higher vocational colleges, and teach students relevant practical skills. Improve the part-time teacher pool, and the proportion of high-level part-time teachers reaches 50% of part-time teachers.

#### **4.4. Famous Teachers and Craftsmen Take the Lead to Build A High-level Double Division Team**

Establish a teaching innovation team. Introduce high-tech and skilled talents from enterprises, and carry out mentoring, full-time and part-time cooperation among the elderly, middle-aged and young people. Tackle key high-level

teaching reform projects, vigorously promote the mode of division of labor and cooperation in teaching, and improve the education and teaching ability of the team. Establish a scientific and technological innovation team. The college and enterprises jointly carry out expert cooperation to tackle key scientific and technological innovation and industry education integration projects. Provide technical services and technical training for industries and enterprises.

## **5. Build an Open and Shared Practical Teaching Base**

Under the background of "double high", the construction of training base and practice system should be carried out from the perspective of hardware support and software support, including the classified construction mechanism of training base and the management and operation mechanism of practice system (Qiang Weigang, 2014). Starting from the specific process of productive training and based on the key resource pool (KR-Pool) model, build a practical service platform integrating the combination of basic experiments inside the college and shared training bases outside the college (Liu Fang, 2015). Through the construction of training and teaching base, we can shoulder the task of out of school education and teaching, and better improve the training system of school enterprise combination, so that students can clearly understand the importance of internship and graduation internship.

### **5.1. Build A Productive Training Base for Electronic Intelligent Manufacturing with Industry-leading Enterprises**

Cooperating with China Electronics, ZTE, ASUS and other enterprises, based on the core skills of the corresponding posts of the professional group, and according to the process requirements and production process, the college and enterprise jointly build three productive training bases, including system integration, SMT and notebook computers. Actively accept orders from enterprises, promote the effective connection between students' specific training projects and enterprises' production projects, and create a training base that is progressiveness and productive.

### **5.2. Build Intelligent Manufacturing Virtual Factory with Siemens Co., Ltd**

Cooperate with German Siemens Co., Ltd. to introduce enterprise intelligent management system and build a training workshop management system based on SaaS cloud platform, CAPP intelligent process design and PDM product information management. With the help of MR and network space technology, build the country's first intelligent manufacturing digital virtual factory for Industry 4.0, and carry out intelligent manufacturing factory and digital workshop simulation construction projects and talent training in related fields for well-known enterprises and universities in the region.

### **5.3. Facing Advanced Manufacturing Technology, Build A Training Center Combining Education and Training**

Build four training centers for microelectronic packaging and testing technology, SMT production technology, modern communication and industrial robots. Teachers and students

participate in actual production, improve the hands-on practice ability of professional teachers and students in professional anti Trojan horse, carry out practical teaching, technology research and development, skill identification, innovation and entrepreneurship and other services, and form a high-level practical teaching platform for the combination of education and training.

## **6. Deepen the Integration of Industry and Education**

The integration of industry and education involves many aspects. Including government level, industry level, enterprise level, students, colleges, etc. In the context of double high colleges, the integration of industry and education in higher vocational colleges has been paid attention to in recent years, which is conducive to providing a lot of talent support for the future development of enterprises (Zhang Guoli, 2020). Through the in-depth development of the integration of industry and education, it plays a positive role in improving the quality of education, realizing economic transformation, strengthening economic development, enhancing entrepreneurial enthusiasm, increasing employment and many other fields.

### **6.1. Create A Joint Model of "Government, Industry, Enterprise and College"**

Make the four parties contact effectively, clarify the responsibilities and obligations of all parties, and they participate in talent training together. Through the efficient integration of different types of resources, colleges and enterprises can truly become a community of common destiny. Government functional departments give full play to their role in resource allocation and scheduling, and encourage enterprises to actively participate in Vocational Education in the form of tax relief or vocational education subsidies. Enterprises and colleges use the talent resources of both sides to set up relevant technical teams in technology research and development, teaching equipment, teaching management software development and other aspects as needed to make breakthroughs in key technologies.

### **6.2. Build A Collaborative Education Mechanism Between Colleges and Enterprises**

Let the teaching of higher vocational education be closely and efficiently integrated with the industrial development of society. In the process of educating people, we should implement and strengthen the dual subjects of colleges and enterprises. Strive to achieve more effective reproduction of students' teaching scenes, classroom teaching contents and production scenes, production management and processes in enterprises, so as to synchronize the production services of enterprises with the teaching cycle of classroom disciplines in colleges. At the same time, both colleges and enterprises fully implement the timely and effective dual mode in terms of teacher allocation, teaching venues, student (Apprentice) selection, semester teaching plan, semester teaching process implementation and semester teaching quality evaluation.

### 6.3. Promote the Coordinated Development of Professional Clusters and Industrial Chains

Vocational education and regional industries need not only coordinated development, but also innovation. If vocational education wants to have vitality, it must develop in coordination with the regional industrial chain. This requires vocational education to actively adapt to the development of industry in the process of development. The training object of vocational education is to meet the technical needs of local industries for talents. Of course, local industries also provide important support and effective guidance for professional construction. Therefore, the professional group and industrial chain should be organically coordinated, so that the target industries, emerging industries and pillar industries can be comprehensively and harmoniously developed, so as to create a community of interests integrating industry and education in local areas. The vocational education specialty is closely combined with the industry, and the industry can further drive the professional development and form a spiral development.

### 6.4. Build A High-level Integrated Development Platform of Industry and Education

A high-level industry education integration and collaborative development platform should strive to realize the integrated development of higher vocational education and industry. In the process of its platform construction, it should give full play to the functions of the platform in the following three aspects: first, enterprises with stable cooperative relations and related professional directions should form deep cooperation between colleges and enterprises. This requires that the industry education integration development platform can carry out in-depth cooperation between colleges and enterprises, explore new development cooperation modes, and provide an internship base for new cooperation paradigms. Second, we are willing to provide necessary support for talent training in Colleges and universities. This is the fundamental starting point and foothold of Higher Vocational Colleges in the implementation of the integration of industry and education. This requires the integrated development platform of industry and education to strengthen the cultivation of talents in the cultivation of students' professional spirit, the edification of corporate culture, the accumulation of professional and technical skills, innovation and entrepreneurship education, engineering practice and so on. Third, provide important support for the development of regional industries and industries. In the market economy, the first thing enterprises need to consider is their own income. If the cooperative relationship with colleges can not bring them benefits or tangible and intangible value, the motivation of enterprises to participate in vocational education is insufficient. This requires the establishment of an industry education integration development platform, which can improve production technology for enterprises, train new employees for cooperative enterprises, and provide enterprises with urgently needed technical employees. Through the platform, the professional teachers of the college need to give full play to their professional expertise to provide solutions for enterprises to solve the technical problems encountered in the process of production and development. The college gives full play to the advantages of human resources to provide key

training for new employees according to the needs of the enterprise. The students trained by the college can keep up with the technology and ability requirements of enterprises for new employees.

## 7. Conclusion

The electronic intelligent manufacturing professional group of C Vocational College connects high-end positions in the industrial chain such as intelligent manufacturing system integration, production and manufacturing, installation and commissioning, operation and maintenance management, inspection and maintenance, etc. Take the advantageous specialty microelectronics technology as the core specialty, and form a professional group of electronic information engineering technology, communication technology and intelligent control technology. The trained talents have firm faith and can achieve comprehensive development; Master the common basic knowledge and basic skills of manufacturing technology and control technology; Facing the electronic manufacturing industry, it is a compound technical and skilled talent engaged in process preparation, production and processing, equipment control and assembly and adjustment, system integration, intelligent transformation, quality inspection, etc. In the process of establishing professional group, it has clear logical relationship and can accurately locate talent training.

The construction of curriculum should be based on the process of professional construction and students' professional construction. Strengthen the training of professional talents' professional ability and the modular design of professional training courses. The key work is to deepen the integration of industry and education, build a shared and open training base, and strengthen the construction of double qualified teachers. Strengthen the management and guarantee measures related to the construction of professional groups to ensure the sustainable development of professional groups. It can be seen that the construction of professional groups requires a series of investment and integration of human, financial and resources. This is no longer a matter of a person or a major, but also the teachers of various majors in the professional group should unite to turn the class into a group. Collaborative teaching and management will promote the systematic project of professional group construction in an orderly manner.

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