

# Research on Personnel Training Mode of School-Enterprise Cooperation for Welding Robot Application and Maintenance

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**Abstract**—The development of the welding industry depends not only on the research and development of highly educated personnel, but also on the application and operation of the vast number of front-line workers, and it is the responsibility of vocational education to cultivate technical personnel and technical operators. The application and maintenance specialty of the welding robot in our hospital has been opened for nine years. The construction of teacher team and the teaching equipment are complete. However, in order to cultivate high skilled personnel, it is necessary to further explore the training mode of school enterprise cooperation. This paper focuses on the practical situation of the application and maintenance of welding robots in our hospital, and the training of the future cooperation personnel of the robot school and enterprise. The paper puts forward some opinions and views.

**Keywords**—School-enterprise cooperation; Training of Teachers; Practical Training Base Construction

## I. INTRODUCTION

In recent years, the supply and demand of welding professionals in technical colleges and universities is increasing. According to the overall goal of the national economic development in 2020 and the development trend of China's welding industry, the proportion of welded structure steel will reach 65% in the next 5-10 years, the welding automation rate will reach 70%, and the annual output of automobile will exceed 800-1000 million vehicles. The annual tonnage of shipbuilding is about 10 million tons. The quantity of welding will increase several times on the basis of the present, and the new material, new technology, new technology and new equipment are also emerging. The foreign experts believe that "welding as a precise, reliable and low cost processing technology with high technology connection material will still be an important part of manufacturing industry by 2020[1]. Welding is more widely applied to the joining of materials and other methods of increasing the added value of welded products have not yet appeared."

Therefore, training a large number of welding professionals to meet the social and economic needs is the top priority of welding education in higher vocational colleges. As an important part of the manufacturing industry, welding has always been a more important process for enterprises. With the

continuous development of the manufacturing industry, the demand for professional high-quality welding personnel is also rising, the problem of welding talent gap has not been solved, and the development of enterprises is restricted. Technical vocational colleges and universities should actively unite the enterprises to make teaching plans and cultivate a batch of welding compound talents with high welding technology and solid theoretical knowledge, which can add bricks to the development of manufacturing enterprises.

The major of welding robot application and maintenance in Xuzhou Technician College of Jiangsu province is to cultivate talents with the ability to operate welding robot and can be used to program welding. Since 2009, the application and maintenance specialty of welding robot has been set up, more than 7000 people have been trained in welding skills, more than 800 students in school, intermediate workers, senior workers and technicians at the training level. The graduates are assigned to Chinese and foreign enterprises such as Xugong Group, Xuzhou Bart, Xuzhou Caterpillar and so on. There are three welding robots. More than 60 sets of simulation software. 11 axis robot workstation, equipped with laser visual system, according to the existing resources of the college, although fully qualified and capable to undertake the teaching and practice tasks of the existing number of students, but to stand out, to train the state level key projects of the senior welder, is not the existing conditions can be realized [2]. How to carry out school enterprise cooperation, realize the sharing of resources between schools and enterprises, and win cooperation are the problems that we should consider at present.

The Ministry of Education Director Guo Chunming pointed out: German "dual system" is business-oriented, and our vocational education, but school-principal. The end result is a "hot" in school-enterprise cooperation. School-enterprise cooperation is a requirement for both schools and enterprises to seek common development and seek for mutual benefits based on their respective interests. In the cooperation practice, due to differences in ideology, target interests, ownership system and other aspects, as well as national policies lagging and other factors have caused the current school-enterprise cooperation to have certain obstacles. The "school-enterprise

cooperation" advocated in the running of vocational education in China is still on paper, and there is a lack of communication and exchange between schools and enterprises in cooperation, and there is a lack of system-level constraints and norms.

## II. STRENGTHENING TOP-LEVEL DESIGN TO ENHANCE COLLEGE'S ABILITY TO COOPERATE WITH ENTERPRISES

School enterprise cooperation is the internal need for the survival and development of mechanic colleges and is a systematic project. As one of the main bodies of school enterprise cooperation, the college first transforms the concept, strengthens the top level design, introduces the strong operational policies and management measures, establishes a special organization, promotes the cooperation level of the school enterprise, and strengthens the ability to cooperate with the enterprises actively.

### A. *To formulate development goals and mandates for school-enterprise cooperation*

In recent years, the college has adhered to the school-enterprise cooperation as the basic school-running system and important school-running philosophy of the college, as the main approach of innovative development and characteristic development. Determine the advancing a profound integration of secondary college, to boost industrial upgrading and economic development of skilled talents of university-enterprise cooperation general objective, formulate university-enterprise cooperation the overall planning, and will be included in the plan secondary school work points and various departments in the assessment of target every year, at the same time, increased publicity, a special meeting for many times, unified thought, raise awareness, docking industry experts, clarify ideas, to improve the recognition of partial teachers of university-enterprise cooperation, provided a solid foundation for the development of cooperation between colleges.

### B. *Revise the school-enterprise cooperation mechanism to achieve win-win cooperation*

School of university-enterprise cooperation work as an important gripper transformation spanning development, formed mainly led by the school or department head of university-enterprise cooperation working committee, regular research university-enterprise cooperation, coordinate to deal with the problems existing in the cooperation between colleges. We will carry out district contracting for the leadership of the college. We will send special personnel to keep in touch with the enterprises on a regular basis [3]. Combined with work reality, the institute set up university-enterprise cooperation essence, clear responsibilities, university-enterprise cooperation work enrich staff, to undertake enterprises, strengthen communication contact cooperation. Set up to cultivate the students' vocational ability as the core goal, predominantly project teaching curriculum reform, our application and maintenance of the current curriculum reform of welding robot is given priority to with Richard real integration and project teaching. College in each semester practice class arrangement, on the basis of phases of project teaching, through the way of integrating theory with practice, to further deepen the students' understanding of theoretical

knowledge, and improve the students' practical ability and the ability to analyze the problem, finally realizes the organic combination of practical face-to-face, and progressive transformation practice system. Working process oriented curriculum development, in terms of application and maintenance of professional welding robot, school cooperate with the enterprise to develop talent distribution, enterprise and students this demand as the focus of the development course of three parties, considering the object. In the course of curriculum development, the work process is directed. The purpose is not only to let the students master knowledge, but the fundamental purpose is to help the learners acquire knowledge about the work process to develop their professional abilities.

## III. STRENGTHENING THE CONSTRUCTION OF TEACHERS' TEAM AND IMPROVING THE QUALITY OF TEACHERS

Implementation of school enterprise cooperation mode of personnel training, the construction of teaching staff is the most critical link. The "double qualified" teachers are the most scarce teaching talents in higher vocational colleges. For the training of "double teacher" teachers, teachers should rely mainly on enterprises. Teachers can learn the related technology of Welding Specialty from the technical personnel of the front line of the enterprise and let their own practical ability rise to a new level. For example, some of our professors of welding specialties went to the enterprise during the summer vacation to carry out the internship, not only to understand the many links of welding production, but also to understand a large number of high end welding technology. Thus, our teaching has been greatly helped, not only the classroom is more rich, but also the students have a greater enthusiasm for learning, so the effect of teaching is also better. Therefore, school enterprise cooperation not only creates opportunities for students to undertake internships, but also helps to develop "double qualified" teachers. The professional teaching team of "double division" should be set up more quickly, and the professional teachers can be developed together with the enterprises, and the number of professional teachers with Double Teachers' quality is more[4]. In addition, it can also be introduced in the industry with high influence professionals to take the lead, hire enterprises and institutions with a large number of practical experience and teaching skills of engineering and technology personnel to the school part-time teaching. The focus should be placed on the training and continuing education of young and middle-aged teachers and teachers. Let the teacher have more comprehensive quality and higher teaching level.

Technical colleges and universities should pay attention to and strive to build a teaching staff that combines work and learning, fully utilize the excellence of the "one-piece company" model, and reform the personnel distribution and management system based on the open and professional requirements. Improving the creation, use, and incentive systems of "dual-qualified" teachers, formulating management measures concerning the employment, cultivation, and assessment of the part-time teachers of enterprises, and trying to create a long-term practice of practicing skills by the company's technical backbone. The dynamic management system invites a large number of technical backbones of

cooperatively-run companies to impart practical skills and serve as part-time teachers in top job internships. In addition, it is necessary to use the various forms of cooperation in running academies for top-level practice, international and domestic exchanges, etc. to enhance the ability of full-time teachers in practical teaching and comprehensive professional quality [5].

In addition, we should build a school teacher learning and learning system, through the relevant system to ensure that the teacher can learn the excellent experience of the enterprise in amateur, improve their practical ability and professional ability. We should reform the evaluation system of teachers' professional titles in secondary vocational education, and create an open management system for relevant teachers. It is a necessary measure for teachers to enter the enterprises to accept practical training, so as to improve the overall level of professional teachers related systems, such as the establishment of "technician qualification certification system", can encourage teachers to actively deepen the production line of enterprises and make great efforts to learn and master all kinds of related skills in their spare time. These methods can improve the level of "double teacher" quality education, optimize the structure of teachers' ability and guarantee transportation. And to develop a high-quality teachers team, better meet the needs of the enterprise post of choose and employ persons, and lets the university-enterprise cooperation further.

#### IV. BUILDING A FIRST-CLASS TRAINING BASE WITH SCHOOLS AND ENTERPRISES

The welding robot training center of our institute has 3 welding robots and more than 60 simulation software. With 11 axis robot workstation, equipped with laser visual system, the construction of practical training base needs the equipment of three docking practical training facilities - the technical platform of the enterprise, the technical level of the teachers in charge of professional teaching - the technical level of the engineering and technical personnel of the related enterprises and the training objectives of the school - the use of the related enterprises The skills and operation of the post group should be related to the establishment of an industrial training base to promote the sharing of resources between vocational schools and enterprises[6]. The training room is the most important aspect in improving the quality of professionals. Suggested that the government department to establish "industrial training base" research, formulate and carry out the relevant supporting measures, strengthen the vocational training facilities of finance, and thus establish a realistic career in school environment, to establish production bases in the school to explore this new university-enterprise cooperation model, the school is responsible for the relevant site and management work, while the enterprise is responsible for equipment, technology and teacher support, and takes the enterprise as the main body to organize practical training. We should make full use of modern information technology to build virtual factories, workshops, processes and experiments. In addition, our college also needs to continuously establish and improve the off-campus internship base. We can also build an industry on the basis of relevant majors by virtue of our advantages in talent and technology[7]. In addition, the government can also through a variety of measures to support the development of

the base, such as making relevant policies, provide financial support for school related equipment, to provide training for enterprise employees provide appropriate teaching funds or subsidies and other equipment, or a workshop, and other training base for students for the school to provide enterprise.

#### V. CONCLUSION

Education of traditional technical colleges and universities, the most deficient of which is the skill and technology level, only showing the specific operation process for students. However, these skills are out of date and cannot meet the production needs of current enterprises. This is the hysteresis of the technical college education. Therefore, it can be seen that students can't meet the needs of the society for advanced technical talents and the advantages of higher vocational education can't be reflected simply by relying on the resources of technical colleges. Based on this, students can acquire a large number of useful skills by attracting enterprises and schools to open practical working environments. Secondly, through school-enterprise cooperation, students' comprehensive skills can be effectively improved. For enterprises, a large number of comprehensive talents with strong professional skills can be cultivated, which will contribute to the development of enterprises. In addition, should also actively expand teaching mode in higher vocational colleges, through the introduction of professional and technical personnel, to provide more professional training program, to make the mechanic colleges and universities students master the solid theoretical knowledge, and cultivate a strong practical ability.

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