

# *Research on the Training Mode of Vehicle Engineering Professionals under the Cooperation of School and Enterprise*

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**Abstract**—This paper introduces the problems existing in the process of cultivating practical ability of college students majoring in vehicle engineering and the necessity and significance of school-enterprise collaborative training. And put forward the core of student engineering practice and innovation ability, and based on the demand of industrial talents, form a school-enterprise synergy long-term mechanism based on “industry-study integration” to create a community of engineering education responsibility for mutual cooperation, joint construction and sharing. Leading the development of innovative talents. Through the school-enterprise collaborative training mode, students are trained to become senior applied talents of automobile industry with strong ability to solve practical problems, high comprehensive quality, innovative spirit, practical ability and broad international vision.

**Keywords**—School-enterprise collaboration; Engineering practice; Innovation ability; Industry-university blending

## I. INTRODUCTION

The goal of higher engineering education is to cultivate engineering and technical personnel with solid basic knowledge and professional skills, as well as strong engineering practice and innovation capabilities. Although the state clearly puts forward the importance of practical teaching for talent training, it actively advocates that college students enter enterprises for internship. However, due to the lack of relevant policy support at the national level, enterprises have little interest in talent training, making it very difficult for college students to enter enterprises to carry out engineering training. Even if students can enter the enterprise, there are few opportunities to operate. For this reason, many colleges and universities have set up engineering training centers to carry out practical teaching, which to some extent solves the problem of engineering training for students. However, because the teaching equipment, production environment and cultural atmosphere of the engineering training center of colleges and universities are quite different from the actual factories and enterprises, it is difficult to achieve the ideal effect of engineering training [1]. Therefore, it is necessary to establish a practical and feasible mechanism for the cultivation of school-enterprise interactive talents to realize the benign interaction between practical teaching, scientific research, engineering and social application. This is the key to improve

the engineering ability of college students.

## II. PROBLEMS EXISTING IN PRACTICAL TEACHING OF VEHICLE ENGINEERING

### A. *Practical teaching environment and resource allocation are tight, and practical teaching links are generally weak*

In the past, the talent training mode of vehicle engineering major in most colleges and universities was usually four-year full-time study in school. During this period, various experimental and practical teaching links will be carried out timely as required. Although some colleges and universities have reformed the training mode of this major and set up engineering training centers, they have decided to set aside one year of senior year for centralized practical teaching. However, due to the lack of relevant policy support at the national level, enterprises have little interest in talent training, making it very difficult for college students to enter enterprises to carry out engineering training [2]. For example, the current practice of automobile engine construction only emphasizes "disassembly" before "assembly". This process can deepen students' understanding of parts and working principles, but does not emphasize whether the engine can continue to work properly after "loading". If the fault occurs, how to judge where the fault occurs, what kind of fault, the cause of the occurrence, etc. Then, the methods and measures to solve the problems are proposed, and finally the troubleshooting is implemented. All these are based on the abilities that students should have under the practical engineering background [3].

### B. *The teaching staff lacks engineering background, and the assessment and evaluation system of teachers is not conducive to the development of education in engineering practice*

After the reform and development of higher education in recent years, the faculty of higher engineering colleges and universities has been greatly improved, and a large number of outstanding talents have been enriched into the faculty of universities and colleges. But there is also the phenomenon of de-engineering in the construction of faculty in higher engineering colleges. The introduction of teachers one-sided emphasis on high education, high degree, lack of industrial background and engineering practice experience of teacher's requirements. Moreover, there is no clear requirement on engineer qualification for teacher positions, which leads to the

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situation that non-engineering professionals teach engineering students. Due to the lack of practical work experience in enterprises, teachers lack modern engineering consciousness and engineering literacy. At the same time, they are not familiar with the research and development, design and manufacturing, production and business activities of enterprises, and do not know the technology, manufacturing process and equipment of enterprises, which will inevitably affect the cultivation of students' practical ability [4]. The lack of practical experience of engineering teachers is undoubtedly a defect in cultivating engineering quality of engineering college students. Chinese academy of engineering, Zhejiang university President Pan Yunhe think: if an engineering professional teachers lack of engineering experience, not only difficult to provide effective guidance to student's engineering practice, is more serious is that the teachers do not understand the inherent characteristics of the engineering thinking, may unconsciously in theory teaching with pure scientific research thinking mode of teaching, and thus for the formation of students' engineering innovation consciousness and practice ability constitute a greater obstacles.

Most of the existing assessment and evaluation systems of college teachers lay more emphasis on theoretical teaching and academic paper indicators, while ignoring the innovation and development of engineering technology itself. This evaluation system has greatly affected the enthusiasm of teachers in engineering practice teaching, which may result in the content of engineering practice teaching remaining on the simple repetition of traditional experiment and practical training projects, and the lack of the development of designable, comprehensive and innovative practical teaching projects closely related to teachers' scientific research and engineering problems. It is not conducive to the cultivation of students' engineering ability, quality, innovative spirit and ability.

### *C. The cultivation of college students majoring in vehicle engineering lacks market orientation*

Education is highly interactive with the social external environment (politics, economy, culture, science and technology, etc.), so the cultivation of college students majoring in vehicle engineering must consider the external needs. However, according to the investigation, there is a lack of timely and effective communication among engineering colleges, university students and enterprises. First of all, education reform in higher engineering colleges cannot keep pace with the development of social economy, science and technology. Colleges and universities pay too much attention to the employment of college students, but pay too little attention to the current situation of the demand for engineering talents from all walks of life, and lack of market orientation for the cultivation of college students. Secondly, college students do not know much about the recruitment standards and selection conditions of employers. Enterprises focus on students' "comprehensive ability", while students think that enterprises only focus on "professional skills". If college students do not have a clear understanding of the real needs of enterprises, they will distort their future development direction. If there is no good interaction between universities, college students and employers, it will lead to the unreasonable and effective allocation of human resources, which will cause huge waste of

human resources for the whole society and cause losses to the three parties to varying degrees.

### III. THE NECESSITY AND SIGNIFICANCE OF SCHOOL-ENTERPRISE COLLABORATIVE TRAINING OF VEHICLE ENGINEERING MAJOR

For the school, it can integrate the advantageous resources of the school and the enterprise and improve the conditions of practical teaching. Through the school-enterprise cooperation in personnel training, improve the effectiveness of practical teaching, improve the quality of personnel training [5]. For enterprises, it can provide students with a platform for independent practice and employment conditions. Students have enough time to get familiar with the production links of enterprises, which can effectively improve the work efficiency, greatly shorten the adaptation period to work positions, and is conducive to improving the economic benefits of enterprises.

### IV. SCHOOL-ENTERPRISE SYNERGY LONG-TERM MECHANISM CONSTRUCTION BASED ON "BUSINESS-STUDY INTEGRATION"

With the development of economy and society, the function of university is becoming more and more complex. The function of the university has evolved into a diversified system serving teaching, scientific research and society. These three functions reflect the importance of universities' participation in industry-university-research cooperation. It is an important embodiment of the three functions of modern universities to transform the achievements of scientific research into actual productive forces. University-industry cooperation not only requires the university to strengthen scientific research, and constantly provide technical innovations and transformation of scientific and technological achievements into productivity, but also strengthen its teaching function, aiming at cultivating innovative senior engineering talents, promote the combination of theory and engineering practice, through improve the quality of engineering education, "learning by doing" increase the engineering quality of engineering undergraduate students. With the actual production of enterprises as the background, we should strengthen industry-university-research cooperation in running schools and broaden internship channels. We should rely on enterprises to establish off-campus internship and training bases that closely integrate production, education and research to form effective operational mechanisms and gradually form a multi-functional and comprehensive education training base integrating teaching, scientific research, production and training. Good talent training mode is the ultimate guarantee to realize the goal of talent training. The comprehensive quality, practical ability and innovation ability of students can be improved comprehensively through the combination of on-campus teaching resources and off-campus teaching resources, the combination of teaching and scientific research, the combination of practical links and job demands of enterprises, and the combination of graduation design and enterprise engineering projects. Based on the "integration of industry and learning", the construction scheme of school-enterprise cooperative long-term effect mechanism is as follows:

- Establish smooth communication channels and coordination mechanism, and establish diversified information communication system and platform. Hold regular meetings, timely grasp the interests of enterprises and personnel training, and timely solve the contradictions and conflicts in the process of cooperation.
- Guided by the development needs of the automobile industry and centered on the cultivation of practical ability and innovative ability, the university and the enterprise jointly study and design the teaching content and curriculum system, especially the professional course teaching, curriculum design and graduation design. On the basis of the relevant key automotive courses, the curriculum system can be adjusted according to the needs of enterprises. Effectively combine the position and skill requirements of the enterprise with the professional setting, curriculum system and curriculum teaching organization and implementation of the school, so that the enterprise can change from a supporting role to a leading role, and increase the courses suitable for the current needs of automobile enterprises. The university and enterprise shall jointly formulate personnel training objectives, promote the integration of personnel training objectives with industry and enterprise employment standards, jointly evaluate the quality of training, and involve enterprises in the whole process of personnel training, so as to constantly promote the open school-enterprise collaboration mode.
- Continue to promote in-depth cooperation with key enterprises related to automobile industry and science, discuss and develop excellent talent training program, sign excellent project education personal training base agreement, and establish a solid off-campus internship base. School-enterprise cooperation to develop students in the enterprise learning practice training program, so that students in the real environment to develop practical ability. Through the practice in the actual working environment outside school, students can not only have the ability to actively integrate into the society, but also preliminarily have the ability to solve practical engineering problems. Through the integration of production and learning, we will make solid progress in the internship of excellence program and promote the seamless connection between talent training and talent demand.
- School-enterprise collaboration to build a multi-level, open, production-learning integration of practical teaching system. According to the auto industry to the car class graduates knowledge, ability and quality requirements, aiming at training applied undergraduate engineering talents, from cultivating students' ability of engineering practice ability, engineering design, engineering, innovation ability and social adaptation ability, perfect the practice teaching system, build a multi-level and open, learning blend of applied innovative talents training practice teaching system, doing to learn, in a real environment to foster students' ability in practical engineering. The following measures can be taken: 1. Lead students to cooperate with individual scientific research projects of enterprises through tutors, so that students can get in touch with scientific research activities as early as

possible. Project - driven teaching, to achieve the effect of "do middle school". Strengthen professional consciousness, improve theoretical learning effect, cultivate scientific thinking, exercise scientific research ability, integrate the scientific research strength of the school, and improve the level of research results. Combined with the strength of enterprises to participate in the training of practical professionals to meet the needs of enterprises for talents. Engage senior engineers as special professors to participate in teaching activities, provide engineering training for school teachers and engineering guidance for students. Strengthen the construction of internship base, increase the content of in-depth engineering practice, and provide enterprises and internship students with a two-way choice in advance during the internship. 2. The university and the enterprise work together to do a good job in the graduation project of students majoring in vehicle engineering. The school can arrange students to complete the graduation project in the enterprise, the real realization of the topic from the production site, the work from the production site, the defense in the production site. The school and enterprise double tutorial system are implemented. The topic of the student graduation project comes from the production line, and the field engineer and the teacher designated by the school jointly serve as the student graduation project instructor. Students first complete the graduation practice related to the graduation project in the enterprise, and then complete the graduation project together under the guidance of two tutors, and complete the graduation project defense link in the enterprise. The thesis is jointly organized by the university and the enterprise to complete the graduation defense in the enterprise, and the final score of the graduation project is given based on the internship [6]. In this way, students can develop the ability to analyze and solve practical engineering problems in a real environment, improve the economic benefits of enterprises, and achieve the goal of mutual benefit and win-win between schools and enterprises.

## V. CONCLUSION

Through the establishment of "collaborative education, collaborative education, collaborative innovation" "production-school integration" talent training mode, the innovative spirit, the concept of training practical application ability is really throughout the whole process of personnel training in vehicle engineering. Guided by industrial demand, we will actively serve regional economic development and cooperate with industries and enterprises to train students to be senior application-oriented talents in the automobile industry who can solve practical problems quickly and efficiently, have high comprehensive quality, have innovative spirit and practical ability, and have a broad international vision.

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