

Exploration on Improving Practical Teaching Mode through College-Enterprise Cooperation under the Background of "New Engineering"

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Abstract:

Under the background of "New Engineering", the innovation of training mode in Colleges and universities is imperative. Under the trend of multi specialty integration, we should also pay attention to the innovation of specific teaching forms. It is an effective way to promote the reform of teaching practice by making better use of the platform of College-Enterprise Cooperation. We have increased the breadth and depth of College-Enterprise Cooperation, and achieved good results by introducing project-based and engineering teaching forms into enterprises.

Keywords: *New engineering, College-enterprise cooperation, Engineering education.*

I. INTRODUCTION

With the proposal of the "trilogy" of "New Engineering" construction of "Fudan consensus", "Tianda action" and "Beijing Guide" in 2017, the direction of the next research and practice of engineering education reform in Colleges and universities in China has been clarified. In view of the needs of the reform related to the construction of New Engineering, the research on the engineering training scheme in Colleges and universities has also become a hot spot [1].

The research focuses on how to solve the following problems:

- The gap between the inherent teaching content and the actual talent needs of enterprises has not been solved. Although colleges and universities have been trying to reduce the gap between supply and demand, on the one hand, due to the inertial thinking in teaching reform, the pace of reform is not firm and clear enough; On the other hand, the demand for talents is changing constantly. Especially after entering the era of Internet plus, enterprises have constantly put forward new contents for the demand for talents [2].

- The training content of practice link is not targeted, and the proportion of project training courses is not enough. Practice links are generally composed of on Campus Training and off campus practice. At present, the content of training in schools is often not updated for a long time, and lacks the significance of practical application; Due to the influence of many factors such as funds and enterprises, off campus practice is often just a passing ceremony, and students' actual practice opportunities are very few.

- Teacher training lags behind, and the teaching ability of school teachers in practice is insufficient. Because the vast majority of college teachers do not have the opportunity to enter the enterprise for practical work ability training, the teaching content and form are difficult to approach the reality in the school training courses [3,4]. The limitation of professional level also leads to insufficient guidance for students.

- Providing internships is a great burden for many enterprises. Colleges and universities hope that their students can enter one or more enterprises for internship. However, the vast majority of enterprises are difficult to accept dozens or even hundreds of people to enter the enterprise internship. At the same time, they have to abide by other management rules of the college. Therefore, the vast majority of enterprises can not meet the internship needs of colleges and universities. Finally, companies engaged in specialized training often take over off campus internships, which undoubtedly only change a teaching place and can not reflect the real value of off campus internships.

Although the domestic research on New Engineering and engineering education is quite rich in theory, most of them are in the form of ideas or teaching methods. There are more theoretical research, and the research results on the practical exploration of the construction of "New Engineering" are still relatively rare [5]. In addition, the focus of "New Engineering" construction in different types and levels of colleges and universities is also different. In the research of specific problems, it is more necessary to combine with the specific teaching work of actual colleges and universities and give a set of research conclusions with practical work significance.

The college where the author works has carried out a series of engineering oriented teaching practice activities since 2015. As the project host, the author has also carried out practical activities in the aspects of industry education integration and College-Enterprise Cooperation. Therefore, in this study, by summarizing the practical experience of College-Enterprise Cooperation at ordinary times and taking the concept of New Engineering as the theoretical basis, we try to find a practical teaching mode that can meet the current needs.

II. USING COLLEGE-ENTERPRISE COOPERATION TO IMPROVE PRACTICAL TEACHING MODE

The "Fudan consensus" of New Engineering mentioned that "the construction of New Engineering needs the active participation of social forces". This work will study and analyze the design of

College-Enterprise Cooperation mode, and try to verify the previous analysis through practical teaching experiments. The main ideas and implementation methods of this study are as follows.

Create a more flexible and convenient integration mode of industry and education, reduce the entry threshold of enterprises, improve the enthusiasm of enterprises to participate in college teaching, and achieve the win-win mode of enterprises, universities and students.

The specific implementation method is to set up a short-term customized training plan with the enterprise. This is another innovation and research focus of this project.

The integration of industry and education represented by the Institute of industry has been put forward many times some time ago. This way of cooperation and joint construction between enterprises and universities seems to be closer to the needs of enterprises in form. However, through the author's analysis, there are two problems to be solved.

First of all, enterprises that can provide joint construction of industrial colleges must have relatively strong technical and financial strength and be able to provide long-term and stable talent demand and education investment. However, whether this large amount of investment can be turned into profit through the input of graduates to enterprises seems to be a big gap between the two at present. This is also a main reason for the low participation of enterprises in industrial colleges.

Secondly, the training mode with a long cycle always lags behind the formulation of teaching content for the majors with fast technology renewal cycle such as computer and Internet. The teaching plan can't keep up with the change of talent demand, which is difficult to overcome.

Through the analysis and summary of the practical work experience of many College-Enterprise Cooperation projects, the author believes that in order to solve the above two problems, we should focus on short-term enterprise customized training projects. The short-term customized culture cycle generally does not exceed half a year, usually 2-3 months. For students in the second semester of junior or the first semester of senior, the size of a class shall not exceed 30. Enterprises mainly provide training teachers and schools provide training venues. Students enter the training through written examination and interview, and enter the enterprise for internship or sign a contract directly after passing the examination.

Such cooperation requires relatively few enterprises, and the training cost of enterprises is reduced. The small number of trainees not only reduces the difficulty of training, but also makes it easier for enterprises to digest the application needs of these students. This undoubtedly greatly reduces the threshold for enterprises to enter and can attract more enterprises to participate. Shorter training cycle means that the training content can be updated and adjusted quickly according to the changes of talent requirements in the market. Enterprises can also provide on-demand training and set up different short-term customized classes according to their own needs.

In addition, this training method also reduces the burden on schools. In the last year of school, students help students find their own development direction through short-term training projects of enterprises. Through cooperation with different enterprises, provide students with different training contents, enrich the types of talent training, and more accurately approach the needs of enterprises, so as to improve the employment rate of students and the satisfaction of enterprises to students.

Further strengthen the engineering practice and innovation ability, and try to build a richer innovative practice teaching system. In the process of studying and analyzing engineering teaching forms, we should consider highlighting the position of practical teaching [6]. Strive to establish a New Engineering education system.

Specific embodiments include:

- Hire experts from the enterprise side to participate in the revision of the university training plan, focus on formulating corresponding training objectives and training plans according to the enterprise's needs for engineering talents, and set up engineering practice courses.
- Relying on the existing internship cooperation units of our university, refine the internship cooperation scheme, on the one hand, strengthen the college's control and evaluation of the internship effect, on the other hand, increase the enterprise's design of the internship content.
- Try to "bring in" to carry out enterprise practice in the school, which is a teaching experimental activity that this project strives to focus on.
- We will continue to carry out the practice of College Students' innovation and entrepreneurship. Work with enterprises to cultivate multi-level innovative talents with industry knowledge background, strong engineering practice ability and meeting the needs of industry development.
- The student innovation laboratory established by the author has been running for two years. It has won dozens of awards in many domestic competitions, established a company and developed one software product. However, it is also limited by its own knowledge reserve and resources, and can not provide more resources for students. Introducing enterprise collaboration to set up innovation laboratory can greatly improve the vitality of the laboratory and add new technologies and ideas, which is undoubtedly a teaching practice activity with great potential.

Make use of the engineering technology resources of cooperative enterprises to build a team of high-level engineering education teachers. Under the concept of "New Engineering", the quality requirements of teachers have also changed. Teachers must keep pace with the times and adjust the teaching content in time according to the trend of social demand for talents. Long-term changes need the

adjustment of syllabus, while short-term changes need front-line teachers to make timely adjustments in teaching work, which requires teachers to have more engineering professional quality.

Specific embodiments include:

- Let teachers participate in the project training of off campus practice. In the past, teachers participated in the training project as teaching assistants or managers, and did not actually participate in the project. Teachers should be involved in the internship project as a project manager. Improve their business level through practical work experience.

- Regularly invite enterprises to give technical lectures in the industry. In this way, teachers can keep up with the current technical direction, understand the latest development trend and maintain a broader vision.

- Off campus tutorial system. Experts from the enterprise are employed as professional instructors, and off campus tutors are responsible for guiding the content design of training projects and teaching guidance in training courses. Including the guidance in the process of graduation design.

Expand the scope of College-Enterprise Cooperation and strive to establish a multi-level teaching and training mode of innovative and practical talents [7]. Most enterprises have limited internship positions, and the cooperation of one or two enterprises is difficult to meet the internship work of students in school. It can take advantage of the opportunity to cooperate with more enterprises and cultivate talents at different levels and professional development directions.

Specific embodiments include:

- Resort out the existing College-Enterprise Cooperation units, communicate with enterprises, strive to carry out internships closer to the needs of enterprises, and take internships in enterprises or invite enterprises to enter schools to carry out internships according to different situations.

- Conduct in-depth analysis of cooperative enterprises, understand the types of talent needs, and summarize and summarize them. Formulate corresponding personal career development guidance outline, and conduct career development guidance training for students at the freshman stage, so as to make students learn more purposefully.

III. WORK RESULTS

Based on the ideas of the previous section, in more than five years of teaching work, specific practice and research have been carried out from two aspects. On the one hand, it provides a comprehensive and diverse student practice platform. Including student competition, software project development, etc; On the

other hand, vigorously improve the teaching quality of students' practical courses and the research of practical teaching mode. In the actual development of external practice, optimize the breadth and depth of College-Enterprise Cooperation. Based on these two aspects, the author has carried out the following work in the early stage:

As the host, he applied for two projects of industry university cooperation and collaborative education of the Ministry of education. One of them is the cooperation agreement with Xinhua Group III. As the project leader, I was responsible for the implementation of the cooperative training project of Xinhua three elite classes. This is the first training program set up by the college in cooperation with enterprises. The training period is two months, and 25 trainees are employed. 17 students obtained the authoritative skill certification in the industry. Through follow-up survey, graduates are in good employment status and are satisfied with their salary.

Actively carry out the research and exploration of teaching mode reform in the school. In 2014 and 2017, as the project leader, he completed two college level teaching reform projects. This paper makes an in-depth study on the training mode of Engineering Specialty in the practical training link from two dimensions. This paper gives a new way of off campus training mode for colleges and enterprises, and provides a more flexible and practical training form. This paper gives the vertical optimization idea from the curriculum system design itself, and tries to carry out engineering and project-based teaching based on the concept of CDIO.

On the basis of theoretical research, actively carry out teaching practice. In the way of engineering education, The Teaching Contents of Database Training and Java EE training are redesigned. The teaching is carried out in the way of project, and good teaching results are achieved.

Set up a student innovation laboratory. Since its establishment two years ago, it has provided a set of personnel evaluation software for the college and has been used in work. In many national computer competitions, he won dozens of awards. Graduates from the laboratory set up a software company.

Based on the idea of engineering teaching, two teaching materials for computer specialty are compiled: Basic and Practical of Java EE and Java Programming. And established the relevant teaching quality evaluation system.

Through the teaching practice in recent years, a set of relatively complete practice and training system has been preliminarily formed. By making full use of enterprise resources and taking the idea of engineering education as the benchmark, the problem of lack of practicability of practical training courses is partially solved. Among them, the training mode of establishing elite classes in cooperation with enterprises is a very rare practical experience, which provides a new reference for the research of College-Enterprise Cooperation mode.

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