

School-enterprise Cooperation to Cultivate Application-oriented Innovative Personnel Cooperation Model

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Abstract: To explore a reasonable mode of school-enterprise cooperation in training application-oriented innovative talents and solve the problems in the process of cooperation. On the basis of formulating the idea and plan of in-depth cooperation in the whole process of school-enterprise cooperation in cultivating application-oriented innovative talents, the school-enterprise cooperation project teaching is introduced into classroom teaching, innovation experiment, engineering practice and other training links, so as to realize the benign cultivation of application-oriented innovative talents.

Keywords: Cooperation Between Universities and Enterprises; Application-oriented Innovative Talents; Project Teaching

1. Introduction

Innovative talents are urgently needed resources in China, and universities, as an important source of talents, need to reform and explore the cultivation of innovative talents in various aspects, so as to cultivate talents with innovative ability for the society. As the main place for talent training, colleges and universities have teachers and research resources to provide basic theoretical knowledge for the training of innovative talents. Enterprises provide students with an environment for innovation and practice, so that students in the process of applying the theory learned in school to practice, to obtain the training of innovation ability. If the two sides can cooperate well and form complementary advantages, they can create better conditions for training innovative talents. At present, there are many problems in the practical operation of school-enterprise cooperation, which affect the quality of personnel training. Therefore, it is necessary to deeply discuss the problems in the process of school-enterprise cooperation in training innovative talents, so as to form a reasonable cooperation mode.

2. Problems in the process of training talents in cooperation between universities and enterprises

At present, the training measures of school-enterprise cooperation are mainly to provide internship opportunities for senior students. After several years of practice, many problems have been found. Common point, most students if only through the first three years of study, also to suit the requirements of enterprise for interns, even for many enterprises, receives the internship students to become a burden^[1], that some students have no work to do in the enterprise, can only act as assembly-line workers do some simple repetitive work, these are not the education goal of training innovative talents. Therefore, how to adapt students to the requirements of enterprises and make good use of the enterprise environment to exercise the ability of innovation has become a problem that needs to be solved.

The practice of students in enterprises is mainly from the third year to the fourth year, while the participation of enterprises is relatively low in the learning process of the first three years. Therefore, students have few opportunities to apply theories to industry

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practice. In order to take advantage of the advantages of enterprises to cultivate innovative talents, colleges and universities need to carry out in-depth cooperation with enterprises. In the process of talent training, some foreign universities allow enterprises to go deep into every link of the teaching process and form in-depth cooperation throughout the whole process, and even send enterprise representatives to participate in the election of the President^[2-4]. However, China's system is different from that of other countries, so these practices should not be copied. Instead, we need to learn from some foreign experience, innovate our thinking, find the common ground and deepen cooperation in various teaching processes according to the actual situation of Chinese universities and colleges.

In addition to the professional skills needed for innovation, students need to cultivate their comprehensive qualities such as project management ability and teamwork ability. At present, the emphasis of school-enterprise cooperation in cultivating innovative talents mainly lies in the imparting of professional knowledge and the cultivation of professional ability, while the cultivation of project management ability and comprehensive quality is neglected. Most student innovation and entrepreneurship programs don't hatch, or if they do, they don't grow. Therefore, in the process of training innovative talents through school-enterprise cooperation, we should attach importance to the cultivation of students' project management ability and improve their comprehensive quality.

3. School-enterprise cooperation to cultivate innovative talents cooperation model

In view of the above problems, this paper makes an in-depth study of school-enterprise cooperation, and summarizes a set of school-enterprise cooperation mode to cultivate innovative talents.

First of all, the idea and plan of in-depth cooperation in the whole process of university-enterprise collaborative training of innovative talents should be formulated, which runs through the whole stage of university engineering education. In addition to the links such as practice and graduation design, enterprises can participate in the construction of courses and experiments, so as to achieve the basic teaching objectives and at the same time cultivate students' ability to conform to the practice of enterprises. At the same time of expanding students' scope of knowledge, carry out targeted engineering project practice training, in order to obtain the comprehensive quality of innovative talents, so that students can adapt to the requirements of enterprises. In the internship process and future work, students can make good use of the enterprise environment to exercise their innovative ability.

Second, we should ensure the investment of both schools and enterprises in the cultivation of innovative talents. The internship in the training of school-enterprise cooperation talents should not be understood as the provision of free labor force by the university for the enterprise, nor can it be understood unilaterally as the compulsory participation of the enterprise in the training of talents in the university. For example, the enterprise provides the necessary practice environment for the university student, provides the appropriate economic subsidy; On the other hand, colleges and universities should have certain practice sites and equipment conditions, including classrooms and experimental sites, relevant equipment and software. Both sides need to invest not only in equipment and supplies, but also in human resources. Therefore, teachers should actively work with enterprises to jointly carry out horizontal projects and develop experimental projects for practice, so that enterprises can obtain innovative resources from universities.

Thirdly, various school-enterprise cooperation programs should be implemented in each teaching link. In order to deepen the cooperation between the school and the enterprise, various school-enterprise cooperation was implemented in different training links, such as classroom teaching, innovation experiment and engineering practice. Especially when the teaching method is reformed, enterprises are allowed to participate in project teaching^[5]. Project teaching is divided into three types: curriculum project, engineering practice project and graduation project. Curriculum project teaching is implemented in the teaching of professional courses. Professional courses are distributed in the 3-6 semesters, so that enterprises can join the teaching from the third semester, and participate in the setting of project topics and process guidance. Engineering practice projects are arranged in the enterprise internship period, generally in the 7th semester. During the internship period, under the guidance of enterprise mentors and the supervision of teachers on campus, students can complete the designated engineering practice projects in enterprises, so as to ensure that students will not simply become a free labor force, and cultivate their innovative ability in the process of completing engineering practice projects. The graduation project was implemented in combination with the graduation design and completed in the 8th semester. Some students who have internship in enterprises in the 7th semester will choose some enterprise projects as graduation projects. These students complete their graduation projects in the enterprise under the guidance of corporate mentors and on-campus mentors. Enterprises participate in project teaching, so that students can get help from enterprises in the process of information collection, plan formulation, scheme selection, etc., and obtain a large number of practical engineering materials that are not available in the classroom, so as to improve the level of knowledge required for innovation. At the same time, enterprises

participate in the development of the project subject more in line with the current social needs, so that the innovation of students can be practical. Enterprises can also gain benefits in project teaching, by using project topics of different sizes to obtain solutions to some problems within the enterprise^[6], and by booking outstanding students, they can obtain good innovative talent resources.

Fourth, school-enterprise cooperation should cultivate the comprehensive quality of innovative talents. In university-enterprise cooperation in the process of training innovative talents, not only to teach basic specialized knowledge, cultivating practice ability and engineering innovation ability, system integration ability, lets the student understand the project management process of enterprises at the same time, cultivate students' teamwork and communication skills, international vision, such as comprehensive quality, in order to make students creative entrepreneurial management ability and development perspective. In addition, enterprises are invited to guide students to participate in design competitions at all levels. Give full play to the enterprise's ability to grasp the actual project, so that students get the opportunity to design exercise, improve the ability of engineering innovation and teamwork.

4. The practice of cooperation mode of school-enterprise training innovative talents

The school of information science and engineering of Fujian university of engineering maintains the foundation of long-term cooperation between enterprises and universities. It has established long-term good cooperative relations with many enterprises while having a number of national practice education bases for college students, which provides good practical conditions for cultivating innovative talents. Fujian institute of information science and engineering college in synergy between colleges to cultivate innovative talents in the whole process of depth cooperation ideas and plan, set up the "production, construction committee, make joint innovative talent training plan, build" horizontal layered-step by step, the longitudinal multipath-neck and neck "practice teaching system. In addition to practice and graduation design, enterprises are invited to participate in the construction of courses and experiments, so as to achieve the basic teaching objectives while cultivating the practical ability required by enterprises. In addition to expanding students' scope of knowledge, students should carry out targeted practice training of engineering projects, and exercise students' innovation ability in the enterprise environment during the internship.

School-enterprise cooperation on the one hand to build an enterprise-level practice platform, jointly compile textbooks, jointly set up training projects. With the cooperation of GE, Siemens, Fujian mobile and other enterprises, the company has invested a large number of industrial-grade experimental equipment, involving automation, industrial network, mobile communication, semiconductor and other fields. To ensure the connection between campus practice and enterprise practice, to ensure that students can quickly and smoothly transition to off-campus engineering practice through campus practice, and to ensure that campus base can meet the needs of external training. At the same time, under the guidance of teachers, students participated in making 504 sets of 23 kinds of self-made instruments and equipment, which are widely used in many laboratories. On the other hand, the construction of college students' engineering practice base outside and in the enterprise practice, more than half of students training, combined with the actual engineering projects for the joint between colleges to guide students into the specified project practice, and evaluate students' achievements for joint, has obtained the very good practice teaching effect, promote the students' innovative practice ability. Two off-campus practice bases have been awarded as national off-campus practice education base for college students and provincial off-campus practice education base for college students. At the same time, the teachers actively cooperated with enterprises to carry out horizontal projects with a total capital of more than 8 million yuan, which not only solved the production problems for the enterprises, but also greatly improved the practice and innovation ability, which had a positive impact on the improvement of students' innovation ability.

During the last three years of study, I cooperated with enterprises to jointly research and implement a number of industry-school cooperative education projects of the ministry of education, and realized the teaching reform with enterprise resources and funds. At the same time of the reform of teaching methods, let enterprises join the curriculum projects, engineering practice projects, graduation project teaching. The course projects are carried out in conjunction with some of the more important professional courses. The teacher and the enterprise engineer jointly set the project subject for the specialized course according to the actual industry development. Let the students freely combine into several project groups and choose the project topic they are interested in. Enterprise engineers participate in students' technical guidance and provide practical engineering materials that are not available in the classroom, so as to make students' innovative design more suitable for the needs of the society. The engineering practice project will be arranged during the internship in the 7th semester and will be completed by students in the enterprise. According to the needs of the enterprise, the enterprise sets the project subject for the students and reports it to the responsible instructor for approval. In the process of students completing the engineering practice project, the enterprise engineer is responsible for guidance, and the campus tutor is responsible for supervision and auxiliary guidance. During this period, students' performance will be graded by enterprises.

At the end of the project, the students reply to the results of their engineering practice projects. The defense expert group is composed of teachers in the school, and the results of the defense are evaluated and given. Students' final grades consist of enterprise grades, thesis grades and defense grades, so that they can reflect their comprehensive ability in theory and practice. During the internship, students completed engineering practice projects, which greatly improved their engineering practice and application ability. If both the enterprise and the student are satisfied with the internship in the enterprise in the 7th semester, they can continue to stay in the enterprise for the graduation project in the 8th semester. Students choose a business tutor and an on-campus tutor from the school and the enterprise respectively, and the two mentors jointly guide them to complete the graduation project. According to the needs of their own enterprises, students determine the graduation project subject under the guidance of enterprise mentors and campus instructors. During the internship in enterprises, students carry out graduation projects, conduct research in the practical environment of enterprises, solve practical problems that meet the needs of the industry, and obtain innovative results. Their actual working ability has been greatly improved^[6]. Enterprises involved in the process of project teaching, in-depth design, planning, implementation and other stages, which improve students' engineering innovation ability obvious effect. Through the contact with enterprises in the process of teaching, students acquire practical knowledge and experience, and well cultivate their practical ability, engineering innovation ability and system integration ability. It can be seen from the graduation thesis of students in enterprise graduation design that the content of their graduation design is more practical. As the design topic and design data all come from practice, the results of the paper have more practical and innovative significance.

In order to improve the overall quality of students, experts from cooperative enterprises are invited to teach courses such as "special topics on new technology" and tell about new projects undertaken by enterprises. It not only enables students to further understand the current new technologies in the industry, but also enables students to understand the project management process of enterprises, so as to cultivate their comprehensive quality and international vision. At the same time, enterprises are invited to strengthen the cultivation of system integration ability, project management ability and other comprehensive qualities during the internship. In addition, enterprises are invited to participate in and guide students to participate in design competitions at all levels, so as to give full play to enterprises' ability to grasp the actual projects and guide students to win awards in various national and Fujian design competitions for many times. By participating in the competition, students can get a chance to practice innovative design, which plays a good role in improving their own innovation ability, practical ability, system integration ability and teamwork ability. During the cooperation between the school and the enterprise in training innovative talents, on average, more than 200 people participated in the competition training every year. Students have participated in various discipline competitions and won 10 international prizes, 2 national special prizes, 10 first prizes and a number of national and provincial awards.

5. Conclusion

Since the implementation of the cooperation mode of school-enterprise cooperation in training application-oriented innovative talents, students have achieved good results in the work of innovation and entrepreneurship. Under the guidance of teachers and enterprise engineers on campus, students have obtained a number of authorized patents and software Copyrights, obtained the approval of 76 innovation and entrepreneurship projects at or above the provincial level, and incubated 6 student startup companies, among which 3 are located in Fuzhou undergraduate pioneer park..

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