Exploration on University-Enterprise Cooperation Mode for Outstanding Engineer Training of Textile Major

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Keywords: Outstanding Engineer Training, University-Enterprise Cooperation, Training Mode, Textile Major.

Abstract. University-enterprise cooperation for talents training is the key for the implementation of “the outstanding engineer training plan”. With the university-enterprise cooperation mode towards textile major as a breakthrough, systematic exploration is carried out on curriculum provision for enterprise practice, cultivation and construction of teaching staff, reform of practical teaching methods, and the establishment of quality guarantee system, which can intensify students’ engineering practice ability, engineering design ability and innovation ability. This paper can provide strong operability for the university-enterprise cooperation mode for excellent engineer training in local colleges and universities.

Introduction

“The outstanding engineer training plan” is a great educational reform project supported by Ministry of Education of the People’s Republic of China, which is of great demonstrating and guiding function to full improvement of the quality of engineering education for talents training. University-enterprise cooperation for excellent engineer training is the key for the implementation of “the outstanding engineer training plan” [1]. However, the problem of lack of teaching resources and full attention during talents training exists in most local colleges and universities. Therefore, how can local colleges and universities effectively integrate their own special resources and cultivate outstanding engineers based on university-enterprise cooperation has become an important subject for education and teaching reform [2]. Taking the textile major in Hebei University of Science and Technology as an example, the adaptive university-enterprise cooperation for training talents in local colleges and universities is systematically discussed including curriculum provision, teaching staff, teaching methods and quality assessment, which is conducive to the quality improvement of excellent engineer training.

Basic Concept of University-Enterprise Cooperation for Outstanding Engineer Training

Recently, many universities explore to find novel university-enterprise cooperation patterns, such as the order type cooperation, “sandwich” type cooperation, project cooperation and the co-establishment of training bases [3]. The cooperation connotation is also gradually extended and enriched with the rapid development of technology. However, viewed from current status, these single, local and temporary cooperation training modes cannot satisfy the long-term development of the enterprises.

How to make the enterprises actively take part in the cooperation training, instead of directly recruiting talents full of experience or fostering talents by themselves, is the problem that universities and enterprises face together. To realize sustainable university-enterprise cooperation training, we should complete the work in the following inspects: firstly, the cooperation training mode should be
continuously innovated to enhance the comprehensive cooperation between universities and enterprises. As a result, the two cooperation sides can be integrated into a whole; secondly, scientific and reasonable enterprise training scheme should be prepared, so that the enterprise can cultivate the excellent engineers in a more planned and targeted way; thirdly, we should insist on improving and dynamically implementing the enterprise training scheme, to guarantee the training quality of excellent engineer and the demand of long-term development of enterprises.

For training of outstanding engineers, we should take the demand of enterprises as guidance, engineering practice as background, and engineering technology as the main line. Through close cooperation between universities and enterprises, we should prepare talent training standard, reform talent training mode, build the engineering education teaching staff with high level, open wider to the outside world, and focus on improving students’ engineering practice ability and innovation ability.

Curriculum Provision for Enterprise Practice

“3+1” university-enterprise cooperation pattern is adopted for the training of excellent textile engineer in Hebei University of Science and Technology [4]. The training phases include school learning and enterprise practice. Students study in school for three years and practice accumulatively in enterprises for one year, so as to ensure the high combination of theory and practice. Curriculum provision for enterprise practice should focus on the actual demands of enterprises. Besides, enterprises should be invited to participate in the design and optimization of the curriculum system and teaching contents in the whole process. Practice contents need to cover various aspects of the textile production, including textile checkout practice, textile procedure operation practice, textile technology practice, textile design practice, and graduation field work. By means of the site practice in enterprise practice phase, the students can improve their flexible use of professional basic theory and the abilities to analyze and solve practical issues, improve their communication skills, organization abilities, environmental adaptation and team cooperation abilities. Therefore, the innovation consciousness can be cultivated and motivated.

Cultivation and Construction of Teaching Staff

Based on the principle of “equal status of teacher introduction and cultivation, full combination of practice and academy”, the dual tutorial system of discipline tutors in school and engineering tutors in enterprises is implemented in Hebei University of Science and Technology.

Construction of Full-Time Teaching Staff in School. The faculty advisers in school mainly include young teachers who generally have high education background and profound professional theories, and processes the ability to do scientific research independently. However, most of the young teachers are lack of practical experience in relevant enterprises. In order to cultivate and construct full-time teacher team with strong engineering practice ability, the following measures can be taken. Firstly, arranging for teachers to take a temporary post in enterprises and take part in the design, research and development of enterprise projects, so as to make them familiar with the enterprise production process. Secondly, assigning outstanding teachers to exploit academic development through further study in famous universities at home and abroad. Thirdly, encouraging teachers to participate in communication conference on domestic and overseas projects, which is helpful for engineering technology level improvment. Finally, encouraging teachers to participate in authentication of industry qualifications and obtain engineer certificates.

Construction of Part-Time Teaching Staff in Enterprise. Experts and engineers with high theoretical level and rich experience from enterprises are employed as part-time teachers. According to different work emphases, these part-time teachers from enterprises are classified as enterprise instructors, enterprise practice teachers and enterprise graduation design instructors. Enterprise instructors mainly give instruction based on specialized courses, and they are required to have high professional technical levels. Generally, the enterprise instructors are technical backbone with senior
engineer certificate in enterprises. Enterprise practice teachers instruct students practice in enterprise practice bases. They are chosen from the engineers who have been active in the first product line for a long time. Enterprise graduation design instructors are mainly responsible for students’ graduation designs and research argumentations. They should be familiar with the whole product realization process such as design, production and detection. The graduation design instructors can be chosen from senior engineers or middle and senior managers with profound engineering practice background in enterprises.

Reform of Practical Teaching Methods

Co-construction and Sharing of Teaching Resources to Intensify Innovation Ability Cultivation. The problem-orientated, case study and circumstance experiential teaching methods are mainly carried out in practical teaching. The problem-orientated teaching creates questions on the basic of the core concept of textile engineering and technology practice. This method is conducive to motivating students’ autonomic learning and training them to find, analyze and solve problems. In the case study teaching, the teaching cases are extracted from practical engineering problems and teachers’ scientific research. Therefore, the curriculum content is close to life and full of typicality and forwardness. The case study learning is also beneficial to widening students’ view and improving their abilities to solve actual problems and make decisions when facing complex situations. The circumstance experiential teaching is based on the laboratory platform construction of textile engineering, and it is aimed at constructing a small-sized experimental production line from raw materials to finished products. An on-limits teacher-student and student-student interactive platform can be established through full use of “MOOC”, “Flipped Classroom”, “E-class”, and other modern information technology. As a result, the principal status of the students can be highlighted.

During the process of outstanding talents training, universities and enterprises should construct teaching resources together and make efforts to realize good-quality recourses sharing. For example, universities and enterprises can jointly compile the training scheme and syllabus, give lessons, and develop textbook, courseware, software and other resources. The enterprises should actively create conditions to convert project resource and equipment into teaching contents and practice objects for students. Meanwhile, the universities should gradually share reference materials, research resources and scientific achievements with enterprises.

Comprehensive Development of Project-Driven Production-Study-Research Cooperation. The project-driven university-enterprise cooperation mode is actively explored during the implementation of the “excellent engineer training plan”. With specific engineering project or product development as the basis, enterprises can propose a project as the student’s research subject according to their actual needs, which avoids the disadvantage that previous research subjects are out-dated and divorced from practical production. On one hand, the project-driven cooperation mode is greatly beneficial to cultivating students’ innovation ability and team spirit. On the other hand, it is helpful for enterprises to solve practical problems by full use of talents and professional advantages from colleges and universities. Through the joint participation of enterprises, teachers and students, the win-win situation of enterprise income and students training can be realized.

During university-enterprise cooperation, the production-study-research cooperation can be carried out completely by the following approaches. Firstly, enterprises employ prominent teachers as technical advisers to hold academic lectures and provide technical consultation. Secondly, teachers work on scientific research and engineering practice in enterprise to improve their professional skills, which can facilitate deep understanding between universities and enterprises. Moreover, universities and enterprises can jointly declare various kinds of scientific research projects and solve engineering technical problems together.
Establishment of Quality Guarantee System

A scientific and reasonable evaluation system must be established to measure the efficiency of the university-enterprise cooperation mode. The evaluation mechanism composed of teaching-supervision system, teaching routine inspection system, teacher evaluation system, and student evaluation system should be established and improved. The commission of teaching instruction has been found in College of Textile and Garment, Hebei University of Science and Technology. The committee is responsible for comprehensive organization and management of the enterprise practice. The quality monitoring is carried out through experts visiting, discussion with students, normative inspection, examination of phased achievements and so on. The quality evaluation should not only focus on the final results but also pay more attention to the cultivation process.

As for the methods of examination and evaluation, student performance can be examined in many ways such as field operation, questions and answers, investigation report and written examination. In the process, it is necessary to develop quantitative evaluation indicators, achieve high operability and reflect students’ comprehensive quality. Process evaluation and ability evaluation are emphasized. Teachers’ teaching inspection can be accomplished through teaching document inspection, classroom observation and comments, and students' evaluation, so as to promote teachers to improve their teaching levels.

Summary

“The outstanding engineer training plan” is a major engineering education reform of that meets national strategic demands, enterprise needs of active service and establishment of university-enterprise cooperation mode. Therefore, the disconnection problem in engineering talent training between universities and enterprises can be effectively solved. Based on analysis of the basic conception of sustainable university-enterprise cooperation mode for excellent engineer training, the adaptive university-enterprise cooperation mode for training talents in local colleges and universities is systematically discussed in this paper. The university-enterprise cooperation mode mainly includes the curriculum provision for enterprise practice, cultivation and construction of teaching staff, reform of practical teaching methods, and the establishment of quality guarantee system, which is conducive to the quality improvement of excellent engineer training. This paper can provide strong operability for the university-enterprise cooperation mode for excellent engineer training in local colleges and universities.

Acknowledgement

This research was financially supported by the Education and Teaching Reform Project of Hebei University of Science and Technology (2016-yb024).

References