Research on Practical Teaching Based on Training Excellent Mechanical Engineers

Jian-xiao Zheng, Li-le He and Dan Luo

ABSTRACT

Aimed at the problem that the practice teaching has existed in the mechanical design manufacture and automation major, and the national basic requirements of the excellent mechanical engineers, and combined with the actual needs of implementing the excellent engineers plans, the basic thought of the practice teaching based on the excellent mechanical engineers will be put forward and the construction of practice teaching system will be discussed during the excellence engineer train. The existing resources and environment of the practice teaching will be optimized. Some measures about the practice teaching were researched. The research results will have a certain effect on the practice teaching of the excellent mechanical engineer, which improves the quality of the practical teaching and achieves the teaching goal of training the students’ ability of the Practice and innovation.

INTRODUCTION

The cultivation plan of the excellent engineer education has been started for the mechanical design manufacture and automation major of Xi’an University of Architecture and Technology, and it is purpose to train plenty of high quality mechanical engineering technology talents with basic practical skills, practical ability, engineering comprehensive ability and innovation ability. With the development of economy, it is higher and higher for the requirements of the comprehensive quality and practical ability of the engineering and technical talents in the society. In order to meet the needs of the economic and social development, In order to strengthen the cultivation of college students' engineering practice and innovation ability, practical ability and basic practical skills, a practical teaching system should be settled that aims at training outstanding mechanical engineers, aiming at the problems of the existing practical teaching system and the difficulty of implementing the external internship units.
1 The practical aspects of teaching analysis

At present, there is a common phenomenon in theory, practice and innovation atmosphere in undergraduate colleges. Although the college has many practical course and experimental course, due to the restraint of the innate educational concept of “knowledge imparting type”, we mainly use the impartation of theoretical knowledge in the design of practical aspects, practice periods and practical contents. In addition, from the breadth and depth of practical aspects, the existing practice cannot meet the requirements of excellent mechanical engineer training. At present, the major aspects of the practice of teaching there are some aspects of the following problems [1-3].

1.1 The problem of practice teaching System Setup and Content Arrangement

The existing practice teaching content system of mechanical design and manufacturing and its automation major mainly includes the experiment in class, experimental course, course design, metalworking practice, cognition practice, production practice, graduation design, social practice, science and technology training. However, the training objectives of excellent engineers require students to cultivate good professionalism and strong engineering qualifications, possess the engineering research, engineering innovation and good engineering practice ability, realize the organic combination of student training, employment and enterprise human resources selection and cultivate innovative practice Type, in line with the development of the new situation requires excellent mechanical engineer.

The existing practice of teaching more and more scattered, the lack of close contact between the various courses, the lack of comprehensiveness and integrity. The existing experiments, curriculum design and graduation design are all carried out in schools. The design content is usually based on the respective course services or the forms and requirements stipulated by the instructor.

1.2 Practice teaching base construction problem

The establishment of a stable practice teaching base inside and outside the school that meets the needs of teaching creates various independent engineering practice environments for students in experiment, internship, design, scientific research and social practice and is an important guarantee for students' practical ability and engineering quality. For a long time, the College for training facilities, equipment and go out to practice a serious shortage of funds, so inclined to cooperate with companies seeking business support for the practice of teaching. Due to the different goals of school and enterprise, especially the real production environment and acceptability of enterprises, it is very difficult for enterprises to invest some energy and financial resources to support the teaching of colleges and universities.
2 The research of excellent mechanical engineer training practice teaching system

According to the requirements of the state for the training of excellent engineers, the training of excellent engineers in this field should pay attention to the cultivation of students' abilities in practice. The training objectives are as follows: Students develop good professionalism, strong engineering quality, with engineering research, engineering innovation and good engineering practice ability, realize the organic combination of student training, employment and enterprise human resources selection, cultivate innovative, practical, in line with the requirements of the development of the new situation of mechanical engineers excellence. Therefore, in order to meet diverse social needs, with the professional characteristics, mechanical design and manufacture and automation of professional practice teaching system consists of practical courses, social practice projects and innovative ability to expand the project composed of 3 links, established the overall train of thought of excellent mechanical engineer practice teaching system cultivation. For the practice of teaching system components, this article focuses on experimental teaching, curriculum (graduation) design aspects, in-school and internship resources optimization research.

2.1 Reform the experimental teaching system and strengthen students' experimental design of independent innovation

Mechanical design and manufacturing and automation of experimental links include: general education curriculum experiment, professional basic course experiment, specialty direction characteristic experiment, experimental teaching content is more, but the lack of connection between courses, validation experiments, less self-designed experiments; billing Division of the experiment, less comprehensive experiment; students basically have no choice of all kinds of experimental courses, cannot effectively mobilize the enthusiasm of students.

During the experimental teaching training process, students should be encouraged to set up an experimental main line of designing, manufacturing, testing and simulating a certain product. From the basic "mechanical design course", students should master the basic idea of a product design and Drawing, through the study of "mechanical self-made process," courses, master product manufacturing and processing technology and other specific requirements. Finally, through the preparation of the program, the application of three-dimensional software simulation and testing experiments, allowing students to judge their own design of the product can be put on the market; the function meets the initial requirements. From their own to build their own experimental platform, and then verify that their own design can adapt to the market, and ultimately become a product, in the process of this product from scratch, the students continue to learn new knowledge and constantly independent innovation.

Now business needs students to learn on their own, rather than to cultivate time, therefore, excellent engineering training requires the ability to develop students in the school experiment; the lessons learned can be linked to the ultimate ability to independently design.
2.2 Increase the course (graduation) design teaching, multi-course integrated curriculum design

As an actual combat training of students during their school days, the design link is an important part of deepening the understanding of the theory class knowledge and enhancing the ability to use the knowledge acquired to solve practical engineering problems. Excellence engineer training programs in a complete set of design teaching system, including curriculum design, graduate design and innovative design of three parts.

1) Course Design

The existing curriculum design includes the mechanical principle and mechanical design curriculum design, belongs to the basic professional course design, the lack of close contact between them, the course knowledge point is relatively independent, cannot be related to the actual product. For the training of excellent engineers, add "Computer Aided Mechanical Design Course Design", "steel structure course design" and "comprehensive ability training course design" to the original course design system, and adjust and optimize the design content of these courses. Throughout the course design links, A specific construction machinery (such as loaders, excavators, concrete or mechanical) system is designed to target the design stages to complete the design task, this will enable the students to acquire knowledge of subjects learned, promote knowledge integration of various courses, develop students' abilities of applying knowledge comprehensively and inspire students to practice actively.

2) Graduation project

Graduation Project (Thesis) is a comprehensive training students to master basic skills essential part of the engineering design and methods. It is part of the examination in which students can directly take part in the responsibility of the enterprise, for the present enterprise. Therefore, in the graduate design teaching, schools should focus on training comprehensive ability of students' innovative thinking and technology. Topics should meet the actual production, enabling students to master a product design process, production technology, technology development processes and equipment operation and maintenance of realistic engineering capabilities.

2.3 Optimization of the practice resources inside and outside school

Practice is the most important practical teaching link in training excellent engineers. The practice of the mechanical design manufacture and automation major includes the metal processing practice, the cognitive practice, the production practice and the graduation practice. For the mechanical design manufacture and automation major, there are two existing practice bases: inside school practice base and outside school practice base. The metal processing practice can be completed in the engineering training center. The requirements of practice can be fully met, and the strong support can be provided for the student practice. However, the traditional
metal processing practice has not been able to meet the needs of society. In order to meet the requirements, it should be transformed into the modern engineering practice teaching.

1) Establish a relatively stable faculty team and hire enterprise experts with high level or rich practical experience.

2) Determine the school practice teachers. Practice teachers should grasp the different business environment, the production equipments, product type, design department and be familiar with enterprise teachers, which requires that the school practice teachers have many practice experiences and can lead the students to be familiar with different departments of the enterprise and can guide students to understand the function of different workshops. Therefore, must determine the school practice teachers, not often changed.

Therefore, it is essential to build and make good use the inside and outside school practice bases, it is important to complete the management system construction. The existing resources can be rationally used. Therefore, the inside and outside school practice base should be optimized and the training objectives of the excellent engineer will be achieved.

3. Conclusion

It is an important way to cultivate the excellent engineers for practice teaching. The new idea of constructing practical teaching system of engineering applied talents is put forward based on the practical teaching system of the excellent plan. According to the cultivation plan of the excellent engineer education, this paper studied the practice teaching system of the professional training of excellent engineers. The applied talents with strong innovation ability can be cultivated based on the cultivation plan of the excellent engineer education and make students become excellent engineers with systematic professional knowledge and strong practical ability, which makes students become excellent engineers with systematic professional knowledge and strong practical ability.

Acknowledgment

This work was financially supported by the Professional construction project of Xi'an University of Architecture and Technology (Project Number: 1609116011), the natural science foundation of Shaanxi province (Project Number: 2012JM7015), Research project of education and teaching reform of Xi'an University of Architecture and Technology (Project Number: JG021333), and Special scientific research project of Shaanxi Provincial Education Department (Project Number:14JK1410) and the natural science foundation of Shaanxi province (Project Number: 2016JM5067).
Reference