

RESEARCH AND EXPLORE ON THE METHOD OF MODERN ENGINEERING TRAINING*

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ABSTRACT

The engineering training takes very important role in higher education in China that cannot only raise the studying interest and innovative potential, but also reinforces what they have taught in class. Over the past few years, a bold initiative has been carried on in our Engineering Training Center aiming to improve students' engineering skills and ability by combining practical and theoretical training. This paper introduces what we have done in recent years to strengthen the students engineering practical skills and ability, our objectives and some measures are discussed to improve the modern engineering training.

KEYWORDS

innovation; engineering realizes; engineering training; talent cultivation

1. INTRODUCTION

Engineering training is a very strong practical teaching procedure and it is a basic course which is necessary in comprehensive engineering practice and modern manufacturing process of all engineering colleges. It takes great responsibility to improve the engineering quality and engineering practice ability of the students, training comprehensive type, innovative and application type as well as high-quality, high-level of modern engineering technique personnel. The important task in the development of engineering talent of the next century is the role that other courses can not be replaced. Its goal is to enable to students learn a wide range of basic theories of modern science and technology and the necessary specialty knowledge. At the same time, give students sufficient time and conditions on training engineering practice ability. The engineering training can guiding student to combine the theory and practice, so as to improve the students' abilities of finding problems, analyzing problems and solving problem on the one hand; on the other hand, it can gradually increase the students' manipulative practical ability, so that students can further consolidate and strengthen basis and professional theory knowledge. Through the process of manufacturing products, students' practice skill, innovative ideology and engineering realize can be improved.

In recent years, the continuously expanding enrollment is followed by the employment of the students. A very important reason for the "difficult Employment" issue arising from the students is that the engineering realize, practical ability as well as adaptive ability to the actual work of students is poor. As a local engineering university, how to train required personnel under the conditions of market economy so as to improve employability is a new topic before us.

2. LOCAL ECONOMIC DEVELOPMENT NEEDS OF APPLICATION-ORIENTED TALENTS

Guangdong is the forefront of China's reform and opening up. Since reform and opening up, social and economic acquires rapid development, the scale of economies has been rapidly growing, new technologies development such as high-tech is with international practice in a variety of areas. This happens particularly in the Pearl River Delta region. In the Pearl River Delta, the Eastern form electronic information industry cluster, the Western emerge as household appliances cluster where machine industry is the main role, which is promoting the continuous development of province's manufacturing industry in depth. The implementation of non-equilibrium strategy giving priority to the development of coastal areas, as a result, the speed of industrial growth in the Pearl River Delta and social wealth is rapid increasing, while the demand for talents has put forward higher requirements. With the construction of the local economy continue to develop in depth, business-to-demand in structure have generated major change. In recent years, enterprises increase the proportion of demand for applicable talents who have a certain technique, and put forward higher requirements of quality. Enterprises need talents with not only theoretical basis, but a certain practical skills, engineering quality, and the ability to adapt the enterprise work as soon as possible. According to the investigation,

ninety-one percent of manufacturing enterprises are most in need of high-tech talents. In the past year, sixty percent of enterprises in Guangdong Province have suffered a serious shortage of workers, an average of 1.5 jobs compete one job seeker. In order to retain the old staff and attract new employees, a number of enterprises have to increase the remuneration of the workers.

At present, the manufacturing enterprises in the Pearl River Delta urgent need a variety of technical talents, particularly application type talents who understand advanced manufacturing technology. As a local engineering university, basing on the needs of local economic development, we must reform constantly the teaching system, teaching content and teaching methods to adapt the community's demand for talents under the conditions of market economy.

3. SELECT AND OPTIMIZE THE TEACHING CONTENT

The purpose of engineering training is to train students in the aspect of practical ability, engineering realizes and innovation spirit. According to the Pearl River Delta region's demand for talent, we have built a multi-level, modular teaching system. Basing on it, we select and integrate the contents of the relevant training, which is in connection with the training of different levels and aiming at strengthening the practical ability of students.

The first level is based training. Currently in the Pearl River Delta region's manufacturing, the numerical control machining equipment is popular. So, in accordance with the needs of local economic development, training content base on numerical control machining, aided by traditional training. At the same time, in this level, compulsory module and elective module of training content have been set up, so students can select appropriate training modules according to their own professional needs.

The second level is improvement training. It is mainly to set a comprehensive practical training after the first level of training, and help students obtain the ability for comprehensive analysis of problems and problem-solving through the training. On the foundation of basic training project, continuous increasing advanced manufacturing technology, modern electronic technology and modern computer technology training programs can enable students to understand more comprehensive about modern engineering technology and its development trend. At the same time, pay attention to the embodiment of specialty's characteristic and increase training characteristics; focus on improvement of project level, and build a integrated, designed and innovative project.

The third level is skills and innovation training. This level is mainly to train students in the engineering realizes and innovative ideology. It is mainly through the process of setting innovative projects and innovative technology activities of students. Through innovative design and manufacturing, the students can culture innovation spirit and engineering realizes.

4. THE USE OF FLEXIBLE TEACHING METHODS AND MEANS

Engineering training center is important practice bases. Comparing with the traditional metalworking, electrical and electronic practice base, there are great changes among the aspect of mandate and functions, teaching methods and the personnel composition. Training methods turned from original single training model to modern industrial-based comprehensive training model. The teaching methods and means take the following methods:

4.1 INTRODUCING MODERN EDUCATIONAL TECHNOLOGY

Traditional engineering training carry on with physical equipment in fixed location. With the continuous development of science and technology and the continuous emerging of new process and technology, engineering training must catch up with the pace of development of science and technology, so the training project must be increase in the synchronization. As some equipments of advanced manufacturing technology is expensive and fast upgrading, the number and content of the equipments are difficult to meet the needs of the training, to enable each student to have ample opportunity to operate the equipment is difficult, so unable to meet the requirements of skills training, at the same time, it is not conducive to enhance the consolidation of knowledge learning by students. For this reason, we introduce modern educational technologies and developed CNC machine tools simulation of the operating system, so that students can use computers to practice the operation of CNC machine tools through the network. In addition to practicing through physical equipment in teaching arrangements time, students are available to train through a virtual operating system in the spare time, and this breaking the constraints of time and space. The controlling panel on virtual operating system is nearly the same with the real CNC machine tools, so the effect of virtual operating system is almost no difference in the operation with the real CNC machine tools. Virtual operating system can not only save the cost of equipment and training costs, increase operating opportunities for students, but also change training content at

any time according to the development of science and technology.

4.2 OPEN TRAINING

The traditional training content has barely unchanged, no matter what profession, how long the training time, all students are unified arranged and they can choose nothing but passive training. In order to have more selection for different professions and different-loving students and raise their training enthusiasm more effective, the training base is completely open of site, time and contents. Opening training contents include two parts, the first is the opening up of the training products, in the traditional training students follow unified drawings and finish corresponding processing production, when opening up, the teacher only teach related operation skills, after the students learn the basic operation skills, they can make their own products; the second is the open of training projects, in addition to the completion of the training required, students can select its own training project, and complete the selected projects in specified time.

4.3 SELF-TRAINING FOR STUDENTS

Traditional engineering training is passive for students. Training projects, training content, training time etc. are planned. Over these years, the basic content of training has not much changed. Discussion and surveys show that this training method for students is only “packaging drug in accordance with the prescription”, students have no way to know the “drug” and how to “package”. The students’ comprehensive ability cannot able to be improved. We put forward the idea of project-led training; through the establishment of related projects, the part design, process design, processing and assembling the final products can be carried out by the students themselves. In this way, students can greatly mobilize enthusiasm, and turn passive training to active training. Training will enable students to have a more in-depth understanding the entire manufacturing process.

4.4 COMPETITIVE STYLE SKILLS TRAINING

To further enhance the engineering practice ability of students and to lay the foundation for the successful employment, we hold engineering training skills competition every year. The competition set CNC machining, electronics technology training and other major projects. Students are willing to actively participate in, well prepare, use after-school time for intensive training, through the competition students have greatly stimulated enthusiasm and their practical ability has been improved. In addition, the creation of related elective course has been set up and combined with skills training. Students master the relevant skills, through the skills of identification, access to the national vocational qualification certificates, so as to improve their employability and competitiveness. In recent years, we have opened related elective courses, after curriculum learning, we provide students with skills to identify opportunities. Over the past few years dozens of students have access to CNC intermediate vocational qualification certificates.

5. STRENGTHENING THE CONSTRUCTION OF TRAINING BASE

The construction of training base is the basis of good engineering training. At the same time in the software construction such as teaching system, teaching methods and means, engineering training is also necessary to strengthen the construction of the hardware. Training equipments are equipped reasonable based on the featured training content. Engineering training equipment is basic material condition, and advanced equipment is an important guarantee for the comprehensive improvement of engineering practice, engineering and other aspects of students’ quality. For this, we have increased the number of advanced manufacturing technology equipments and other related equipments, in recent years we have increased nearly 30 CNC machine tools and three-coordinate measuring instrument, rapid prototype, laser processing machine, etc. At the same time, we have closely cooperated with enterprises to build the training base. Currently we have set up a “modern design and manufacturing technology training bases” with the UGS company of U. S. A, and we have established a “Hong Kong-Guangdong Joint Training Center” with the Hong Kong Vocational Training Council.

In order to better train students in the spirit of innovation, engineering sense and practical ability, engineering training resources are opening up for all students so that students have more time and opportunities for training.

6. CONCLUSION

Over the past few years, we have focused and conducted a research and exploration on how to improve the student’s practical ability, engineering realizes and innovation spirit and thus enhance the employability and competitiveness of students. We achieved good results from establishing corresponding teaching objectives and teaching plans

for improving the skills of the students and taking a series of effective measures, including equipment investment, the development of virtual experiment system, the construction of training base etc. On this basis, we identify the skills training and skills identification into the normal teaching program. At the same time we have reformed the teaching methods, education system, and constantly summed up experience and strived to improve the quality of the training, so as to adapt to local economic development of talent needs and the needs of scientific and technological development.

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**This research is funded by Guangdong undergraduate higher education teaching reform project (BKJG200727) (BKJGYB2008050).*