Practice Teaching Reform of Mechanical Specialty for Application Oriented Creative Talent Cultivation

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Abstract. Practice teaching is the key link in the undergraduate education; practical teaching reform is a very important aspect in higher education reform. Mechanical specialty emphasizes the close combination of theory and practice; practical teaching plays a very important role in the cultivation of talent. On the basis of the analysis of the needs of practical teaching reform, this paper expounds the guiding ideology and general thought of reform, specific measures of reform and the implementation effect. Practice teaching reform of mechanical specialty is to cultivate application oriented creative talent, and to achieve the purpose of cultivating the "Engineering", "innovation” talent.

Introduction

Practical teaching reform plays an irreplaceable role in promoting students to integrate theory with practice, cognitive objective world, refining objective law, students explore the spirit and sense of innovation, enhance post-secondary students professional skills and comprehensive quality. With the development of modern science and technology, practice teaching has become an important part of the quality of the students of the professional training.

Due to the higher engineering college, affected by the previous teaching mode, teaching is still the focus of the narrow special mechanical design knowledge, lack of system integration of the whole mechanical industry, with the defects of teaching, curriculum, experimental configuration etc, the contradiction between the University of Education, the employment of college students and the national industrial structure adjustment. Due to the influence of long term examination oriented education, especially the influence of traditional culture, ideological education and teaching methods, current students habits in according to rules of teachers or textbooks to study, the pursuit of examination content and achievement. Not in accordance with the study of scientific research methods, it is able to learn but will not acquire new knowledge; engineering practice ability is poor, not to carry out scientific research and innovation.

To this end, it is a very necessary topic to discuss the reform of practical teaching. This article is in bear the "Heilongjiang Province Education Science Research Base Project Special Topics", "Heilongjiang Province Education Science Key Project" and "Heilongjiang Province Higher Education Teaching Reform Project" support, the original mechanical specialty practice teaching of reform and practice.

Guiding Ideology and General Thought of Reform

Taking the road of independent innovation with Chinese characteristics and building an innovative country, this is the basic requirement of the talent training in the history of Chinese universities. The 18th National Congress of the Communist Party of China stressed that adhere to the new industrialization, informatization, urbanization, agricultural modernization of Chinese characteristics, to implement innovation driven development strategy. Stressed that scientific and technological innovation is the strategic support to improve the social productive forces and overall
national strength, must be placed in the core position of the overall development of the country, these requirements are exactly the basic requirements of modern machinery industry innovation.

The reform of practice teaching should be based on meeting the requirements of modern higher education, and the demand of the students' ability should be in line with the market, and should reflect the concept of modern education. Based on this concept, we identified for my school Machinery Teaching Reform: "design innovation as the core, to mechanical and electrical combination as the main line, on the training of application ability as the foundation, widen the basic, pay attention to practice." Under the premise of popular education, characteristic training is also an important element of practical teaching. It must not only conforms to the requirements of the training objectives, but also to meet the personality development of students, in the spirit of innovation, practical ability, cultivation, artistic accomplishment, the level of foreign language etc. specially, create a unique professional mechanical characteristics, so that students with the skills to society, seek individual interest and social needs of the same. In the concept of teaching quality, more self-comparison, less horizontal comparison, you can avoid impulsive disturbance. As long as we persist in our efforts, we can get the recognition and support of the society and the market.

We consider the goal of the training of mechanical professionals, to avoid the professional training direction of key institutions. Play the advantages of multi subject in our school, lock in the cultivation of a more solid basic ability of the application, composite innovative talent, and puts forward the "For the local, to play the advantages of multi discipline, training high-quality engineering and technical talent and achieved great success. Its graduates are welcomed by employers, the rate of employment of the graduates has been more than 95%.

Specific Measures of Reform

Practical teaching is one of the basic conditions for teaching and improving the quality of teaching, and it is also an important means in the teaching of practical theory. In recent years, our school teaching infrastructure has been improved, practical teaching is also in the further construction and improvement, the indicators have been improved. In order to improve the practical teaching level of mechanical engineering and to train high quality engineering talents, a new exploration of practical teaching is carried out:

Experimental Mechanism Reform

Advocating practice is one of the contents of the teaching idea in our school, and it is one of the ideas and experiences of our school. According to the level of school running, the orientation of service, the training of talents and the orientation of school type, based on talent cultivation in order to cultivate advanced application type, compound type, engineering and technical personnel mainly, we set up the innovation and opening experiment. Through innovation and open experiment, training students' practice ability, cultivating the student's innovation thought, innovation consciousness and innovation ability, and cultivate interest in science, technology and engineering design, to broaden the students' knowledge, enhances the student to analyze and solving problems ability and comprehensive quality, discovery and outstanding talents. The opening of laboratory should pay attention to the actual effect Students according to their own actual situation, choose to do the basic training of the experiment, also can choose to do design, comprehensive, research experiment. Open project can be the teaching plan requirements of the class experiment, also can be extracurricular content, in order to meet the requirements of different levels of students, especially the students as the main body of innovative experiments to account for a certain proportion. According to the demand of the applied innovative talents, the opening and innovation experiments are added every year to improve the students' engineering practice ability and innovation consciousness. As for the needs of enterprises for students' engineering application ability, open the mechanical structure of the opening experiment, mechanical innovation design and other innovative experiments, greatly improve the students' practical ability and innovative awareness.
In order to achieve this goal, each student must complete a certain innovation credits, this innovation credits can be obtained through a variety of ways. To participate in the teacher's scientific research projects, and to be a teacher's scientific research assistant; To participate in the innovation practice or comprehensive practice project established by the school; Apply for the establishment of the school of innovation and entrepreneurship projects or their own application; Results can be published research papers, to participate in a variety of competition, patent applications, the results of the transformation and other forms to reflect

Reform of Comprehensive Practice Training

Establish "social practice-cognition practice-engineering training- school or business skills training-integrated design and production practice-internship and practical innovation - graduation design" multi bit integrated, step by step the comprehensive training system of practical teaching.

First semester: Students through social practice to understand the social and corporate demand for talent;

Second semester: Implement cognition practice teaching link. Students to visit the enterprise, so that students in the engineering practice of the application have a preliminary understanding of the professional;

Third semester: Implementation of engineering training practice. Students into the school engineering training center, through a series of direct participation in the production process of processing, so that students master the preliminary engineering application skills;

Fourth semester: Implementation of the practice of electrical and electronic practice and skills training. Through this practice, the students' engineering practice ability has been further improved, and the corresponding vocational qualification certificate is obtained through the professional skill certification training;

Fifth and sixth semesters: Implementation of integrated design training and production practice. Through the comprehensive design training link to enable the student to grasp the preliminary mechanical product development and design ability; Through the production practice, the students can learn the theory of the school to guide the practical production, and from the production process to find the problem, analyze the problem, and finally solve the problem;

Seventh and eighth semesters: Enterprise practice, innovation practice and graduation design. Under the guidance in the business part-time teachers and college full-time teachers, supplemented by, students to the identity of the staff, through the enterprise practice and graduation design, comprehensive training on the corporate culture, professional ethics, comprehensive vocational ability, to enhance the students' creativity and entrepreneurial ability, engineering practice ability.

Develop Vocational Skills Training

Aiming at the demand of numerical control technology, software engineering application in machinery industry and nearly two years of mechanical engineering students’ employment situation, the units are in urgent need of master NC technology application, large engineering software applications such as specialty students; with students the skills certification will be in the distribution of employment has a strong competitive advantage. In view of the above situation, set up the numerical control processing skill training, the engineering software application training, extracurricular science and technology innovation activity, all kinds of competitions and so on extracurricular practice link, and has set up the corresponding extracurricular credit. For students to carry out numerical control processing skills, engineering software applications and other skills certification training, through professional skills certification training can get CNC machining skills, Auto CAD global authentication, etc.; Student science and technology innovation team set up, in terms of funding, places to give strong support to enable students to actively participate in scientific and technological innovation, homemade experimental equipment and other activities, organize students to participate in a variety of competitions; To encourage students to use their spare time to participate in enterprise research and practice activities, to further increase the enterprise engineering environment to adapt and understand.
Increase the Strength of the Combination of Production and Research

To comprehensively implement the national revitalization of old industrial bases in Northeast China's strategic objectives, enhance scientific and technological talents, promote the combination of University Science and technology and economic construction, and accelerate the transformation of scientific and technological achievements, so that colleges and universities targeted for enterprise services, to promote the transformation process of enterprises to promote the equipment manufacturing industry, to achieve the integration of production and research. To this end, we provide a professional mechanical and technical consulting, scientific research, in accordance with the relevant national enrollment requirements for the factory training engineering master's degree, for enterprises to carry out scientific and technical personnel training and other services.

Implementation Effect

Students' Independent Innovation Ability Has Been Improved Significantly

In order to facilitate the cultivation of students' ability to analyze and solve problems, the experimental center opened more than 10 innovative experiments each year, while opening up of fischertechnik robot, design of assembly disassembly system, the combination sleeve design and test mechanical precision, computer aided design and other comprehensive open experiment, to enable students to understand the typical parts such as shaft, axle sleeve, bearing, thread, sprocket, sprocket drive, speed changing mechanism and specific structure and assembly requirements, at the same time, it also improves the students' analysis, problem solving and practical ability, enhance the students in practical engineering practical ability and application of theoretical knowledge of the skills, student's perceptual knowledge and engineering consciousness, enhance the students in the practical engineering application of theoretical knowledge and skills, to enable students to use a variety of methods for 3D modeling, broaden the students' design method, improve the ability of students in the integrated use of design software.

By taking part in the experiment, students' awareness of independent innovation has greatly improved. Many students spontaneously formed a group of science and technology innovation, themselves with the guidance of teachers, participates in "mechanical innovation design competition", " robot contest" and "TRIZ" Cup Undergraduate Innovation Contest".

New Breakthroughs in Cooperation between Colleges and Enterprises

Schools and enterprises to form interdependent relations, personnel training by schools and enterprises to bear, the school is responsible for the theory of teaching, the enterprise is responsible for the practice of teaching and to provide internship positions for graduates. Through the combination of schools and enterprises, schools can be more comprehensive understanding of the needs of the enterprise for talent, help to guide the school's professional setting and teaching content arrangement. Enterprises to participate in the personnel training to obtain their required professionals, thus forming the enterprise is the school survival depend on, the development of the source, school is the talent pool of enterprise development, technological innovation of the ideological base, the situation of school enterprise win-win situation. Internship during enterprises and technical personnel with college appointed teacher cooperation, combined with the enterprise demand for talents, including enterprise management, staff quality and 5S management, equipment operation, engineering technology and the like enterprise training and numerical control technology, computer aided design, technical English teaching theory and practice of learning, has received the good effect.

Students' Engineering Practice Ability Has Been Improved

Respectively in Harbin Cinema Machinery Co., Ltd., Xinya high precision auto connect Co., Ltd., Harbin solid Tai Electronics Co., Ltd., and other enterprises set up more than 10 teaching practice base, combined with excellent engineer education and training programs implemented in 7 to 8 semester during delivery to the enterprise practice, innovation practice and graduation design.
Students in various positions in the enterprise to practice, give full play to the theory of solid, strong communication skills and other advantages, for the enterprise production and technological innovation to contribute their own strength. According to the characteristics of enterprise products, combined with production and R & D needs, school teachers and enterprise engineering and technical personnel jointly developed the graduation design topic, all the questions around to solve the difficulties of enterprises technical problems and develop new products to meet established. For graduation design subject characteristics were set up in the mold development project group, the plane of R & D project group, apparatus of R & D project group, mechanical and electrical system development project team and technology group and take joint enterprises and technical personnel and school teachers guide, solve problem of enterprise, on the other hand also trained students ability of engineering technology and practical problem solving ability, make students employment can more quickly into the role, get enterprise recognition and wide acclaim.

**Teachers' Engineering Practice Ability Has Been Improved**

In accordance with the requirements of teachers "outstanding engineers plans", intensify the efforts of building the contingent of teachers, make cooperative enterprises to become teachers' training base. At the same time, the enterprise engineering and technical personnel into "excellence program" the building of the contingent of teachers, the establishment of university teachers to the enterprise learning and training, enterprise engineering and technical personnel to institutions of higher learning and training mechanism regularly to teachers and administrators were assessment, training and communication, to enhance the teaching ability and level of the professional teaching team.

**Summary**

To cultivate the innovative talents of mechanical engineering, through strengthening the practical teaching link, it should reflect the improvement of engineering practice and innovation ability. Ability training is various, has the language expression ability, the computer application ability, the design ability, the experimental operation ability, the project practice ability, the innovation ability and so on. Our students only have the ability to work with the employing units, and truly become high-quality engineering and technical personnel, can be recognized by the market, to be welcomed by the enterprise.

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