Reflections on the orientation and construction of mechanical engineering discipline under the background of new engineering

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Abstract: New engineering has become a hot topic in the field of engineering education, and it is also a construction orientation, so the traditional major of mechanical engineering has become the mainstream major of reform under the background of new engineering. The new engineering course is not only the response of higher engineering education to the new trend and new demand of future engineering development, but also a breakthrough change in the field of engineering education according to the major needs of the country, industry and science and technology. Carry out engineering practice in the form of cognitive practice, production practice and engineering case training, improve students' professional quality and teamwork spirit, and improve students' comprehensive quality such as theoretical knowledge, engineering practice ability and professional quality. Taking the discipline of mechanical engineering as an example, this paper thinks about the orientation and construction of mechanical engineering discipline under the background of new engineering.

1. Introduction

The construction of new engineering is a new mode of engineering education, and its "newness" is not only to set up some new majors, but also to focus on the reform of teaching system and the renewal of practical content of the original majors [1-2]. This study takes the applied mechanical engineering discipline as the carrier, the social and market demand for talents as the input, and the excellent mechanical designers who meet the market demand as the output, and strengthens the cultivation of students' employability and social adaptability, thus forming the training characteristics of applied undergraduate mechanical professionals. The orientation and construction of mechanical engineering discipline under the background of new engineering are considered.

2. Connotation of new engineering construction

The construction of new engineering is a major action plan to continuously deepen the reform of engineering education on the basis of "excellent engineer education and training plan" from the perspective of serving the national strategy, meeting the industrial demand and facing the future development [3-4]. Its main content is to set up and develop a number of emerging industries such as artificial intelligence, cloud computing, Internet, etc., and also to transform and upgrade a number of traditional engineering majors to form a new type of engineering with typical characteristics such as cross-border integration, advanced derivative, innovation-driven and practical application [5].

The traditional major of mechanical engineering should be based on serving national defense and regional pillar industries, and cultivate applied senior engineering and technical personnel who can engage in the design, manufacture, testing and control of electromechanical products in mechanical engineering and related fields. With the in-depth thinking on the new mode of training new engineering talents, where its actual origin, how to define its connotation and how to land its educational practice have become urgent questions to be answered at present [6].

Whether the professional function is rich, full and contemporary will not only affect the intellectual function of higher education, but also directly affect the quality of personnel training. At present, we must be smooth and grounded, continue to concise the characteristics of professional

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personnel training, strive to seek the support of regions, industries and enterprises, and take the initiative to train professional and applied technical personnel with solid electromechanical basic theory and good hands-on practice for the equipment manufacturing industry.

3. Orientation of mechanical engineering discipline under the background of new engineering

3.1. New engineering should be based on innovation

As a typical old engineering specialty, mechanical engineering specialty must seize this once-in-a-lifetime historical opportunity, actively adapt to the requirements of new engineering reform, and do a good job in related reform. At present, the degree of integration between talent training and industry in China University is not high enough, and there is a lack of participation of industry enterprises in key links such as talent training scheme formulation, curriculum system revision and curriculum resource development [7-8].

As a typical old engineering specialty, mechanical engineering specialty must seize this once-in-a-lifetime historical opportunity, actively adapt to the requirements of new engineering reform, and do a good job in related reform. The training program should also focus on improving students' ability, so that teachers can quickly adapt to learning new things and establish new ideas for cultivating students.

3.2. Training of mechanical engineering specialty is in line with the development of new economy

Classroom teaching content is not closely related to today's engineering practice. With the continuous development of society and industry, the teaching materials of mechanical engineering specialty are rarely changed. If we only teach the course according to the teaching materials, some contents will be out of touch with the engineering practice, which cannot meet the requirements of new engineering for innovation and comprehensive talents. As the number of students continues to increase, this mode will inevitably lead to a further decline in the teaching effect of engineering training and the practical ability of students in engineering practice [9].

The key to establishing a scientific and reasonable talent training plan is to grasp the relationship between various subjects and teaching links and the proportion of class hours. Can master new knowledge and technology, solve complex engineering problems in future development, participate in new economic development, and play a leading role in future science and technology and industry.

3.3. Meet the training needs of talents under new engineering

After entering the 21st century, with the development of high and new technology, the equipment manufacturing industry is increasingly moving towards a brand-new era of integration of optics, machinery, liquid and gas, man-machine integration, multi-function of one machine, integration of testing and experiment, flexibility, intelligence and globalization. According to the requirements of domestic industrial development for outstanding talents in mechanical engineering, we will further improve the training objectives of mechanical engineering. Specialty construction is a social practice activity that takes necessary measures and means to cultivate senior professionals who meet the needs of society according to the characteristics of the times, social division of labor and the inherent laws of talent training. Carry out engineering practice in the form of cognitive practice, production practice and engineering case training, improve students' professional quality and teamwork spirit, and improve students' comprehensive quality such as theoretical knowledge, engineering practice ability and professional quality.

4. Discipline construction of mechanical engineering under the background of new engineering

4.1. Strengthen professional construction

Engineering training is a subject involving a wide range, strong comprehensiveness and close combination with engineering practice. In the process of training, different training programs and different training contents should be formulated for students of different majors to meet their professional needs. The new model requires students to make a meaningful work, and it is more difficult for students to make it alone, so a new model of group cooperation to complete the training work is implemented [10].

According to the characteristics of the times and the development of manufacturing industry, the barriers are broken down, and many original independent courses are hierarchically established according to their functions and knowledge to form a mutually supportive curriculum group system (as shown in Figure 1).

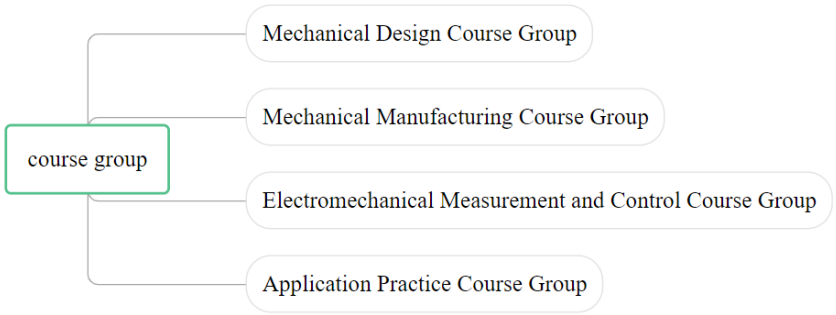

Figure 1 Curriculum group structure of mechanical engineering discipline

Professional training plan is an important part of college education, college education and teaching, and college education and teaching. On this basis, according to the training purpose and demand of talents, two kinds of training are carried out respectively to achieve comprehensive and multi-angle training of students' comprehensive ability and quality; One is to cultivate outstanding talents by selecting materials. The internship content includes enterprise course study, production internship, graduation internship and graduation design.

4.2. Teaching material construction

It is not obvious to reform and upgrade the training scheme of mechanical engineering specialty only from courses and credits. Only by combining the new requirements under the background of new engineering, breaking the routine, promoting integration and making leap-forward development can we achieve new breakthroughs. First of all, a high-quality textbook library suitable for the curriculum group is established, which includes high-quality textbooks, multimedia courseware and test question bank. Using modern multimedia technology, the examination database is established, which makes teaching and examination out of touch. Secondly, for each stage within the group, the team members write an experimental training guide within the group to help the team members build each stage within the group. Through practical training, the learned content is integrated and integrated to improve students' ability of analyzing and solving problems.

4.3. Constructing a multi-level practical teaching system

Aiming at the teaching mode of new engineering, it is not only the classroom teaching in schools. We should make full use of the resources of related enterprises, deepen the cooperation with enterprises, extend engineering education to the enterprise site, cultivate students' interest in self-learning, ability to adapt to industrial development and craftsman spirit, and realize the training goal of new engineering.

Based on the needs of the training of mechanical professionals, the practical teaching of this major generally includes experiments, internships, course design, graduation thesis (design) and other links, and each link clearly corresponds to the specific indicators in the training objectives of

mechanical professionals. A multi-level practical teaching system should be constructed (Figure 2). According to the function, space and mode of practical teaching, the practical teaching system in the training of mechanical professionals is divided into three levels: course practice, professional practice and social practice, which correspond to three modules: discipline foundation module, professional skill module and innovative education module respectively.

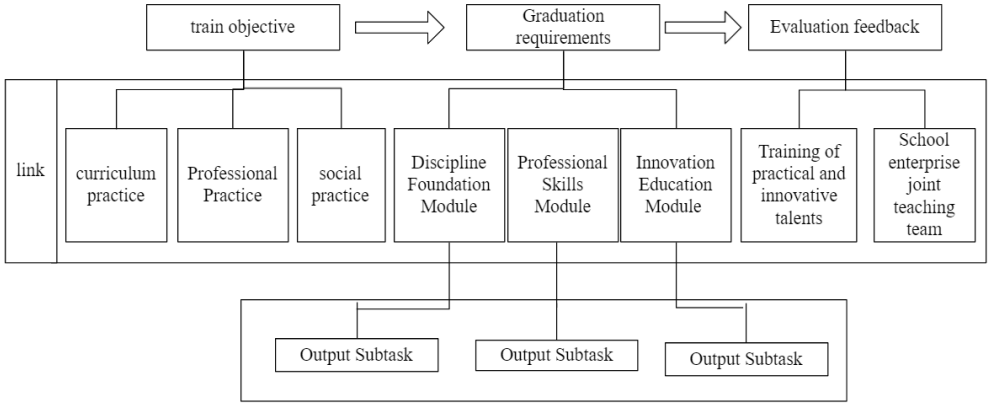

Figure 2 Multi-level practical teaching system

In the process of cultivating mechanical professionals, we should take the tutor's studio as the carrier, and carry out the second classroom practice activities around the theme of professional education and innovation and entrepreneurship education through school-enterprise linkage and project-driven mode, so that students can transition their professional study into innovation and entrepreneurship practice under the guidance of tutors, thus improving their innovation consciousness and ability.

Specifically, it is a control experiment system based on the realization of industrial robots and mechatronics, a competition practice platform for science and technology competitions, and a mechanical innovation center that serves students' independent innovation. The production practice mode, which is oriented to solve the field engineering problems of internship enterprises, trains students' ability to find, analyze and solve problems in the practice process.

4.4. Strengthen team building

To cultivate a group of high-quality mechanical professionals who meet the needs of the society, there must be a team of teachers who are suitable for it. On the basis of the existing teaching staff, we should strengthen the cultivation of teachers' practical ability by improving their academic qualifications, taking temporary training in enterprises, marking courses in prestigious schools, and hiring experts from well-known enterprises. In the training of experimental teachers, it is necessary to change the previous thinking of attaching importance to theory rather than practice, attach importance to the training of theoretical teachers, and strengthen the training and construction of experimental teachers.

This is a professional, technical and applied subject. Therefore, how to optimize the structure of teaching staff and improve the teaching staff reasonably is an urgent problem to be solved in the construction of teaching staff in colleges and universities.We should make a perfect development plan for teachers, and ensure that the teaching team of mechanical engineering discipline develops in the direction of strong engineering practice ability, high degree of education, reasonable age structure, good professional title structure and optimized knowledge structure through the strategy of entrusted training and talent introduction. And recruit experienced high-tech enterprises with high titles as part-time teachers. Gradually improve the requirements of the new engineering and engineering education standards for teachers.

4.5. Improve the evaluation mechanism of practical teaching

Teaching evaluation is an important link in the reform of mechanical engineering discipline, which can not only timely feedback the actual effect of the reform of mechanical engineering discipline, but also further guide its innovative development. Strengthen the cultivation of hands-on

ability; Comprehensive design experiments can help students deepen their comprehensive understanding and application of many knowledge points in the course, strengthen the cultivation of problem-solving ability, gradually reduce confirmatory experiments and increase the proportion of comprehensive experiments. For example, in the car training program for mechanical majors, after the students are assembled, the teacher provides a slope, and each group of students slides the car down from the same height, and the results are calculated by the distance of sliding. The farthest distance means that the processing and assembly accuracy is the highest and the results are the best; This assessment method can make each group of students feel competitive and interesting, and will deepen the knowledge learned in the engineering training process.

5. Conclusions

New engineering is a new project that takes the new economy as an opportunity, serves the national strategy as a starting point, meets the needs of the industry and adapts to the future development.At present, we must be smooth and grounded, continue to concise the characteristics of professional personnel training, strive to seek support from regions, industries and enterprises, and take the initiative to train professional and applied technical personnel with solid electromechanical basic theory and good hands-on practice for the equipment manufacturing industry. According to their own orientation and ideas, Chinese universities also offer different courses and credits. Therefore, under the background of new engineering, the discipline construction of mechanical engineering should not only maintain the harmonious development of professional courses in schools, but also meet the relevant provisions of engineering education.

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