A Large-scale Engineering Perspective-based Construction of Mechanical Engineering Practical Teaching Platform in Local Technology-applied Universities

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Abstract: The traditional engineering view has not been suitable for the development of modern engineering education. Education concept of the big engineering view is playing an increasingly important role in education of modern engineering. The paper aims to explore how to construct the practical teaching system of the mechanical classes in applied local colleges and universities. First of all, from the essence of education, the paper analyzes the requirements of education concept of big engineering view to the practical teaching system of mechanical specialty in education of modern engineering, and then enumerates the present situation of the construction of the practical teaching system of mechanical specialty in applied local colleges and universities. As a typical case facing the reform of modern engineering education, this paper shares the experience of construction of mechanical specialty practice teaching system of Xuzhou University of Technology, as well as provides reference for local applied colleges and universities.

Keywords: Big engineering view; Applied; Practical teaching system

INTRODUCTION

The engineering view originated from the “regressive engineering movement” initiated by American engineering education in the 1990s, first proposed by former MIT headmaster. “Regressive engineering movement” main idea is to reform the education system of American engineering education “over-engineering science”. “Reconstruction engineering education” makes education based on discipline return to its original meaning, pays more attention to engineering practice and engineering education itself system and integrity[1]. Such a system, large complete engineering education concept includes not only science and technology, also includes is closely related to science and technology of economic, social, environmental ecology, culture and art, ethics, and many other factors. In recent years, the latest achievements of education reform in international engineering-education mode of

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CDIO engineering is the representative of education mode under the guidance of education concept of big engineering. The big engineering view provides reference for education of higher engineering in China.

“Applied” Undergraduate education is an important branch of Chinese higher engineering education, and it is to train applied undergraduate engineering and technical personnel as the goal, pay attention to the cultivation of students' project practice ability, the school localization of being local undergraduate colleges and universities, considered as the location of local universities. How to build a practical teaching system in the field of “big engineering view”? This is the question to be discussed in the paper. This paper starts with the essence of education concept of “big project view” and analyzes the modern engineering education for the construction of practical teaching system of mechanical engineering, then enumerates the present practical teaching system of mechanical engineering in local colleges applied construction situation, as a typical case for modern engineering education reform, and discusses the Xuzhou University of Technology of engineering practice teaching system of mechanical engineering construction cases, as well as provides reference for other local undergraduate normal colleges.

The first: The education concept of big engineering view is the requirement of the practical teaching system of mechanical specialty.

People used to think that, the project is to create a social existence as the goal, to relevant industries and specific professional technology as the main body, the fusion associated technology, and in accordance with the corresponding rules and laws are integrated human practice activities [2]. This kind of practice is different in different historical periods, with different engineering problems and different models. Under the traditional engineering concept of engineering education to engineering practice and isolated from human's historical period, it simply attaches great importance to the mastery of academic knowledge and professional knowledge, but neglects to the cultivation of engineering practice ability. It is focused on the research and application of engineering skills, but neglects the cultivation of innovation ability of engineering technicians. It simply attaches importance to education of engineering technology and ignores the cultivation of human, moral and artistic aspects of engineering technicians.

With the advancement of science and technology and the development of human society, modern engineering presents a systematic, complex and comprehensive feature, so traditional engineering view has not kept up with the development requirements of education. People realize that the purpose of engineering activities is not simply to transform nature, but to follow the laws of natural ecological activities and reshape ecological activities in a higher social living standard [3]. Therefore, we must contain the elements which will conduct engineering activities involved in the project activities, and establish a system, complete engineering ecological view, values, engineering orthodoxy, engineering society, this is the basic content of the modern concept of big projects.

But machinery plays an important role in the human transformation of nature. Mechanical engineering education is an important part in education of higher engineering. It inherits the essence of education concept of “big project view”. Mechanical engineering practice teaching system the requirements of the building can be summarized as follow: it is necessary to
develop mechanical engineering and technical personnel of mechanical science and technology skills training. It contains the tension of cultivating scientific quality and humanistic quality; it stimulates and trains students' engineering practice ability and innovation ability.

The second: The current situation of the construction of practical teaching system of mechanical specialty in applied local colleges and universities.

Education, a mechanical engineering of China's application-oriented local universities, has been exposed to the traditional academic type education, which is influenced by historical factors, and the construction of its practical teaching system is also confined to the traditional engineering view. At the present stage, the problems existing in the practical teaching system of mechanical specialty in local colleges and universities mainly include:

1. Follow the practice teaching system of traditional academic undergraduate education, then attach importance to theory and despise practice. Applied undergraduate education concept was born at the beginning of the century, which originates from the level of education in our undergraduate universities, but it all follows the traditional teaching indoctrination, education mode based on books, and lacks the characteristic. To serve the modern engineering industry, to show the features of school-running, education administrative departments in our country in recent years, has been clear about the education of our higher education pattern: “the national more than 1200 colleges and universities will have more than 600 colleges and universities will gradually to turn” application technology university [4]. However, at the beginning of the shift, the practical teaching system of mechanical specialty in applied local colleges and universities is still in accordance with the practice teaching system of traditional academic machinery, and attaches great importance to the theory of contempt practice, and lacks of scientific quality and the cultivation of the humanities.

2. The proportion of education is not significant in practice, and the training of applied talents is insufficient. At present most of applied undergraduate college practical teaching systems from teaching concept to teaching method, from the practice curriculum to implement, all reflect the practice teaching theoretical teaching affiliate or just part of the theory teaching course concept. Such student's engineering training ability is not focused on training, and it is difficult to acquire skills in many skills of mechanics.

3. It is not possible to highlight students' dominant position according to the education method and means of teaching innovation and practice. The current practice teaching systems of applied undergraduate colleges still regard teachers as the dominant position of education mode, which rely on a teacher in the dominant position of knowledge and ability training, but it does not highlight student's dominant position. In the practice project, it is accomplished by the teacher whether it is the determination of the practical project, the implementation of the practice activity and the demonstration of the operation. It limits the students' subjective initiative and creativity, which is not conducive to the cultivation of students' engineering practice ability and the training of students' innovative ability.

Therefore, the education concept of “big engineering view” is urgently needed to reform the practical teaching system of local colleges and universities at present. Then I will give you an example of the reform of the mechanical engineering practice teaching system of
Xuzhou University of Technology to share experiences with other local universities.

**The third: The reform and practice of Xuzhou University of Technology for the practical teaching system of mechanical specialty of “big project view”**.

Xuzhou University of Technology is one of the first colleges and universities to cultivate “application-oriented” undergraduate talents. At present, there are four mechanical majors, including mechanical design and manufacture, automation, mechanical and electronic engineering, material control molding, industrial design, etc. Because the school is located in “China construction machinery city”, Xuzhou construction machinery and its supporting is one of the economic pillar industry of Xuzhou, wherever the schools are established based on service, training strategy of radiation throughout the country. The college of electrical and mechanical engineering guided the construction of professional practice teaching platform with the concept of “big engineering view”, and constructed the practical teaching system as shown Figure 1. The practical teaching system includes four platforms: internship platform, practical training platform, discipline competition platform and teaching integration platform. There are the following characteristics about its construction:

![Practical teaching system diagram](image)

1. The construction of the internship platform relies heavily on regional advantages to
create conditions and close service industry, industry and professional needs; during the internship, students gain professional cognition and cultivate professional emotion. Xuzhou's engineering machinery manufacturing enterprises cluster, supporting manufacturers. There are five divisions, only eight manufacturing base and 15 subsidiaries in a Xugong group, which is engaged in other private enterprises related to engineering machinery up to hundreds of companies. The school of mechanical and electrical engineering makes use of the advantages of regional resources, and establishes an off-campus internship base in 26 engineering machinery production and service enterprises such as Xugong group. When constructing practice teaching system of practice platform, in addition to the metalworking practice arrangement in the school practice base, the understanding of the students practice, production practice, graduation practice are arranged in whole or in part in Xuzhou local engineering machinery, manufacturing and service enterprises. On the one hand, it promotes the exchange of schools and enterprises, so as to make the teachers and students of the school go into the industry, understand the industry dynamics, clarify the industrial demand, and in turn promote the adjustment of the professional training plan and the updating of the curriculum system. On the other hand, it also deepens the students' professional cognition, so that students can infiltrate and train in the melting pot of engineering machinery, and improves the students' professional cultural quality and cultivating professional emotions.

2. The construction of the training platform highlights the features of “application”. The practical training platform in the practical teaching system is the characteristic embodiment of the training of “application-oriented” undergraduate talents. The college of electrical and mechanical engineering has cooperated with the technical appraisal center of Xuzhou bureau of labor. Now, there are four kinds of secondary vocational qualifications, such as CNC machining and maintenance electrician, among undergraduates. Innovation theory teaching system at the same time, the software employs throughout the theory of teaching, students after learning the software program, such as CAD, SolidWorks, you can choose whether to receive overtime training to get the corresponding software engineer certificate. The training orientation of 3D printing technology is not limited to students majoring in industrial design, but it also improves students' professional quality while improving their professional skills. The construction of practical training platform, greatly increasing students for industry practical technical proficiency, shortens the development period of the technology to adapt to social employment. It enables the student to study in school period was associated with professional skills.

3. The construction of the discipline competition platform reflects the students' interest and interest as the center, which has fully aroused the initiative and innovation of students' autonomous learning, and improves the students' engineering practice ability. The platform relies on the resources construction at all levels of the school, and the platform is multifarious, which increases the students' space of choice. In the establishment of the project, there is a selection of the guidance teacher system to enhance the interaction between teachers and students. At the same time, students are required to form teams across professional and inter-school departments to promote the integration and infiltration of multi-disciplinary knowledge in the student knowledge system. Students are regarded as heads of research projects and leading roles in the most practical researches and projects of platforms. It not only greatly stimulates students' creativity, but also exercises the students' engineering practical ability.
In addition, the teaching integration platform in the system can provide students with the auxiliary learning and experimental help of the mechanical routine courses. Under the platform management, in addition to the basic teaching function, it is open to students by appointment system, and the subjective initiative of students' learning of professional knowledge is transferred, which effectively supports the cultivation of students' awareness of big engineering.

The fourth: Summary

Traditional engineering view is not suitable for the development of education of modern engineering. Education concept of big engineering concept is playing an increasingly important role in modern engineering education. The practical teaching system of modern mechanical engineering is oriented to the construction of big project view, perfect practical teaching system in cultivating students' engineering quality, students' project practice ability and innovation ability play a decisive role, especially in applied in local colleges, but also to reveal its characteristics at the same time to provide support and protection.

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