

## The Undergraduate Practical Engineering Exploration and Research based on the New Engineering Background

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### Abstract

The construction of new engineering is very important for the talent training of higher engineering students, In particular, the practical training education related to engineering training puts forward clear requirements, that is, to cultivate innovative talents in the engineering field with innovation and entrepreneurship ability and comprehensive problem-solving ability. By constructing the OBE teaching system of engineering education, continuously improve the teaching mode and content of the course and form a closed-loop feedback. Considering the internal logic and knowledge system of engineering education, cultivating students' ability can solve complex engineering problems. Combined with the practice and exploration of the reform and development of the school of engineering training and innovation, the evaluation scheme of innovative practical teaching system in universities is formulated. Improving the brand effect of undergraduate professional production practice education is helpful to cultivate the awareness of high-quality practice education. The practice results show that the school of engineering training and innovation has achieved remarkable results in cultivating students' innovation, practice, ability and engineering quality.

### Keywords

New Engineering; Engineering Training; OBE Teaching System; Practical Teaching.

### 1. Introduction

At present, the development of the world is setting off a new round of scientific and technological revolution. Recently, the development of science, technology and industry in China is facing unprecedented rapid development. According to the promulgation of a series of national strategic plans such as "2025 Made in China", "Several opinions of the general office of the State Council on deepening the integration of industry and education", and "The action plan for artificial intelligence innovation in universities" in the Ministry of education. The "Beijing Guide", "Fudan consensus" and other student training methods among universities have been successively introduced [1-3]. The continuous innovation of artificial intelligence, Internet and emerging science and technology puts forward higher requirements for the comprehensive quality of talents in new engineering. With the rapid development of new business forms and industries, China urgently needs a new batch of new engineering talents with knowledge and skills [4, 5]. In order to meet the huge demand for talents in China's market, the construction of "new engineering" in the school of engineering training and innovation is an important teaching platform for cultivating compound talents [6]. The school of engineering training and

innovation's goal of training students is to improve the comprehensive ability of interdisciplinary compound scientific and technological talents, so that students have the basic quality of independent thinking and strong practical ability.

## **2. General Situation and Existing Problems School of Engineering Training and Innovation in Shenyang Jianzhu University**

### **2.1. General Situation**

The school of engineering training and innovation carries out engineering knowledge training, engineering skill training, comprehensive engineering training and innovation training for all students. It is also a practice, innovation and service base that can be closely connected with the frontier of disciplines and multi-disciplinary integration. It mainly focuses on practice. At the same time, it has a modern teaching practice platform for postgraduate and young teacher training, scientific research, technology development and serving the society. Under the background of "new engineering", it strengthens the characteristics, and plays the role of demonstration and radiation.

### **2.2. Existing Problems**

(1) There is no clear teaching goal. Although engineering education has received effective attention in universities, it is still in the transitional period or preliminary exploration. The practical goal is still formulated according to the original theory, which leads to more theoretical teaching. The cultivation of practical talents is difficult, and the overall teaching goal is not clear.

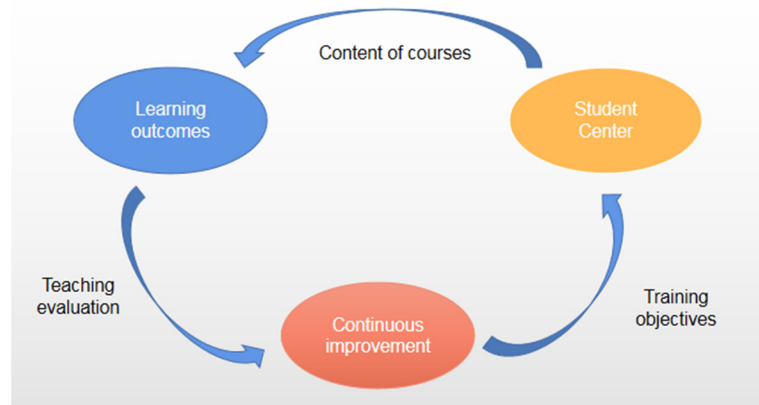
(2) There is no comprehensive evaluation teaching system. In the context of the diversity of teaching and teacher development, the traditional teaching evaluation system can not meet the existing teacher evaluation. Many practical contents are ignored. There is no teaching evaluation system suitable for diversity. There is a lack of theoretical research on the process cognition and process evaluation of teaching.

## **3. Exploration of OBE Engineering Practical Training Teaching System**

The construction and exploration of the school of engineering training and innovation is directly related to the cultivation of students' innovative ability and teaching quality in universities. It is an important training place for engineering education, which can effectively improve the practical ability and innovative ability of undergraduates and even postgraduates. Under the background of "new engineering", OBE teaching system is used to improve the teaching quality of undergraduates to meet the development needs of modern engineering and technical talents in China. By summarizing and combining the teaching mode of undergraduate talent training, multi-disciplinary work study combined with ideological and political elements, characteristic teaching materials or courseware and other landmark achievements are carried out. An interdisciplinary integration platform conducive to the emergence and implementation of new technologies, new courses and new majors which is built. A collaborative innovation promotion platform for Industry Education Integration and school enterprise cooperation is established.

OBE engineering training and teaching system takes achievement oriented education as the main goal, it is to meet the teaching concept of cultivating compound talents in the society through engineering training, and a scientific teaching system can guide students to pursue engineering knowledge. The methods and contents of engineering teaching are served to the students, which has been recognized by the school, teachers and students. In the OBE engineering training and teaching system, teachers choose appropriate teaching cases to make

students clearly understand the objectives and importance of engineering education and take practical problems as the teaching object, which can improve students' interest and initiative awareness. It can also drive students to carry out relevant courses, using the evaluation system to correct teaching methods in time and improving teaching quality. The OBE teaching system is shown in Figure 1.



**Figure 1.** The OBE teaching system

#### 4. Objectives and Measures of Construction

With the continuous innovation of new engineering teaching mode and the development of OBE teaching system, modular teaching, the change of classroom teaching methods and the introduction of virtual platform, the teaching quality of the center are comprehensively improved. [7-9].

##### (1) Innovative training content

Shenyang Jianzhu University majors include dozens of majors such as machinery, near machinery and non machinery. In order to comprehensively improve the engineering quality and ability of students, the school of engineering training and innovation considers the uniqueness of teaching contents of different majors and the differences of students' professional knowledge. Based on the OBE teaching system of result oriented education, the engineering training courses are carried out, which can meet the diversified and personalized learning requirements of different majors. It can make undergraduates have a self-challenging attitude, stimulate students' enthusiasm in learning engineering courses, and achieve a new breakthrough in engineering teaching.

##### (2) Improve teaching methods

The school of engineering training and innovation introduced the advanced teaching concept of "flipping class", broke the traditional class mode and created a new teaching method of learning after class and asking questions in class. Flipped classroom mainly has the following characteristics. 1. Making the students become the main body of teaching, master the initiative of teaching, let students more actively participate in the module teaching of engineering training, which can focus on the learning of process projects, master the cutting-edge problems of intelligent manufacturing, and then understand the basic concepts and needs of new talents under the background of new engineering. 2. Teachers play a guiding role, applying Internet technology to carry out online teaching, let students freely conduct online search, stimulate students' interest in engineering and realize teaching diversity.

##### (3) Introduction of virtual platform

With the continuous innovation of science and technology and the continuous improvement of students' requirements for teaching results, the school of engineering training and innovation

plans to introduce intelligent manufacturing virtual simulation platform in combination with the characteristics of construction and construction machinery. Because construction machinery equipment are expensive and occupy a large space, it is difficult to meet the procurement requirements of relevant equipment and restore the scene of the construction site. At the same time, in the process of practice, the personal safety of students is also the main factor considered by the college. The virtual platform can solve the problem of shortage or shortage of college funds and engineering training equipment. In the traditional demonstration teaching, teachers only teach in theory, so it is difficult for students to feel the real practical teaching process of construction machinery, and the proportion of students' passive teaching is too large.

The intervention of virtual platform can make students have a new understanding of the new knowledge of construction machinery, achieve the teaching principle of "virtual complementing reality", jointly apply open virtual teaching resources and design virtual teaching platform.

## 5. Conclusion

Under the background of new engineering, The school of engineering training and innovation carries out exploration and research on undergraduate engineering training based on the "OBE" teaching system, takes students as the center, establishes new modular teaching, and explores the training mode of new compound talents in China. With the deepening reform of curriculum and teaching methods, it can effectively solve some problems existing in current teaching, point out a positive direction for the teaching construction under the background of new engineering, and promote the improvement and development of professional ability and quality of engineering training.

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