

## Exploration on the Construction of Innovative Course System for Engineering Training Lathe Work Teaching

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**Abstract:** Undergraduate education is the foundation and key of college talent training. While, the engineering training center is a practical base to cultivate students' engineering consciousness in higher engineering colleges. Lathe work practice teaching is a significant component part of it. Currently, the college engineering training lathe work teaching is faced with the certain danger of common lathe operation with a lot of physical consumption, which seriously affects the enthusiasm and initiative of students' practical training of lathe work. Therefore, this paper puts forward the innovation curriculum system reform of engineering training lathe work teaching, so as to change the current situation, improve the students' interest in learning, improve the teaching quality and sense of achievement of the training teachers, and cultivate engineering training talents with engineering training awareness, engineering practice ability and innovative thinking in the new era.

### 1. Introduction

The college engineering training centre is an essential link in the reform and development of higher education in China. As a practical teaching platform for the implementation of engineering education in colleges and universities in China. Engineering training centre is a new practical teaching mode with Chinese characteristic engineering practice education idea and the teaching pattern innovation<sup>[1]</sup>. Engineering training is primarily aimed at undergraduate students of various majors, which provides them with engineering practice education, industrial manufacturing understanding and industrial culture experience<sup>[2]</sup>. Moreover, it also a significant educational link to cultivate students' practical ability and innovation consciousness.

Nowadays, most Chinese engineering colleges and universities have been already established the engineering training centre, which have become the practice teaching bases with the largest teaching scale and the largest number of students in engineering colleges and universities. Meanwhile, it is also the project with the largest single investment in the construction of college experimental teaching<sup>[3-4]</sup>. The modern engineering training teaching in our country started relatively late, whose development exits a greater imbalance, and the regional differences are extraordinarily obvious.

As a link of engineering training teaching, lathe work practice teaching plays an important role. However, the lathe work practice training curriculum in domestic colleges and universities mostly adopt the teaching mode of explanation and demonstration by training instructors. It is hard for students to understand and master the simple explanation of abstract and intricate knowledge points in lathe work, such as general lathe's process principle, equipment structure, internal transmission principle and processing technology and so on<sup>[5]</sup>. In view of this problem, a few colleges and universities use the form of playing video to cooperate with the practical training instructors to explain, but most of the video materials are in the form of fragments with not systematic and comprehensive, which makes the students boring to watch and difficult to understand. Therefore, the innovation teaching reform of engineering training curriculum is the inevitable trend of the development of engineering training curriculum system, which is extremely significant and necessary for improving students' engineering consciousness, cultivating engineering practice

ability and developing innovative thinking<sup>[6]</sup>.

## 2. Lathe Work Course System Construction

For the construction of lathe work teaching innovation curriculum system, it should be paid more attention on insisting to the joint training of school and enterprise and the driving of project competition, which also should be laid emphasis on cultivating the ability and quality, and ensuring the coordinated development of quality, ability and knowledge. Only by establishing the experimental teaching platform of the combination of virtual and real, it can train the talents who will reflect the characteristics of industrialization and information integration, and meet the future development requirements of new engineering elites training<sup>[7]</sup>. During the process of training new engineering technical talents, we should pay more attention to the cultivation of students' ability of expression and communication, team cooperation, innovation and entrepreneurship, analysis the cultivation of problem-solving ability, so that students can form good basic engineering norms, safety and environmental awareness, industrial ethics, social responsibility and others.

### 2.1 Clear Teaching Philosophy

According to the characteristics of engineering training and lathe work teaching, the curriculum system structure of Lathe Work Engineering Teaching establishes “cognitive training—basic training—comprehensive innovation training”(show as figure 1), which is hierarchical, phased and progressive, so that students can master the process principle, equipment structure, internal transmission principle and other concepts of general lathe, understand the lathe work process, and be familiar with the equipment used in the enterprises, and preliminarily grasp the basic operation skills of lathe and master the core knowledge points of lathe work.

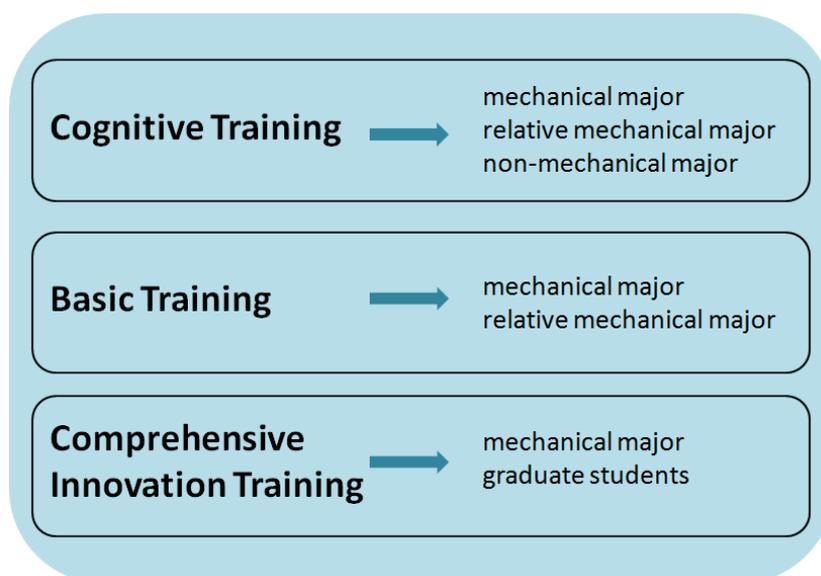


Figure 1. Lathe teaching system.

### 2.2 Setting up Teaching System

The lathe work curriculum has twenty-four hours in total. It mainly opens to undergraduates of the whole school, covering the mechanical, relative mechanical and non-mechanical students. Different students have different majors and interests. Therefore, teachers should teach students in accordance of their aptitude. The innovation curriculum system of lathe work teaching should be properly combined with multiple-disciplinary cross and multiple-level practical projects, which clearly defines the design scheme, technical points, innovation points, etc. and implements them to specific experimental projects. In addition, it also comprehensively considers the characteristics of experimental objects of different grades and specialties. The modular and gradient contents are designed to meet the teaching links of different levels or requirements, and they are presented in the

form of static and dynamic digital resource media such as text, illustration, animation, voice, video, network streaming media and virtual simulation interaction.

The specific methods are as follows:

① Cognitive training. It is primarily aimed at the freshman and sophomore who study in mechanical major, relative mechanical major and non-mechanical major, which combines online and offline teaching. Before the class formally starts, students can watch the basic composition, transmission principle, turning process and other animation videos of the lathe through the virtual online teaching platform. It can help us have a certain understanding of the lathe work process. In the class, teachers can explain the real lathe operation, technological process and other contents, which leave a deep understanding of the lathe work process.

② Basic training. It is chiefly aimed at the junior and senior students who study in mechanical major, relative mechanical major with certain professional basis. The teacher introduces the relevant knowledge points through teaching the basic principle of lathe work. The students can select the appropriate cutting tools to set the correct feed speed, arrange the processing sequence and complete the processing through the resources of text, illustration, animation, video, etc..

③ Comprehensive innovation training. It is suitable for senior and graduate students who are major in machinery with high foreign language communication and computer operation ability. Moreover, they also can analyze and process the complex parts who also can operate the virtual simulation software to design the processing process, simulate the processing process, and ultimately carry out the actual processing on the turning-lathe.

### **2.3 Construction of Teaching Evaluation System**

Teaching evaluation gives a value judgment to all the effects during the teaching process according to the teaching purpose and teaching principle. The quality of evaluation has an extreme influence on students. It is unscientific to adopt the traditional mode of final examination to evaluate in practical curriculum. Therefore, according to the characteristics of practical training curriculum, the combination of various evaluation methods can not only arouse the enthusiasm of students, but also cultivate the ability of self-study. According to the curriculum standard, the assessment mode is determined to be composed of three parts, which are experiment design scheme, experiment process performance and experiment report assessment. Meanwhile, the proportion is slightly adjusted according to the students in different modes. It takes into account the difficulty coefficient of the work, the completed condition of individual or team, and combines student self-evaluation, mutual evaluation and teacher evaluation in various forms, which is incorporated into the performance evaluation of the experimental process to make the curriculum system more systematic and interactive. This kind of evaluation method has strong implementation, which can better objectively evaluate the curriculum by strengthening the classroom teaching process with students as the main part and teachers as the auxiliary part.

### **2.4 Building Security Awareness**

In the actual teaching work, there exists a certain danger in the operation of the general lathe. Therefore, the instructors must standardize the students in the process of the practical training of the lathe work, so that the students can form good behavior habits, such as the placement of measuring tools, knives, clamps, the cleaning of chips on and around the lathe, the placement of process cards, etc., so as to protect themselves, maintain the safety of others, obey the operation discipline and achieve safe and civilized production during the training.

### **Conclusion**

The curriculum system reform of lathe work teaching principally aims to cultivate high-quality talents who are “ambitious, dare to bear, knowledgeable, transcendent, innovative and adaptable” can adapt to the development of modern enterprises, and build a talent system leading the development demands of modern enterprises. Moreover, it mainly takes the cultivation of talents as

the aim and adheres the purpose of training the innovative talents, which transfers the simple knowledge teaching to the innovative talents training, so as to improve the students' engineering consciousness, engineering practice ability and innovative thinking.

The construction of engineering training lathe work teaching innovative curriculum system is presented in the form of static and dynamic digital resources such as text, illustration, animation, voice, video, network streaming media and virtual simulation interaction, which have the great significance for updating teaching concept, changing teaching mode and improving the teaching efficiency. Therefore, it is extraordinarily significant and necessary for the construction of lathe work teaching innovation curriculum system to cultivate students' engineering consciousness and engineering practice ability.

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