

# Exploration of the Teaching System of Engineering Practice in the Specialty of Vehicle Engineering

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**Abstract.** Practical teaching is an important part of training personnel in vehicle engineering. This paper starts from the requirement of the practical teaching mode in the training of talents for vehicle engineering, and by analyzing the present situation and disadvantages of the practical teaching in the major of vehicle engineering, proposes a new system of the practical teaching in the major of vehicle engineering to cultivate students' comprehensive practical ability and innovative ability.

## 1. Introduction

The development of new economy requires engineering talents to have higher innovative and entrepreneurial capabilities and cross-boundary integration ability. And it requires establishing more diversified and personalized engineering education training mode. Local colleges and universities should play a supporting role in regional economic development and industrial transformation and upgrading. College can actively dock local economic and social development needs and enterprise technology innovation, grasp the direction of talent demand, make full use of local resources, play their own advantages, refine school-running features to carry out the student-centered concept, deepen the teaching fusion, university-enterprise cooperation, cooperative education, enhance the students' employment ability, cultivate a large number of strong industry background knowledge, engineering practice ability, fit for industry development needs applied and technical persons. Therefore, only by reforming the existing teaching system and strengthening the practical teaching can we cultivate excellent applied talents in both theory and practice.

## 2. Current Situation and Disadvantages of Practical Teaching of Vehicle Engineering

The traditional teaching mode is effective for single basic experimental skill training. However, for the designable and comprehensive experiments, such experiments cover a wide range and have strong comprehensiveness and uncertainty. If this teaching mode is also adopted, students will always be passive in the learning process, which also limits students' creativity. This experimental teaching mode can not fully adapt to the requirements of training high quality applied talents of vehicle engineering, and its disadvantages gradually appear, mainly in the following aspects[1].

### 2.1 The experiment content is outdated and lacks continuity.

Most of the experimental teaching materials are traditional and the teaching contents are simple and repetitive. There is a lack of continuity between the experiments. Students tend to be passively receptive, far from cultivating exploration and innovation.

### 2.2 The training projects are simple and the training conditions are backward

At present, the practical teaching projects of vehicle engineering in undergraduate colleges are mainly cognitive experiments or confirmatory experiments. These practical teaching projects are only equipped with simple experimental process and experimental report requirements, and the experimental equipment cannot meet the actual production requirements.

### 2.3 Lack of hidden professional quality training for students

In the present practical teaching system of automobile engineering, the problems related to automobile engineering design are carried out from the perspective of production technology, ignoring the requirements on humanistic feelings related to automobile engineering practice and failing to cultivate

students' hidden professional qualities[2].

### **3. The Goal and Principle of Construction of Engineering Practice Training System for Vehicle Engineering**

The construction of the practical teaching system must focus on the training program for talents and the training objectives for professionals to cultivate students' professional quality, engineering ability and innovation ability and comprehensively improve the quality of teaching for vehicle engineering[3,4]. Therefore, the establishment of vehicle engineering practice training system in our university should follow the following basic principles:

#### **3.1 Integrity principle.**

The practical teaching system is a relatively independent and unified organic whole; each system is interrelated and has the characteristics of stratification and modularization. Each practice link is distinct and progressive. There are clear requirements and safeguards to ensure the integrity of the entire practical teaching system.

#### **3.2 Principle of applicability.**

The application is reflected in the demand of social position for professional personnel of vehicle engineering. It is the purpose of cultivating professional talents for graduate students in our university. The construction of practical teaching system of vehicle engineering is the premise of realizing the training goal of applied talents.

#### **3.3 The principle of identity.**

The forms and links of engineering practice are various and distinctive, including experiment, internship, graduation design and enterprise practice. The construction of the engineering practice teaching system of vehicle engineering in our university should establish the characteristics of "quality education as the core, cultivation of technical application ability as the main line, cultivation of innovation ability as the key, and integration of production and learning as the approach".

#### **3.4 The principle about integration of production and learning.**

The aim of the construction of the engineering practice teaching system is to train high quality innovative talents for the society. The integration of production and learning and research is the necessary means to achieve this goal. Through these means, we can jointly study the training program, formulate the training plan and implement the training process to meet the needs of social work posts.

### **4. Construction of a New System of Engineering Practice for Vehicle Engineering**

#### **4.1 Construction of engineering practice teaching system for vehicle engineering.**

According to the construction objective and principle of the engineering practice teaching system and the characteristics of the teaching practice of vehicle engineering in our university, a practical teaching system including content system, assessment system, guarantee system and innovation practice system is established. The four systems complement each other and run through the whole process of professional training of vehicle engineering. The structure is shown in fig.1.

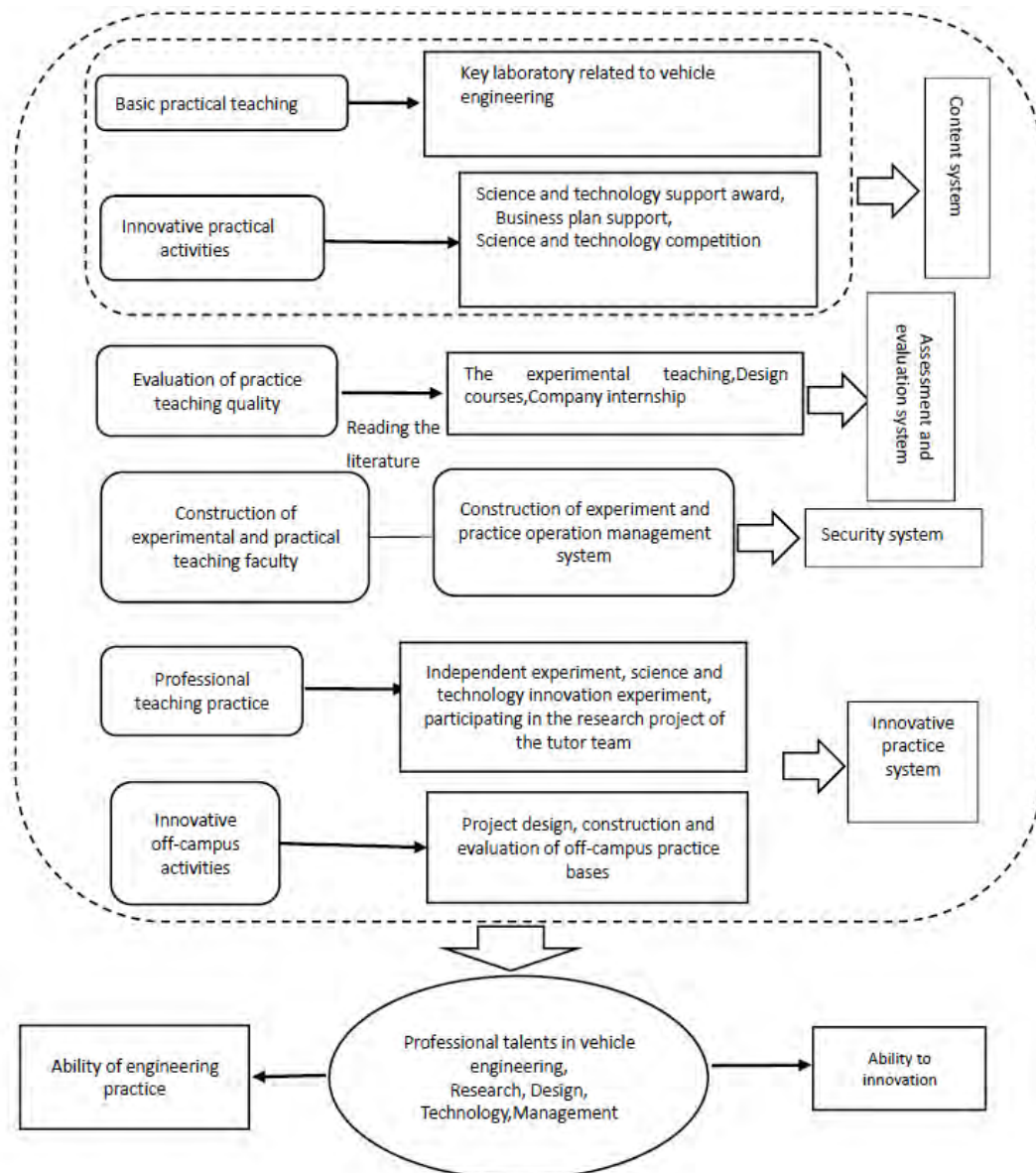


Fig.1 Practical teaching system of vehicle engineering

#### 4.2 Improving the construction of the laboratories for vehicles.

For undergraduate institutions of mechanical engineering, they should not simply copy the inherent model of engineering universities, but should have certain features and expertise in the field of vehicles. In the construction of the laboratory, we should fully use our advantages to carry out corresponding construction timely, and focus on the functional construction of the laboratory.

##### 4.2.1 Meeting the requirements of teaching experiment

Experimental teaching is the basic function of university laboratory. From the perspective of teaching content, many professional basic experimental practices cannot meet the actual requirements. Therefore, it is necessary to decompose, refine and highlight some original methods, which is also beneficial to the development of experimental projects. From the utilization of school resource, first, we should make full use of or integrate the existing resources. Second, properly purchase and make professional experimental equipment. Modern automobile has higher and higher scientific and technological content and humanization degree, which puts forward higher requirements for the construction and teaching of automobile engineering. Therefore, we should take decisive measures to implement the funds needed for laboratory construction.

#### 4.2.2 Meeting the requirements of scientific research and experiment

The university laboratory must also carry on the construction of experimental research. The usage of the teaching laboratory for experimental research is also conducive to improving the teaching quality and the engineering practice ability of students, and driving the further construction of the corresponding laboratory. Professional practice plays an irreplaceable role in training students' basic skills and improving their engineering quality. Therefore, it is necessary to improve the experimental teaching of specialized courses by transforming the experimental teaching concept of specialized courses and formulating feasible experimental teaching objectives and models[5].

#### 4.2.3 Meeting practical training needs

From school to society, students should have certain professional adaptability and qualifications. Undergraduate teaching should have a certain goal of cultivating scientific research ability, but it should not be divorced from reality. These skills are not limited to simple hands-on skills, but are more embodied in the use and analysis of test instruments, fault diagnosis of complex structures, and specific application of professional knowledge. Therefore, the functional construction of practical training should be an important part of the laboratory construction of vehicle engineering, which should be fully considered in the laboratory planning.

### **4.3 The construction of university-enterprise collaborative long-term mechanism based on the "integration of production and learning".**

With the rapid development of automobile industry, a long-acting mechanism of university-enterprise collaboration based on "integration of industry and learning" should be formed[3,6].

(1) We will establish smooth communicative channels and coordinative mechanisms, establish diversified information communication systems and platforms, hold regular meetings, timely grasp the interest demands of enterprises and talent cultivation, and timely resolve the conflicts in the process of cooperation.

(2) Guided by the demands for development of the automobile industry and centered on the cultivation of practical ability and innovation ability. We will promote the implementation of the "3+1" talent training program for undergraduates majoring in vehicle engineering which is in short supply, jointly build the course system, jointly implement the training process, and jointly evaluate the training quality. Enterprises should participate in the whole process of talent cultivation, and constantly promote opened school-enterprise collaboration[7].

(3) We will constantly further promote the production and learning cooperation with key enterprises associated with Shanghai automobile industry. Carry out the discussion of the "excellent engineer plan", sign the agreement to establish excellent engineering education talent training base and establish a solid off-campus internship base. The school cooperates with the enterprise to develop the student's enterprise study and practice training program and let the student cultivate the useful engineering ability in the real environment. Through the integration of production and learning, we have made solid progress in the excellent program practice, and promoted the seamless connection between talent cultivation and talent demand.

## **5. Conclusion**

To sum up, the cultivation of various abilities of students who are majoring in vehicle engineering is inseparable from the engineering practice teaching. Colleges and universities should construct the practical system of automobile engineering reasonably. Shanghai University of Engineering and Science has made some reforms in the teaching system of vehicle engineering practice and achieved some results, but there is still much work to be done which is compared with the national and social requirements on talent cultivation. The teaching system and specific content of engineering practice need to be constantly summarized and improved in the future teaching practice.

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