

Construction of a practical teaching system for an automobile major

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ABSTRACT: The Chinese automobile industry is developing rapidly and requires a greater number of excellent professionals. To adapt to this new situation, many universities have established an automobile major. After many years of teaching in the Yancheng Institute of Technology, the authors propose the construction of a practical teaching system for an automobile major. To cultivate the student's ability in mechanical basics, the automobile profession, innovation and integrity, the practical teaching system includes course experiments, a curriculum project, on-campus engineering training, the practice of enterprise engineering, the promotion of innovation and a graduation project. Support for the practical teaching system is summarised from the perspectives of the system setting, the practical base, teaching staff, innovation and the teaching assessment.

INTRODUCTION

In recent years, the Chinese automobile industry has developed rapidly and requires many more excellent professionals. This provides universities with opportunities to develop automobile majors of high professional teaching quality [1]. The teaching mode of an automobile major must adapt to the requirements of enterprises and be developed in a timely manner. Otherwise, the teaching would lag behind societal developments and students would not achieve the required level of knowledge and practical ability. The automobile major not only teaches students theory, but also trains them to apply theoretical knowledge to practice. Therefore, improvement of the practical teaching system is of great significance in developing students' practical and innovative abilities.

CULTIVATION OF PROFESSIONAL TALENT FOR THE AUTOMOBILE INDUSTRY

With rapid development of the domestic automobile industry, the demand for talent by the automobile manufacturers, research institutions and service agencies has increased sharply in recent years. The requirements for automobile majors have undergone great changes mainly reflecting job differentiation and increased educational levels. The jobs for undergraduate students have changed from design and manufacture-based work to the support and service-based work [2][3].

Therefore, the objectives of an automobile major are: to cultivate talents to adapt to societal developments; to have a solid foundation of theoretical knowledge in the field of automobile engineering; to be aware of developments in automobile technology; to be innovative and have practical ability. After graduation, students will be employed in product design, manufacturing, testing and diagnosis in automobile enterprises. The requirements and nature of the automobile major practical teaching system were explored and a new system was constructed at the Yancheng Institute of Technology.

PRINCIPLES FOR THE CONSTRUCTION OF THE PRACTICAL TEACHING SYSTEM

When constructing the practical teaching system for the automobile major, three principles should be followed [4][5]. These are comprehensiveness, authenticity and openness.

Comprehensiveness

Comprehensive quality training in engineering should be reflected in the practice teaching system. The practical content should be arranged not only for students to master professional techniques and skills, but also to train them regarding practical applicability. Practical teaching is about applying theory to practice, as well as learning to work hard.

Authenticity

The environment should be authentic, especially in professional practical teaching. Therefore, a real practical environment must be built in accordance with the techniques and skill requirements of automobile professionals. Students are trained according to professional job requirements. Part of a practical project can be carried out in an actual enterprise.

Openness

The practical teaching is open not only to students, but also to automobile enterprises. Thus, the teaching can connect closely to society's economic development. In the foundation stage, the practical teaching should be implemented mostly on campus. The professional stage mostly should be in an enterprise. In addition, the practical teaching is also an on-line system, so as to provide students access both in and outside of the classroom.

CONTENT OF THE PRACTICAL TEACHING SYSTEM

The content of the practical teaching system for the automobile major embodies the educational objective of talent development. In the process of developing the teaching plan, it is necessary to arrange the teaching content for experiment, practice, the curriculum project, innovation and the graduation project in accordance with requirements and abilities. The training programme can be divided up into course practice and comprehensive practice.

The former is made up of basic course experiments and professional course experiments. The course experiments mainly cultivate the student's individual skills, and strengthen their comprehension of the theory. The comprehensive practice, including curriculum project, practice, innovation activity and graduation design, is focused on cultivating the student's practical problem-solving ability.

The practical teaching system consists of the following four levels, as shown in Table 1.

Table 1: Ability levels of the automobile major.

Ability levels	Cultivation objectives
Comprehensive application	Make the student master the methods of topic selection, proposal verification, product design and manufacturing.
Innovation	Improve student's innovation ability and create conditions for the best students.
Professional	Train student's ability to solve an actual engineering problem
Basic	Train students to apply basic engineering knowledge

Accordingly, the practical teaching system for the automobile major, as designed, is shown in Figure 1.

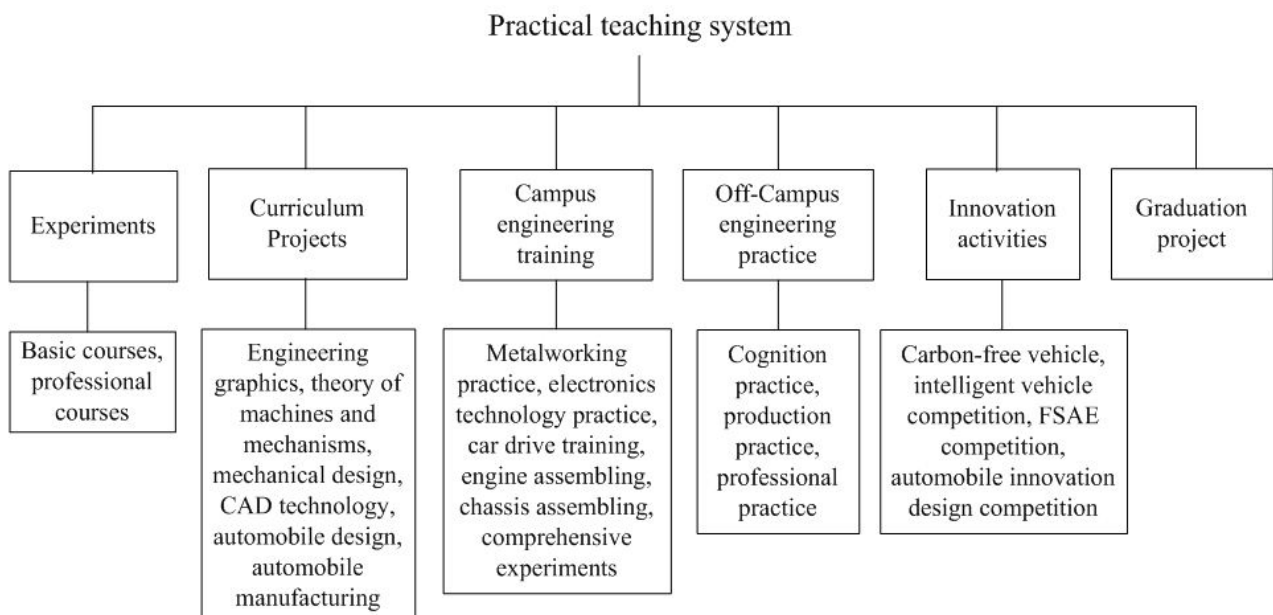


Figure1: Scheme of the practical teaching system for the automobile major.

The experiments help students to comprehend the content of theoretical teaching and train them in professional practical skills. The curriculum project requires students to design a product that has a relatively complete development process. It trains students to utilise curriculum knowledge in an implementation and to write a technical paper, which can lay a good foundation for a student in the future.

The campus engineering training cultivates a student's elementary practical ability, innovative thinking and the ability to apply knowledge. The off-campus practice can improve a student's comprehensive practical ability and awareness of the actual requirements of an enterprise and development trends in the automobile profession. Innovation practice is a way to encourage students to attend to the research projects and academic competitions in order to cultivate their practical innovation ability.

The graduation project is one of the most important parts of practical teaching, which can inculcate the comprehensive capabilities of project analysis, technical writing and oral presentation. It is essential to combine theory with practice and to cultivate a student's comprehensive practical ability. Thus, they become accustomed to work quickly.

SUPPORT MEASURES FOR THE PRACTICAL TEACHING SYSTEM

Set Scientific Talent Cultivation Programme

The practical teaching system scientifically and rationally promotes the combination of practice teaching and theoretical teaching [6]. But the practical teaching needs to be enhanced by way of a talent cultivation programme to ensure it takes up a significant proportion of the teaching process. The teaching content must follow the developments in automotive technology. The subjective nature of students should be emphasised, so as to cultivate their professional job skills, as well as their initiative and creativity.

Establish Campus and Off-campus Practice Bases

The campus and off-campus practice bases improve the quality of practical teaching and are an important prerequisite to improving a student's practical ability [7]. The campus laboratory is the major site for practical teaching and an important base for vocational skill training. The off-campus practice bases can compensate for the lack of a teacher's practical experience and be an important guarantee of success of the practical teaching.

Improve the Practical Teaching Ability of Teachers

Teachers are responsible for the practical teaching. They should not only have theoretical knowledge, but also have a wealth of practical skills. This requires universities to import more high-level engineering talent to enrich the teaching team. On the other hand, there is an alternative approach through arranging some professional teachers to undertake practical work for a co-operative enterprise. Hence, they will not only solve practical problems for the enterprise, but also improve the teacher's research capacity and practical skills.

Carry out Science and Technology Innovation Activities

Scientific innovation groups are an important way to develop students' practical ability. It is important to transform extra-curricular activities, from entertainment-oriented to science-oriented, through research and innovation activities. Campus cultural activities promote not only a student's practical ability and excite their innovation potential, but they also cultivate a co-operative team spirit.

Improve the Assessment Method for Practical Teaching

The assessment should focus on the training of practical skills. It is better to carry out a comprehensive assessment according to a student's attitude, operation and performance in the practical process.

Currently, the automotive industry is facing an important development opportunity. Practical teaching in the automotive major plays an important role in cultivating a student's ability. There needs to be awareness of the importance of practical teaching and the need to take effective measures to cultivate high-quality talent for the automobile profession.

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