

Research on the Teaching Reform of Integration of Theory and Practice in Automobile Structure in Applied Undergraduates

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Abstract. This paper analyzes the main problems existing in the current teaching of automobile structure, and proposes the basic ideas of teaching reform of integration of theory and practice. It introduces the projectized reform of curriculum content, the concrete implementation of the integration of theory and practice, and the trinity of curriculum assessment. These have certain reference value for the teaching reform of automobile structure course in applied undergraduates.

1. Introduction

Automobile Structure is an important compulsory course for automobile undergraduates. Through the study of this course, students can systematically master the overall structure of automobile engine. They can master the functions, composition, structural features and working principles of crank-connecting rod mechanism, valve mechanism, fuel supply system, cooling system, lubrication system, etc., as well as the automotive transmission system, driving system, steering system and braking system. At the same time, it requires students to master the principle of automobile engine and chassis structure. Then, based on this, they are able to disassemble, test and adjust each assembly of the engine and chassis, and reach the ability of modern automobile technical tools and measuring tools. The study of automobile structure lays a solid foundation for learning other professional courses and engaging in professional work after graduation. At present, there are some typical problems in the teaching of automobile structure course. For example, theoretical teaching is out of touch with practical teaching. Students' learning initiative and enthusiasm are not enough. Students have insufficient practical skills in assembly and parts disassembly and adjustment, etc. These problems need to be solved through the reform and innovation of curriculum teaching.

2. Main Problems in the Teaching of Automobile Structure Course

At present, the teaching of automobile structure course in applied undergraduates mainly has the following problems.

2.1 Theoretical teaching and practical teaching are disconnected.

At present, the teaching of automobile structure in most schools is firstly explained by teachers according to textbooks in class, and then the experiment time is arranged separately after theoretical teaching. That is to say, the teaching process of the course is mainly carried out in the classroom, and the teaching is mostly based on books as the objects. Teachers often focus on students' understanding and mastery of book content and neglect the cultivation of students' practical skills. On the one hand, teachers in the classroom are difficult to describe some structurally complex structures, and students are not easy to understand. On the other hand, students have been in a passive position in the classroom, and lack the initiative and enthusiasm for learning. The automobile structure course is very practical. Because theory and experiment can't be synchronized in time and space, after entering the practical teaching stage, the memory of students' theoretical

knowledge is not deep. In addition, students' understanding of knowledge in theoretical teaching is not very thorough, so it is difficult to achieve integration, and students' learning pleasure and practical ability are greatly restricted.

2.2 The leading role of teachers and the main role of students are not fully reflected.

Classroom teaching should be a two-way interactive activity between teachers' teaching and students' learning. At present, multimedia teaching is widely used, which is easy to draw students' attention more to the screen. Moreover, some teachers, especially young teachers, depend too much on courseware and lack interaction between teachers and students in traditional teaching methods. In fact, some teachers are buried in demonstrating courseware and reading content in class, who are not communicating with students, not paying attention to observing students' dynamics, not adjusting teaching rhythm and methods in time. Too much dependence on multimedia, teacher-student interaction will often become unilateral teaching by teachers and unilateral learning by students. The lack of interaction between teachers and students leads to the decline of students' learning enthusiasm and initiative, and the teaching effect is not good.

2.3 The methods of course assessment are backward.

At present, the assessment of the automobile structure course mainly has the following problems. Firstly, the assessment purpose is single, which only focuses on the assessment of the course content itself, without paying attention to the assessment of students' professional quality and development ability in the future. Secondly, the assessment subject is single, for there is only the teacher's assessment of students, but no mutual assessment among students. Thirdly, there is a lack of assessment process, for there is only conclusive assessment, but assessment for the learning process of students. Fourthly, the assessment method is single, which only pays attention to knowledge assessment, does not pay attention to the assessment of students' practical ability, especially the assessment of students' learning and working attitude. The underlying reasons for these problems include the following. The first is the influence of traditional assessment methods and ideological understanding. The second is that teachers lack positive reforming attitudes and determination. The third is that the assessment of knowledge and other aspects is easier to do because of the high reliability and validity of the measurement. However, skills, attitudes, etc. are not easy to quantitatively assess, and the operability is poor, so teachers have fears in this aspect. Therefore, the assessment means and methods of the automobile structure course are also in urgent need of reform.

3. Exploration and Practice of Teaching Reform of Integration of Theory and Practice

3.1 Projectized Reform of Curriculum Content.

In order to implement the teaching reform of integration of theory and practice, based on the investigation and analysis of corresponding positions in automobile enterprises, this paper sorts out and integrates the teaching content of Automobile Structure. It takes projects as the guidance of the whole course, and divides the content into several projects to form a completely new curriculum structure system. The selection of teaching content should determine the required knowledge, ability and quality according to the requirements of the assessment objectives of national vocational skills and the actual working content of enterprise posts. In the specific implementation process, the learning requirements of knowledge, skills and attitudes are proposed for each sub-project, which lays a foundation for the implementation of projectized teaching. Taking the transmission system as an example, the projectized decomposition is shown in Table 1.

Table 1 Projectized Decomposition of Teaching Contents and Learning Requirements (Transmission System)

Sub-project	Learning Requirement			Class hour
	Knowledge requirement	Skill requirement	Attitude requirement	
Sub-project 1 clutch	Master the structure and principle of clutch and its operating mechanism	Learn to disassemble assemble, and adjust the clutch	Standardization, cooperation, environmental protection, safety	4
Sub-project 2 derailleur and transfer	Master the structure and principle of derailleur and transfer	Learn to disassemble assemble, and adjust the derailleur and transfer	Standardization, cooperation, environmental protection, safety	4
Sub-project 3 universal transmission	Master the structure and principle of universal transmission	Learn to disassemble, assemble and adjust the universal transmission	Standardization, cooperation, environmental protection, safety	2
Sub-project 4 drive axle	Master the structure characteristics and principle of main drive, differential, half shaft	Learn to disassemble, assemble and adjust the drive axle	Standardization, cooperation, environmental protection, safety	4

3.2 Specific Implementation of Integration of Theoretical and Practical Teaching.

The integration of theory and practice is guided by work tasks in the implementation of teaching. On the one hand, it can stimulate students' enthusiasm for learning and cultivate the ability of active learning. On the other hand, through the division of labor and cooperation in the completion of tasks, students' teamwork and hard-working spirit can be trained to improve their professional quality. Teachers should determine the content of teaching in advance. Firstly, the core knowledge points of each sub-project should be integrated into specific tasks. Specifically, the teaching content of each sub-project is further decomposed into several specific tasks according to the requirements of knowledge and skills. Each task is then decomposed into several learning units. Teachers also need to be fully prepared for the content involved. This includes: can the task stimulate students' initiative? How can students understand their role in the team and adapt to team work? Besides, some questions that students may ask should be considered. When assigning learning tasks, it is necessary to consider that the introduction of tasks should be attractive, and how to fully mobilize students' enthusiasm for learning and discussion. The specific steps are:

According to the requirements of projectized teaching, the task should be treated as the guide to design the task sheet of each teaching project. The work sheet includes: task objective, knowledge preparation, operation process, process record, inspection and evaluation, etc. Students are divided into several groups, each of which has their own strengths in knowledge, skills and quality. This is good to mutual discussion and exchange of ideas, to improve practical skills, cultivate students' teamwork spirit and communication skills.

To analyze tasks, we should make reasonable assignment and arrangement according to the strength of the team members, analyze and discuss the specific implementation plans and steps of tasks, and determine the working means and methods. Students are required to analyze and solve problems according to actual tasks, so as to improve their decision-making ability, professional ability and teamwork ability.

According to the division of labor and the arrangement of specific tasks, students should preview the relevant theoretical knowledge taught in the class, and inquire about the relevant technical data such as the national standard and enterprise standard of automobile chassis maintenance involved in tasks. This stage mainly trains students' teamwork ability, communication ability, information acquisition and processing ability.

The implementation process of each specific teaching task includes the following steps. ① Consultation: Teachers teach the theoretical knowledge and instruct the key points of practical training needed for the task on the training site, and students understand the key points of knowledge and skills needed to complete tasks under the guidance of teachers. ② Demonstration:

Teachers demonstrate the steps of dis-assembly, assembly and adjustment of chassis on the spot, and suggest attention and related technical requirements. ③ Exercises: Students make implementation plans based on the specific requirements of the work sheet, and conduct on-site exercises in groups. ④ Project implementation and process assessment: Students perform the operations of dis-assembly, assembly and adjustment of the chassis according to the plan. Teachers conduct assessment according to students' on-site performance and process records, and team members conduct self-assessment and mutual assessment according to their respective performance. ⑤ Summary and comments: Teachers summarize and comment students' practice and skills. ⑥ Arrangement: After the teaching process, the training site needs to be arranged, and attention should be paid to safety, hygiene and environmental protection.

3.3 Reform of Trinity of Curriculum Assessment Method.

According to the requirements of the curriculum assessment of the projectized teaching, the assessment method of the Automobile Structure should fully reflect the principle of trinity of "knowledge + skill + attitude", especially the process assessment. Knowledge is mainly reflected in the mid-term and final exams, and the usual quizzes. Skill is mainly reflected in practical operation, task sheet, etc., attitude is mainly reflected through students' classroom performance (including late arrival, early leave and absence, etc.), communication with teachers in normal times, performance in the process of dis-assembly, assembly and adjustment, and ability to cooperate with classmates to solve practical problems, etc. The overall score of the course is a combination of the above results, which plays a good guiding role in improving students' comprehensive professional ability and quality.

The link of practical teaching can not only reflect the degree of students' mastery of knowledge, but also reflect the quality of students' practical skills and working attitude, and reflect students' professional quality to a certain extent. Therefore, the assessment of the practice is the focus of the assessment. However, due to the poor reliability of practical skills, it is also a difficulty in course assessment. The following aspects should be done well in detail:

Defining the assessment items. In order to implement the trinity of "knowledge + skill + attitude", the assessment items of practical teaching mainly include: time of project completion, whether the content of practical operation is correct and complete, whether the process of fault diagnosis and elimination is scientific and standard, whether the instruments such as tools, meters are placed and used correctly. In addition, it also includes site, equipment, waste cleaning, personnel and equipment safety, task sheet filling and other professional qualities reflected in the practice process.

Determining the evaluation index. The assessment system is composed of first-level and second-level indexes. The first-level evaluation indexes mainly include completion time, operation process, safety and cleanliness, task sheet and so on. Each first-level index is further divided into several second-level indexes. The index system must fully reflect the assessment and evaluation of practical skills and working attitudes, and correctly reflect the professional core competence of students. This includes dedication to professional ethics, working attitudes, self-learning ability, teamwork and communication skills, ability to solve practical problems, and innovative spirit.

Comprehensive evaluation system. It mainly includes process evaluation, such as students' self-evaluation, groups' evaluation, and teachers' evaluation; development evaluation, namely teachers' evaluation and students' evaluation; Selection evaluation, including skills competition, vocational qualification examination, etc. In particular, it is necessary to increase the assessment of students' comprehensive abilities such as team spirit, expression ability and independent learning. In the process of task-driven teaching, when students complete a certain task, they are presided over by teachers. Each group first selects representative tasks to make a detailed summary. Then, each student will report on the roles, responsibilities, problems and innovations in the task. In the reporting process, it can clearly reflect whether students have carefully observed, thought, and standardly disassembled, assembled and used tools in the training process. Then, the teacher puts forward specific questions, and the students answer them. According to answers, the daily scores of the training are given, which are counted into the total scores of the individual in proportion.

Multi-angle evaluation means and methods. It mainly includes on-site operation, achievement display, quality feedback etc. In the evaluation, it should pay attention to the combination of quality and quantity, especially the process evaluation, and pay attention to students' working attitude, professional ethics and quality reflected in the practical teaching.

4. Conclusion

Through the curriculum teaching reform of integration of theory and practice, the course of automobile structure has obtained positive changes in enhancing students' learning initiative, strengthening teacher-student interaction, and improving skills training. This has strongly promoted the improvement of teaching effect and teaching quality. Apart from the measures mentioned in this paper, we can also explore the implementation of open experimental teaching, school-enterprise cooperative teaching and other reform measures.

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