

Reform of Automobile Electronic Technology Teaching-mode Based on OBE Educational Theory

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Abstract

To solve problems existing in the teaching of Automobile Electronic Technology, the OBE education concepts were introduced for this course. The main characteristic of OBE education and the basic process of implementation were introduced, and the application of OBE methods in Automobile Electronic Technology course was discussed, which mainly related to the determination of learning outcomes and contents, the implementation of the teaching and the design of the evaluation system.

Keywords: OBE, automobile electronic technology, teaching reform

1. Introduction

At present, the modern higher education is changing significantly. On the one hand, with the rapid development of social economy and science and technology, industrial structure and economic growth have profound changes in China. With the raising of production efficiency and technology content of products, a large number of high-quality, comprehensive talents, especially the applied talents for the practice, are needed for China at present. At the same time, Chinese higher education has entered into the stage of popular education from elite education stage. The popularization of higher education is not only to meet the the needs of social development, but also to meet people's desire to acquire professional skills in higher education, which requires the current higher education to cultivate applied talents as much as possible, and to make the student get corresponding skills through the cultivation in the universities.

In the 1980s, the OBE educational theory was developed by the American scholar Patty, which is very suitable for the university education of rapid developed economic society. Thus, when the OBE was put forward, it was adopted by the federal government of America, and quickly popularized in Europe, Hong Kong, Macao and Taiwan regions. The core education idea of OBE is the "output" thought, which focuses on what capacity of students obtain and what they can do through higher education, and requires all education activities, education process, course contents, evaluation methods are designed around the desired learning results[1-2].

The Chinese scholars studied mainly the achievement oriented education from the perspective of specialty construction and curriculum reform. Wei Ruonan, Tan Jingjing, Zhang Liwei[3-5] dug respectively the connotation of OBE, achievement oriented education, and developed the corresponding training mode of innovative talents from the perspective of specialty construction. Zhou Ping, Ma Qiuzhi, Li Xiangli[6-8] developed respectively the teaching reform and exploration for automotive and electronic courses from the perspective of curriculum reform and practice on the basis of OBE. However, the course

of “Automobile Electronic Technology”, which has both the characteristics of automobile courses and electronic courses, has not been explored in the teaching reform based on the idea of achievement oriented education. In this paper, the OBE educational theory will be used to reform the teaching mode for “Automobile Electronic Technology” in order to improve the teaching quality.

2. The connotation and theory of OBE

Outcome-based Education is an education concept focusing on "output", namely, what the students can do and what ability the students can get through learning. Educators should continue to pay attention to the students' learning outcomes, and all course system, teaching process and evaluation work should be implemented to achieve the expected results for students. Outcome-based Education emphasizes on students' learning outcomes, effects, professional skills and their acquisition, and considers that all teaching should be organized by the structure of major or the course itself outcomes.

The teaching process based on OBE are as follow:(1) the training objectives are determined by subject staff based on expert consulting committee description of businesses needs students' outcomes, and then the Outcome Guide or Outcome Map Plans are determined, the course system and the course syllabus are developed to meet the industry needs. (2) The course training goals, i.e. the level, characteristics and achievements that the students should get after learning, are determined by teachers on the basis of the outlines and industry needs with OBE principle. And then the teaching units are developed by teachers according to those targets. (3) The teaching evaluation strategies and evaluation plans are formulated by teachers according to the training objectives and teaching units. By this, we can ensure what students learn and achieve. (4) When teaching, teachers should change the previous "teach-centered mode" to "learn-centered mode", teachers should explain thoroughly the difficulty knowledge of curriculum, introduce the latest theory and technology and practice application cases into courses, and guide, motivate, and encourage students to independently think and autonomic design learning programs based on teachers' teaching, and then form their own unique ways to solve and think problems, at last make students master knowledge and applying knowledge ability by means of self challenge. In the process of teaching, strengthen the process evaluation, and timely correction, in this way, students' engineering practice ability, engineering design ability and innovation ability are strengthened. (5) At the end of the course, students are randomly selected to participate in the course of defense organized by expert advisory committee, to further examine the students' professional skills and the final outcome and determine whether students get the OBE target ability. (6) The teaching results and summaries are fed back to the next teaching in order to improve the original teaching design.

Therefore, OBE education ideas pays special attention to the learning achievements and getting professional skills, and emphasis on letting learning outcomes guide the teaching process, of course, OBE is a kind of pragmatic education method, which is very suitable for the university education when technology development and innovation is society mainstream and brilliant feature, for example now. Thus, OBE is a very important method for reforming engineering course teaching.

3. The Present Situation of "Automotive Electronic Technology" Teaching

Automotive electronics technology is an important professional course in vehicle discipline. This course enables students to master the construction and principle of automotive electrical and electronic control equipment, and develop automobile common electronic control systems. The course is used to cultivate practical and theoretical ability of students and has difficulty for beginners.

3.1 The old teaching methods are difficult to adapt to the teaching objects

The "Automotive Electronic Technology" course has the characteristics of generality, abstraction, application and practicality, has learning difficulty for students because of lacking practical experience. And the students are born after 1990s, and have distinct personality characteristics, whose learning persistence and theoretical learning enthusiasm are not high, and the lack of initiative. In addition, the course always is opened in the senior. In this time, the students are facing seeking jobs and postgraduate entrance examination, so there is not much time for the classroom. Therefore, in the traditional teaching mode to carry out this course, it is difficult to have a better learning effect.

3.2 Traditional teaching mode is difficult to reflect the characteristics for modern college education

Combined with the actual teaching experience and student survey results show that: "automotive electronic technology" is a compulsory course, perennial opening and fixed teachers for vehicle major. Teachers are used to previous mode and directly carry out teaching according to previous years. So it is difficult to carry out reform in teaching methods, teaching contents, teaching material construction etc. Therefore, the teaching modes of "automotive electronic technology" course are the cramming of pure theory, are lack of innovation and practice teaching. It does not meet the modern university education and curriculum practice requires strong.

4. The teaching reform and practice of Automobile Electronic Technology course based on the OBE

4.1 Establish course objectives

The electronic control system development works in automobile enterprises require students to obtain desired goals in "knowledge, skill, attitude" fields by learning the Automobile Electronic Technology courses. Knowledge goals require that students could understand, memory, apply and analysis related knowledge after learning, which include the structures and principles of automobile power supply system, starting system, ignition system, engine ECU, automatic gearbox TCU, automotive steering control system EPS, safety driving control system, comfort control system and so on. Skill goals refer to the subjective ability of students to apply knowledge and experience to complete some tasks successfully. "Automobile Electronic Technology" requires that students can develop the hardware and software of some electronic control system, draw circuit principle diagrams, circuit board layout, accomplish simulation test, write programs by C or assembly language, develop basic control strategy on Simulink through the experimental lessons. Attitude goals require students have a significant improvement in job positive, serious responsible, and efforts attitudes through learning this course and related experimental lessons.

4.2 The determination of learning contents and the implementation of educational activities

In the teaching process, we cannot do everything because of class hours, experimental conditions limitation. We should adjust and choose the teaching content based on the curriculum target and the curriculum characteristic. Many systems have same knowledge structures and development moded in Automobile Electronic Technology, therefore, according to the course contents, the curriculum systems were divided into four modules: automotive power supply system, instrumentation and automobile electrical; engine control system, transmission control system; steering control system, automobile comfort control system; safety driving system, automobile dynamic control system.

In the theory and practice teaching, one control system was taken from each module to learn the theoretical and develop electric control system together with the students. One system was taken from each module as team self-learn and development control system in classes under the guidance of teachers.

Finally, one system was taken from each module as team's curriculum design, and completed by team independently. In this way, students' engineering practice ability, engineering design ability and innovation ability were strengthened, and finally the expected training objectives of course were reached.

4.3 The design of the learning outcomes assessment system

In order to check the students' learning effectiveness and ensure students to achieve the expected targets for Automobile Electronic Technology teaching, teachers need to evaluate students in the whole teaching process. The teaching evaluation system was preliminary established for Automobile Electronic Technology, which includes three parts: (1) Knowledge goals were evaluated by examination (50%) and ordinary achievements (50%) came from submission, explanation of students' team achievement and students' mutual evaluation. (2) Skills goals were graded from the students' schematic circuit diagrams and the software programs for the curriculum design. (3) Attitude goals were inspected and graded through curriculum defenses and submissions of curriculum design.

5. Conclusions

The connotation of OBE and the teaching situation of "Automobile Electronic Technology" course were analyzed in this paper. The idea of OBE was combined with Automobile Electronic Technology course actual teaching situation. The curriculum goals and course contents were constructed, the teaching and learning activities were carried out, and learning outcomes evaluation system was designed. In this series reforms and exploration based on OBE and modular teaching, students' interest in courses are improved, the practical ability and comprehensive quality of students are cultivated through the course, the students' learning experience and learning effects were improved, which met with the excellence engineers talented needs for automobile industry under economic and social high speed development.

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