

# Teaching Design of “Electronic Technology Foundation” Based on OBE Mode

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**Abstract**—In the paper the author puts forward the thinking of teaching design and teaching design scheme of the electronic technology foundation based on “OBE”. In the scheme, the author has completed the construction of the teaching system, analyzed the relationship between the teaching platform and the target point, and realized the teaching design of the whole course around the target point of this course.

**Keywords**—OBE; Target point; Teaching system; Course platform.

## I. INTRODUCTION

The OBE (outcome based on education) that recommended by Engineering Education Accreditation is an effective, measurable and advanced educational mode [1] basing on students' learning outcomes. The guiding of this mode is professional training goal, it drive the whole curriculum activities by the learning results, it carry out teaching activities around the students' learning outcomes, it design reversely the teaching program, it guide organically graduation requirements of the certification standards into the curriculum plan. In the mode, the contribution degree of each lesson for students' ability is legible, this is an effective model for training goals and to ensure the realization of training goals.

After the rapid development OF Higher engineering education in China in recent decades, the scale of education has been ranked first in the world, the number of training engineers every year equals the sum of Japan, India and Europe combined, but the overall quality of training engineer is not optimistic. In order to change the status quo and improve the quality of engineering education, we can start from the main source of Engineering -- higher engineering colleges and universities to reform the personnel training system of Engineering Colleges and promote the accreditation of engineering education, and then we will improve the international recognition of talent cultivation quality.

The foundation of electronic technology is an important basic course and major course of electrical engineering and automation. This course has the characteristics of strong concept, complex theory, many disciplines involved, strong practicality and strong engineering. In the long-term course research and construction, rich teaching resources and teaching platform with various contents of our school's electronic technology foundation course has been accumulated. These courses resources were developed under the concept of a lot of class hours and teachers' teaching as the leading part. Although these accumulation have sustainable building space, but with the rapid development of the teaching reform of the education system, the updates of idea of educational philosophy and educational technology, and the continuous compression of class hours, these courses resources and platform of original must be innovated and rebuilt.

## II. THE TEACHING DESIGN THOUGHT OF FOUNDATION OF ELECTRONIC TECHNOLOGY

on the whole, the teaching process based on the concept of engineering education have three key points: the first is teaching design based on the result oriented, the second is teaching implementation based on result oriented, and the third is the teaching evaluation based on result oriented [2].

Based on this idea, if we want to teaching design guiding by results of foundation of electronic technology, we must clarify the target points corresponding to this course before making instructional design, and then we set up course system around the target points of this course. Further, we can put forward the teaching requirements of this course, organize teaching contents according to teaching requirements, carry out teaching evaluation of this course after completing teaching contents, and put forward measures and suggestions for quality continuous improvement according to the evaluation results. The design idea of the teaching of the foundation of electronic technology is shown in Figure 1 [3].

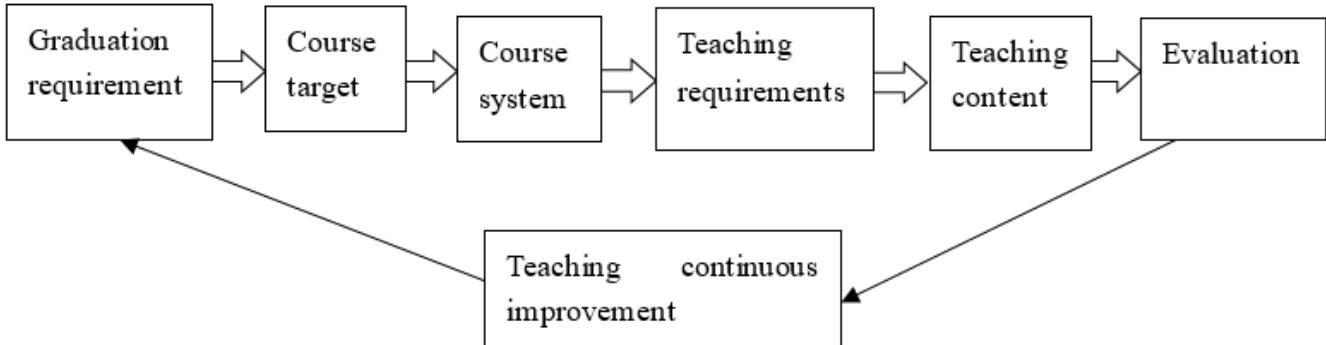


Fig. 1. The design idea of the teaching of the foundation of electronic technology

### III. THE COURSE GOAL OF FOUNDATION OF ELECTRONIC TECHNOLOGY

In accordance with the needs of our school, social and educational development, according to the development of electric power industry and the demand of employees, according to the students' personal development and the needs of the industry, the goal of foundation of electronic technology of Electrical engineering and Automation Specialty is decomposed into twelve graduation requirements. The twelve graduation requirements are decomposed into forty-two target points, and then the target points are loaded into each course according to the characteristics of each course.

According to the decomposition results, the first target of foundation of electronic technology is labeled as 1.4 of the first graduation requirement, the content is: Engineering and professional knowledge can be applied to the design and improvement of complex engineering problems in power system. Two target points labeled by 3.3 and 3.3 in the third graduation requirements should be reached, the 3.3 target points is that students can design process and calculate system parameters by the way of model construction, the 3.4 target points is that Students can master the basic innovation method, have the attitude and consciousness of pursuing innovation,

and reflect in the design / development. The last target points labeled by 4.2 in the fourth graduation requirements should be reached, the content is that students can choose the research method based on the professional theory, and design the feasible experimental scheme according to the characteristics of the object.

### IV. TEACHING DESIGN OF FOUNDATION OF ELECTRONIC TECHNOLOGY COURSE

#### A. *The teaching system of foundation of electronic technology based on OBE*

According to the graduation requirements, goal orientation of this course in the personnel training goal system can be summarized as three aspects: engineering knowledge, design research and development, so we should begin to design the teaching system from the three aspects around the completion of the target points of this course. According to the accumulation of curriculum teaching for many years, thinking about the 'student center' and the cognitive law of learning process, we reconstruct the course system of this course shown as in Figure 2.

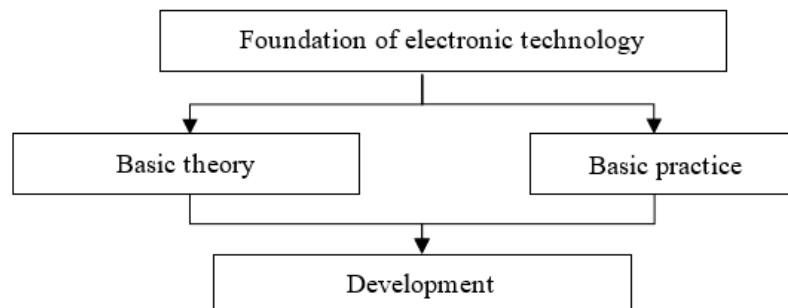


Fig. 2. Course system of Foundation of electronic technology

analyzing the target point of this course, we can find that point 1.4 is requirement for engineering knowledge, We can accomplish this requirement in this basic theory and the basic practice part, target point 3.3 can be completed by basic theory teaching and course development, target point 3.4 can be

completed by basic course development, and target point 4.2 can be completed by basic practice course development. The relationship between the target points and the teaching system and the teaching platform is shown in figure 3.

**B. The teaching platform of foundation of electronic technology based on OBE**

In order to support the teaching system of this course, on the one hand, we integrate existing teaching platform, optimize the resources of the teaching system and eliminate the outdated teaching resources and platforms. On the other hand, the new teaching platform and resources are developed. Teaching platforms are set up with the concept of students center based on OBE [4].

In the basic theory teaching module, the existing teaching platform mainly includes classroom teaching, small class discussion class, and engineer forum currently being built based on online open flip classroom. The Engineering Forum is planned to introduce engineers and technicians in the electric power industry, they will explain the application examples of the electronic system in the power industry in the form of special report in order to enrich the practical knowledge of engineering practice, strengthen the concept of engineering practice and the ability of engineering practice.

In the basic practice teaching module, the original verification practice module should be retained in order to train

students' ability using electronic instruments, train students building electronic circuits and the ability of testing fault. Considering the rapid development of modern electronic technology, we increase the learning and application of EDA software in the basic practice module to enhance students' ability of engineering design / development and innovative practice.

In the course development of this teaching module, the main teaching platforms are the integrated design of electronic system, the center of maker, the E home of the Internet, the electronic design contest, etc. The learning activity of this module is mainly based on team activities, so as to train students' design and improvement in engineering problems, cultivate students' attitude and consciousness, and be able to choose research programs based on professional theories.

**C. The relationship between this course system and the teaching platform based on OBE**

To sum up, the relationship between the course system and teaching platform is summarized in figure 3.

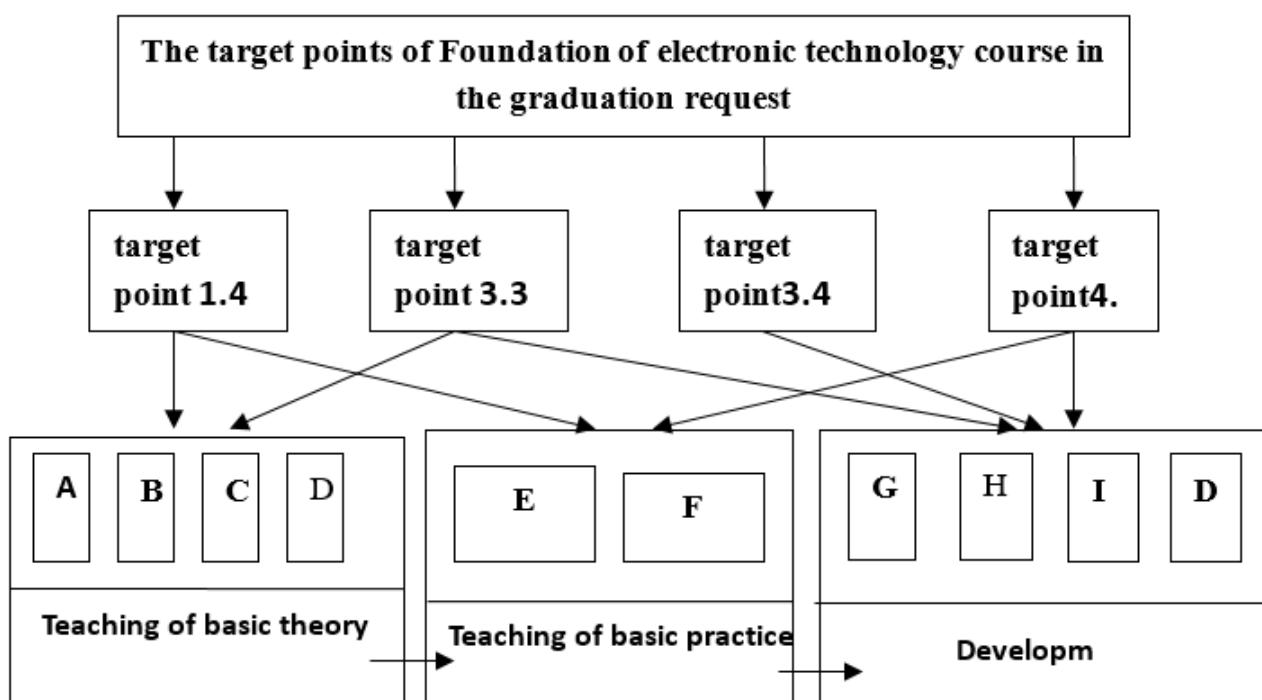


Fig. 3. The relationship between courses of foundation of electronic

Technology and teaching platforms

In fig.3,A is classroom teaching, B is Online open class, C is discussion class, D is Engineer's Forum, E is platform of basic confirmatory experiment, F is EDA, G is Comprehensive assignment of electronic system, H is making center, and I is Electronic Design Contest

We can see from Figure 3 that each target point of this course should be completed through multiple teaching platforms, and the teaching system should go from foundation

to innovation. The corresponding teaching platform is also constructed forming a multi-level and multi-dimensional framework. It is the main serving goal to provide selective teaching resources for student learning, so as to achieve the goal of improving the quality of training in three aspects: knowledge, ability and quality.

#### D. Teaching objectives for the basis of electronic technology

According to the graduation requirements for this course, the objectives of the teaching of foundation electronic technology are clearly defined as the following.

- Students are familiar with the structure, principles and characteristics of the basic elements in the electronic circuit (including typical small scale integrated devices), to master the methods of analysis and design of electronic circuits, and to have the basic thought of engineering analysis and calculation.
- To cultivate students' ability of knowledge transfer and engineering practice, and to solve the practical problems in the field of electronic equipment and electronic
- Systems with the comprehensive application of their knowledge.
- Students should have basic theoretical knowledge and basic engineering technology to develop, plan, and

design, operate and maintain of electrical and electronic engineering.

- Students should can use a EDA software to simulate and analyze electronic circuits &systems.
- To cultivate students' scientific thinking ability and analysis and calculation ability, and to achieve innovative consciousness and attitude through integrated application and summary.

#### E. The relationship between the course objectives and the graduation requirements

The relationship between this course objectives and the graduation requirements is shown in table

TABLE I. THE RELATIONSHIP BETWEEN THIS COURSE OBJECTIVES AND GRADUATION REQUIREMENTS

<b>Graduation requirements</b>	<b>Target points of this course</b>	<b>Course objectives</b>
1.engineering knowledge	1.4 Design and improvement of engineering and professional knowledge for complex engineering problems in power systems	<b>Teaching objective:</b> 1 <b>Reaching way:</b> Classroom explanation, online open class, small class discussion, course assignments, and engineer's Forum
3.Design / development solutions	3.3 can calculate parameters and equipment indicators by model construction	<b>Teaching objective:</b> 2 <b>Reaching way:</b> Classroom explanation, course assignments, engineer's Forum, and Practice
	3.4 Master the basic innovation method, have the attitude and consciousness of pursuing innovation, and reflect in the design / development	<b>Teaching objective:</b> 3 and 4 <b>Reaching way:</b> Classroom explanation, course assignments, Development, and Comprehensive Assignment
4.research	4.2 can choose the research route and design the feasible experiment scheme based on the professional theory and the object features.	<b>Teaching objective:</b> 4 and 5 <b>Reaching way:</b> Classroom explanation, course assignments, Comprehensive Assignment, Network course and Experiment

#### V. THIS COURSE EVALUATION AND CONTINUOUS IMPROVEMENT

##### A. This course evaluation

The evaluation of this course focuses on the indicators of graduation requirements .Considering the role played by each course platform in the teaching process. The evaluation score of this course is made up of five parts, the proportion of each part is shown in Table 2.

TABLE II. EVALUATION COMPOSITION OF FOUNDATION OF ELECTRONIC TECHNOLOGY

Order	Component	Proportion
1	attendance and performance in classroom	20%
2	Course assignments	20%
3	Development and other	10%
4	Term examination	50%
	Total	100%

From the table of achievements, we can see that the evaluation method of this course adopts a diversified evaluation system. The evaluation not only evaluates the knowledge point, but also examines the professional ability and quality related to the knowledge point. The evaluation value is not only have the final exam, but also on the learning process. There are not only the combination of basic theory and practice, but also the evaluation of students' independent learning and teacher oriented learning. The whole evaluation system should tend to be comprehensive, specific, scientific and reasonable.

#### B. Continuous improvement of this course

By the statistical analysis of the performance and test results of students in the teaching process, The values of the completion of the four target points in the course is evaluated respectively. The overall value of this course is the lowest value of four evaluation values. Furtherly, we compare the actual value of each target point with the expected value of this course to get the conclusion, and put forward the measures and suggestions for quality continuous improvement, so as to further achieve the graduation requirements.

#### VI. SUMMARY

On the whole, the teaching design of electronic technology based on OBE pay attention to the cultivation of students' comprehensive ability of engineering and engineering quality. When we design this course teaching, Engineers forum, multi-dimensional teaching platform and practical engineering cases should be introduced into the classroom to promote the teaching content of "engineering trends". Comprehensive

assignments should be also introduced into classroom, it complete the project by teamwork. In this way of teamwork, after students decompose tasks on its own, students need to cooperate in tasks such as project argumentation, overall plan design, research and experiment work, data analysis and research summary. This working mode will help cultivate the students' ability to analyze problems in a comprehensive way and improve their team cooperation and innovation ability. In this mode of teaching, we hope to meet the needs of the social development, and be beneficial to power science and education of our country.

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