

# *Reform and Practice of Electrical Engineering Curriculum Teaching Based on the OBE Concept*

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**Abstract:** The innovation of electrical engineering education based on the OBE concept is the key to improving the quality of education and cultivating talents urgently needed by society. By carefully constructing a student-centered curriculum system, not only can innovative teaching methods be adopted, but also a comprehensive and scientific evaluation system can be established, which can effectively ignite students' enthusiasm for learning and systematically cultivate their practical operation ability and innovative spirit of exploration. The continuous feedback and improvement mechanism of the OBE concept has injected a strong impetus into the continuous optimization of electrical engineering education, enabling education to keep pace with the times, continuously adapt to and meet the rapidly developing needs of society, and continuously provide high-quality talents for the country's electrical engineering field.

With the rapid development of society and the continuous advancement of science and technology, the demand for talents in the field of electrical engineering is also constantly changing. The traditional education model based on knowledge impartment has been difficult to adapt to the needs of the new era, while the education model based on the concept of OBE has received widespread attention for its unique advantages.

## **1. Overview and Core Elements of the OBE Concept**

### **1.1 Origin and Development of the OBE Concept**

OBE, or Outcome-Based Education, is an advanced educational philosophy that originated from educational reforms in the United States in the 1990s. It emphasizes a student-centered approach, focusing on students' learning outcomes and emphasizing what students can do after graduation, rather than just what they have learned. This philosophy breaks away from the traditional content-oriented and teacher-centered teaching model, paying more attention to students' learning effectiveness and future development. With the development of globalization and the internationalization trend of education, the OBE concept has gradually been accepted and adopted by countries worldwide. In China, with the improvement of higher education quality and the deepening of educational reform, the OBE concept has gradually become an important guiding ideology for reform in higher education teaching.

## 1.2 Core Content and Characteristics of the OBE Concept

The core of the OBE concept emphasizes a student-centered approach, with students' learning outcomes as the starting and ending points. It focuses on reverse design, setting teaching goals based on internal and external needs and expectations, and then designing teaching activities and evaluation systems based on these goals. The OBE concept also emphasizes continuous improvement, optimizing teaching design and implementation processes through the collection and analysis of student feedback on learning outcomes.

The characteristics of the OBE concept are mainly reflected in its goal-oriented nature, where all teaching activities are centered around achieving predefined learning outcomes; student-centeredness, where teaching design and implementation processes fully consider students' needs and characteristics; flexibility, where the teaching process can be adjusted and optimized in a timely manner based on students' learning progress and feedback; and evaluation diversity, where multiple evaluation methods are used to comprehensively and objectively assess students' learning outcomes.

## 1.3 Current Application Status of the OBE Concept in the Field of Education

Currently, the OBE concept has been widely applied and promoted globally. In the field of education, an increasing number of universities have begun to adopt the OBE concept for teaching reform and practice. For example, some universities have applied the OBE concept to curriculum system construction and teaching content reform, guiding students to actively learn and participate in classroom discussions and practical sessions by setting clear learning outcome goals and evaluation criteria. In China, with the promotion of higher education popularization and the requirement to improve education quality, more and more universities have begun to pay attention to and adopt the OBE concept. Some high-level universities and key disciplines have actively explored and practiced the OBE concept in educational teaching reform, achieving significant results and gaining valuable experience<sup>[1]</sup>.

## 2. Construction of Electrical Engineering Curriculum System Based on the OBE Concept

### 2.1 Composition and Characteristics of the Electrical Engineering Curriculum System

The electrical engineering curriculum system mainly consists of basic courses, professional core courses, and practical components. Basic courses include natural science fundamentals such as mathematics and physics, providing students with a solid theoretical foundation and scientific literacy. Professional core courses cover core knowledge in the field of electrical engineering, such as circuit theory, electromagnetic field theory, electric machines and power electronics, and power systems, aiming to cultivate students' professional literacy and comprehensive abilities. Practical components, through course design, experiments, internships, and other means, enable students to apply theoretical knowledge to practical engineering, improving their practical and innovative abilities.

The characteristics of the electrical engineering curriculum system are mainly reflected in the following aspects: First, the systematicness and integrity of knowledge, as electrical engineering involves a wide range of fields, requiring students to master a comprehensive and systematic knowledge system; second, the close integration of theory and practice, as electrical engineering is a highly practical discipline, requiring students to have the ability to apply theoretical knowledge to practical engineering; third, innovativeness and forward-looking, as technology in the field of electrical engineering is rapidly updating, requiring students to possess innovative consciousness

and forward-looking thinking.

## **2.2 Application of the OBE Concept in the Construction of the Electrical Engineering Curriculum System**

In the construction of the electrical engineering curriculum system, the application of the OBE concept is guided by student learning outcomes, clarifying the training objectives and graduation requirements of the curriculum system, and ensuring the consistency between curriculum design and training objectives. It is student-centered, fully considering students' needs and characteristics, and designing teaching content and teaching methods that conform to students' cognitive laws and interests. Emphasis is placed on the design and implementation of practical components, providing students with more practical opportunities and innovative platforms through school-enterprise cooperation, industry-university-research integration, and other means. Specifically, the OBE concept can be integrated into various aspects of the electrical engineering curriculum system. In curriculum design, course content and teaching methods are determined based on training objectives and student needs; in classroom teaching, heuristic, case-based, and other teaching methods are adopted to guide students to actively think and practice; in practical components, cooperation with enterprises is strengthened, and practical teaching activities such as course design, experiments, and internships are carried out to cultivate students' practical abilities and innovative spirit.

## **2.3 Reform Strategies and Methods for the Electrical Engineering Curriculum System**

To optimize curriculum design, we must adjust the structure and content of courses based on training objectives and student needs. By making the curriculum system more aligned with engineering education accreditation standards and industry development needs, we can achieve better outcomes in education.

We should also innovate teaching methods and means by adopting modern teaching tools such as multimedia teaching and online teaching to improve teaching effectiveness. Project-based teaching, flipped classrooms, and other teaching methods should be introduced to stimulate students' interest and initiative.

Furthermore, we need to strengthen the construction and management of practical components by improving the practical teaching system and management system to ensure the effective implementation of practical teaching. Cooperation with enterprises should be enhanced to carry out industry-university-research cooperation projects to improve students' practical abilities and employment competitiveness.

Finally, we must establish a comprehensive evaluation system and feedback mechanism to objectively evaluate students' learning outcomes and provide timely feedback to students and teachers for adjusting teaching strategies and methods. By doing so, we can achieve better outcomes in education and training.

## **3. Innovation of teaching methods for electrical engineering courses based on the concept of OBE**

### **3.1 The influence and inspiration of the OBE concept on traditional teaching methods**

Traditional teaching methods tend to be teacher-centered, focusing on the instillation and impartation of knowledge, while students are in a passive state of acceptance. This teaching method is difficult to stimulate students' interest and initiative, and is not conducive to cultivating students'

innovative and practical abilities. The OBE concept emphasizes student-centeredness, learning outcomes-oriented, and focuses on cultivating students' comprehensive qualities and abilities.

The OBE concept requires teaching methods to place more emphasis on the subjective position and role of students, respect their individual differences and diverse needs, adopt more flexible and diverse teaching methods and means, and stimulate students' interest and initiative. The OBE concept emphasizes that teaching methods should be consistent with the training objectives, focus on cultivating students' practical abilities and innovative spirit, and improve students' comprehensive quality and social adaptability[2]. The OBE concept also requires teaching methods to focus on the evaluation and feedback of teaching effects, timely understand students' learning situation and needs, and constantly optimize the teaching process and improve teaching quality.

### **3.2 Innovative Practice of Teaching Method for Electrical Engineering Major Courses**

**Project-based teaching method:** By introducing practical engineering projects or design tasks, students are able to learn electrical engineering knowledge and skills in practice, and their practical and innovative abilities are improved. Teachers can guide students to learn independently and cooperatively to complete the design and implementation of the project according to the needs of the project or task.

**Flipped classroom teaching method:** Flip the lecture and practice parts in traditional classrooms, allowing students to preview the course content through self-study, watching videos, etc. before class, and then focus on explanations, discussions, and answering questions in class. This method can stimulate students' interest and initiative, improving the teaching effectiveness and interactivity of the classroom.

**Case teaching method:** Through the introduction of typical cases or practical engineering problems, students can learn electrical engineering knowledge and skills in the process of analyzing and solving problems. Teachers can guide students to carry out group discussions, role plays, and other diversified learning methods based on the characteristics of the cases or problems, and cultivate students' teamwork and communication skills<sup>[3]</sup>.

### **3.3 Evaluation and optimization of teaching methods for electrical engineering courses under the OBE concept**

Under the concept of OBE, the evaluation and optimization of teaching methods for electrical engineering courses is an important part of continuous improvement. During the evaluation process, attention should be paid to the following aspects: first, the evaluation of students' learning outcomes, including knowledge mastery, practical ability, and innovation spirit; second, the evaluation of the teaching process, including the applicability of teaching methods, the depth and breadth of teaching content, and the effectiveness of teaching interaction; finally, the evaluation of teachers' teaching effectiveness, including teachers' teaching attitude, teaching ability, and teaching effectiveness.

Based on the evaluation results, the teaching methods of electrical engineering courses can be optimized and improved. On the one hand, teaching content and teaching plans can be adjusted and improved to better meet students' learning needs and training objectives; on the other hand, teaching methods and means can be improved to enhance teaching effectiveness and students' learning interest; at the same time, teaching team construction can be strengthened to improve teachers' teaching ability and level. Through these optimization and improvement measures, the teaching quality and effectiveness of electrical engineering courses can be further improved, and more outstanding electrical engineering talents can be trained.

Fourth, the construction of an evaluation system for electrical engineering courses based on the concept of OBE

### **3.3.1 The internal relationship between the OBE concept and curriculum evaluation**

The OBE concept emphasizes student-centeredness, learning outcomes-oriented, and focuses on cultivating students' comprehensive qualities and abilities. Curriculum evaluation is a process of evaluating and providing feedback on the teaching effectiveness and quality of a curriculum, aiming to improve the teaching level and learning outcomes of students.

The OBE concept provides clear evaluation goals and standards for curriculum evaluation. Under the guidance of the OBE concept, curriculum evaluation should focus on students' learning outcomes, evaluating their performance in terms of learning effectiveness, practical ability, and innovative spirit.

The OBE concept emphasizes continuous improvement and feedback mechanisms, which also aligns with the goal of curriculum evaluation. Through evaluation and feedback on the effectiveness of curriculum teaching, problems and deficiencies in the teaching process can be identified in a timely manner, and targeted improvements and optimization can be made<sup>[4]</sup>.

### **3.3.2 Construction of the evaluation index system for electrical engineering curriculum under the concept of OBE**

**Learning outcome orientation:** Evaluation indicators should be focused on students' learning outcomes, including the degree of knowledge mastery, the improvement of practical abilities, and the embodiment of innovative spirit. This requires evaluation indicators to be clear, measurable, and achievable.

**Diversified evaluation:** In addition to traditional evaluation methods such as written exams and lab reports, other diversified evaluation methods should be introduced, such as project completion, group discussion performance, and classroom interaction. This will help to comprehensively and objectively evaluate students' learning effectiveness and practical abilities.

**Process evaluation** involves closely monitoring students' performance and assessment throughout the learning process, offering prompt feedback on their progress and challenges, and assisting them in refining their learning techniques and strategies. Process evaluation can be combined with summative evaluation to form a more comprehensive evaluation system.

**Continuous improvement:** The evaluation system should have the function of continuous improvement, adjusting teaching content and methods in a timely manner based on evaluation results, optimizing curriculum design and implementation plans. This will help continuously improve the teaching quality and effectiveness of the curriculum.

### **3.3.3 Implementation and feedback of electrical engineering curriculum evaluation under the concept of OBE**

When implementing the evaluation of electrical engineering courses under the OBE concept, the following aspects should be noted: first, ensuring the objectivity and fairness of the evaluation to avoid subjective assumptions and prejudices; second, using a variety of evaluation methods to comprehensively reflect students' learning outcomes and performance; third, providing timely feedback on evaluation results to students and teachers so that they can understand their learning situation and teaching effectiveness and make corresponding adjustments and improvements<sup>[5]</sup>.

In order to ensure the effectiveness and continuous improvement of the evaluation system, a sound feedback mechanism needs to be established. On the one hand, regular teaching inspections, student evaluations, and other methods can be used to collect opinions and suggestions from teachers and students on the curriculum and promptly feedback them to relevant departments and teachers for improvement. On the other hand, tracking surveys of graduates can be conducted to

understand their practical application of the courses they have learned in their work and provide feedback to further optimize the curriculum. Through these measures, the evaluation system of electrical engineering courses can be continuously improved and optimized to improve the teaching quality and effectiveness of the courses, and to cultivate more electrical engineering talents that meet the needs of society.

#### 4. Summary

The construction of an electrical engineering curriculum system, teaching methods, and evaluation system based on the OBE concept is key to improving education quality and cultivating talents that meet the needs of society. By constructing a student learning outcomes-oriented curriculum system, innovating teaching methods, and establishing a scientific and comprehensive curriculum evaluation system, it is possible to effectively stimulate students' interest and initiative, cultivate their practical ability and innovative spirit, and improve the teaching quality and effectiveness of electrical engineering. The continuous improvement and feedback mechanism of the OBE concept also provides a strong guarantee for the continuous development and optimization of electrical engineering education.

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