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Teaching Reform and Practice of the Course "Electrical Control and PLC Technology" Based on OBE Concept

Xiaoping Chen[1,2],Zhihui Liu[1,2],Huangzhu Long[3],Xue Wen[1]

[1]School of Mechanical and Energy Engineering, Shaoyang University, Shaoyang 422099, China
[2]Key Laboratory of Hunan Province for Efficient Power System and Intelligent Manufacturing, Shaoyang University, Shaoyang 422099, China
[3]Academic Affairs Office of Shaoyang University, Shaoyang 422099, Hunan, China

Abstract: With the deepening of educational reform, the teaching of the course "Electrical Control and PLC Technology" should be further optimized. When carrying out educational work, teachers should try to introduce some new technologies, methods and ideas to ensure the quality and efficiency of the teaching of "Electrical Control and PLC Technology." The teaching reform of "Electrical Control and PLC Technology" under the OBE concept can greatly enrich the teaching content of the course, broaden the path of education, and greatly promote the comprehensive development of students. In view of this, this paper will analyze the teaching of "Electrical Control and PLC Technology" based on the OBE concept and put forward some strategies, which are for reference only.

Keywords: OBE concept; "Electrical Control and PLC Technology" course; Teaching reform

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1. Overview and analysis of the OBE concept

Outcomes-Based Education (OBE), an education model centered on learning outcomes, first emerged in the field of basic education in countries such as the United States and Australia, becoming a key achievement in basic education reforms [1]. This educational model emphasizes student learning outcomes as the orientation, focusing on the cultivation of students' abilities and their practical application, rather than merely imparting knowledge. In the 1980s, the American education community conducted in-depth discussions on the OBE concept and continuously enriched and developed it in practice. American educational scholars defined the OBE concept as: a more explicit organization and concentration of the education system to ensure that students can achieve success in their future lives. They believe that education should be student-centered, pay attention to individual differences among students, and provide personalized learning paths to meet the needs of different students. The Australian education sector, on the other hand, defines OBE as an educational process aimed at achieving specific learning outcomes for students. Guided by this concept, the structure of educational work and curriculum

content are regarded as tools to achieve educational goals. Education itself is not the ultimate goal; its core purpose is to assist students in developing specific abilities and qualities. Australian educational practitioners emphasize that the OBE model requires educators to clearly define the learning outcomes that students should achieve, and design courses and teaching activities based on this orientation. This model encourages students to actively participate in the learning process, master knowledge and skills through practice and exploration, to better prepare for future study and life.

2. The value of teaching reform in the course "Electrical Control and PLC Technology" based on the OBE concept

2.1. Helping to stimulate students' potential

Carrying out the teaching reform of the "Electrical Control and PLC Technology" course based on the OBE concept can further stimulate students' interest in learning, prompting them to participate in knowledge exploration and learning more actively and enthusiastically. This is of great significance for enhancing their learning interest and can effectively stimulate students' potential. Through the teaching reform of the "Electrical Control and PLC Technology" course, students can not only master theoretical knowledge but also develop higher-level practical abilities and comprehensive literacy. The more rational introduction of Internet technology, big data technology, etc., can promote more all-around development of students and help them form a more positive and healthy professional concept [2]. In the teaching of the "Electrical Control and PLC Technology" course, teachers can better integrate theory with practice, significantly deepen students' mastery of knowledge, cultivate their comprehensive abilities, and stimulate their potential for development.

2.2. Meeting the needs of the times

In today's society, with the rapid development of science and technology and the continuous improvement of industrial automation, the demand for talent in electrical control and PLC technology is increasing. By implementing the teaching reform of the "Electrical Control and PLC Technology" course based on the concept of Outcome-Based Education (OBE), we can more effectively improve students' comprehensive literacy, moral character, and practical ability. This teaching reform not only helps students master solid professional knowledge but also stimulates their innovative awareness and critical thinking, to better adapt to the needs of the times [3,4]. In the teaching process of the "Electrical Control and PLC Technology" course, students will have the opportunity to combine theoretical knowledge with practical operations, and apply what they have learned to future work practice through practical projects and case studies, satisfying their expectations for knowledge exploration [5]. This is not only conducive to the improvement of students' knowledge system but also of great significance for enhancing their practical ability and problem-solving literacy. Therefore, carrying out the teaching reform of the "Electrical Control and PLC Technology" course can help students achieve more long-term and all-round development and cultivate more high-quality talents with innovative ability and practical skills for society [6].

2.3. Conducive to promoting educational reform

Under the guidance of the OBE concept, the implementation of the teaching reform of the "Electrical Control and PLC Technology" course can effectively promote the current educational work. This reform makes education more reasonable and scientific, and helps teachers introduce more new ideas and technologies in educational activities, thereby enhancing students' initiative in knowledge exploration and learning interest. In addition,

combining the OBE concept to carry out the teaching reform of the "Electrical Control and PLC Technology" course can achieve a breakthrough and innovation in the traditional teaching mode and content, break the old teaching framework, and introduce more teaching methods and means in line with modern educational concepts. This can not only inject new vitality into educational work but also help to enhance the depth of educational reform and promote the overall improvement of educational quality. Through such reforms, we can cultivate more high-quality technical and skilled talents who can meet the needs of future social development.

3. Current teaching situation of the course "Electrical Control and PLC Technology"

3.1. Lack of student interest and unclear goals

In the teaching of the "Electrical Control and PLC Technology" course, teachers will find a problem: students usually lack a clear goal to guide them in their learning activities. This leads to a lack of interest and motivation when they study the knowledge in this course. In addition, due to the unclear teaching goals of the "Electrical Control and PLC Technology" course, teachers also lack a clear direction for development when carrying out educational work, which further exacerbates the problem of students' lack of interest. Moreover, we have observed that in class, some students often show inattentive behaviors such as being distracted or playing with their mobile phones. These behaviors not only pose a great obstacle to the smooth progress of teaching work but also are not conducive to building a good teaching atmosphere [7,8]. The existence of this phenomenon undoubtedly hurts students' future development and limits the exertion of their learning potential.

3.2. Outdated educational model and imperfect curriculum system

In the current teaching practice of the "Electrical Control and PLC Technology" course, teachers can see a relatively common problem: many teaching models lack necessary innovation and improvement [9]. This traditional and outdated educational model has caused considerable obstacles to the subsequent educational work and restricted the expansion of students' thinking and the cultivation of their innovative abilities. At the same time, we also find that the teaching system of the "Electrical Control and PLC Technology" course has certain imperfections. In the teaching process, many teachers tend to impart theoretical knowledge while ignoring the introduction and strengthening of practical teaching content. This curriculum system, which emphasizes theory over practice, is not conducive to the cultivation and development of students' practical abilities, thus affecting the overall teaching effect of the "Electrical Control and PLC Technology" course. To improve this situation, we need to reform the teaching model and strengthen the practical teaching links, so that students can deepen their understanding through practical operations while learning theories and improve their ability to solve practical problems. Only in this way can we cultivate talents in electrical control and PLC technology who understand both theories and have practical skills, meeting the needs of society and the industry.

3.3. Unreasonable curriculum design and insufficient ability to apply knowledge

In the teaching design of the "Electrical Control and PLC Technology" course, there is a certain deviation between the course content designed by many teachers and the actual needs of students [10]. This unreasonable design not only fails to meet students' learning needs well but also hinders the cultivation and development of students' comprehensive abilities to a certain extent. In addition, during the teaching process, we find that there is a lack of an effective practical teaching model, which leads to students' insufficient ability in knowledge

application. This insufficiency in knowledge application makes it difficult for students to effectively apply the knowledge they have learned to solve problems when facing actual work, which is not conducive to improving their competitiveness in the workplace in the future. Therefore, we need to reflect on and improve the existing teaching design to better meet students' learning needs, enhance their practical abilities and knowledge application abilities, and thus lay a solid foundation for their future career development.

4. Teaching reform strategies for the course "Electrical Control and PLC Technology" based on the OBE concept

4.1. Align with market demands and clarify educational goals

Under the guidance of the OBE concept, to further improve the teaching effectiveness of the "Electrical Control and PLC Technology" course, teachers need to establish clear and specific educational goals. Such goals can provide a clear direction for teaching activities. To achieve this, teachers should conduct an in-depth analysis of market demands and explore the teaching content of the course thoroughly [11]. This approach ensures that the teaching content is consistent with actual market needs, laying a solid foundation for setting teaching goals. In the process of market demand research, teachers should make full use of modern information technology, which not only significantly improves the efficiency of the survey but also ensures the rationality and scientificity of the results. Based on the market demand information obtained from the survey, teachers should further clarify educational goals, ensuring that the teaching of "Electrical Control and PLC Technology" meets market expectations and effectively enhances the educational effect.

4.2. Focus on work processes and optimize the curriculum system

In the traditional teaching of "Electrical Control and PLC Technology," the curriculum system was often dominated by theoretical courses. This model may restrict students' all-around development, as the lack of sufficient practical links is detrimental to improving their ability to solve practical problems [12]. Therefore, in the teaching reform of "Electrical Control and PLC Technology" based on the OBE concept, teachers should take more proactive measures. For example, they can conduct an in-depth analysis of actual enterprise work processes and introduce practical course content based on this analysis. This method can effectively optimize and innovate the curriculum system of the course, allowing students to more intuitively feel the development and progress of the times in the process of knowledge exploration, thereby better stimulating their interest and enthusiasm for learning [13]. In addition, optimizing the curriculum system of "Electrical Control and PLC Technology" can deepen students' understanding of the relevant industry, laying a more solid foundation for their future career development.

4.3. Enrich teaching approaches to stimulate students' interest

In carrying out the teaching reform of "Electrical Control and PLC Technology" based on the OBE concept, teachers should attach importance to stimulating students' interest and continuously enrich the approaches and forms of teaching to provide students with higher-quality teaching services. Much of the content in "Electrical Control and PLC Technology" is abstract. When teaching such knowledge, teachers can try to integrate project-based teaching and case-based teaching methods to ensure students' understanding efficiency and depth of exploration, thereby enhancing the effect of the course reform [14]. In addition, teachers can carry out educational activities using micro-lectures. Introducing interesting and educational micro-lecture videos into the course

can help students effectively break through key and difficult knowledge points, facilitating more efficient knowledge exploration. This greatly promotes students' interest in knowledge exploration. By continuously enriching teaching approaches, the effect of the teaching reform of "Electrical Control and PLC Technology" can be significantly improved, creating a better learning atmosphere for students and promoting their long-term development.

4.4. Emphasize environment construction and cultivate a "Dual-Qualified" teacher team

To enhance the effect of the teaching reform of "Electrical Control and PLC Technology" based on the OBE concept, teachers should pay attention to building and optimizing a high-quality teaching environment during the teaching process. This can provide support for subsequent teaching activities, allowing students to explore and learn course knowledge in a free and pleasant atmosphere, and improving their ability to apply knowledge. In constructing the teaching environment for "Electrical Control and PLC Technology," teachers should focus on introducing new methods and concepts to provide students with better educational services [15]. To ensure the effectiveness of the course reform, schools should continue to deepen the cultivation of a "dual-qualified" teacher team (teachers with both academic expertise and industry experience), providing more opportunities for teachers to participate in enterprise practice. This allows them to communicate more deeply with enterprise employees and leaders, which is of great significance for improving their practical teaching ability. Through practice in enterprises, teachers can accumulate more new ideas and learn more new technologies, which greatly promotes their subsequent teaching activities. In addition, schools can invite enterprise employees and leaders to give lectures in the school, helping students understand more industry knowledge and development trends, and supporting their comprehensive development.

5. Conclusion

In summary, to further enhance the teaching effectiveness of the "Electrical Control and PLC Technology" course based on the OBE (Outcome-Based Education) concept, teachers can start from aspects such as integrating market demands, focusing on work processes, enriching teaching approaches, and attaching importance to the construction of teaching environments. By doing so, the teaching effectiveness of the "Electrical Control and PLC Technology" course can be imperceptibly elevated to a new level.

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Disclosure statement

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References

[1] Du X, Wang X, 2025, Discussion on the Reform of Dual-Oriented Teaching: Taking the Course "Electrical Control and PLC Technology" as an Example. Technology Wind, 2025(5): 40–42.

[2] Han L, 2024, Research on Teaching Reform and Application of the Course "Electrical Control and PLC Technology" in Higher Vocational Education. China Packaging, 44(12): 183–188.

[3] Chen L, Kong X, 2025, Construction and Research of Integration Course of Specialty and Innovation Based on "Modern Electrical Control Technology". Times Automobile, 2025(8): 37–39.

[4] Dou X, 2022, Teaching Research on "Electrical Control and PLC Technology" Based on OBE and PBL Concepts. Industrial Technology and Vocational Education, 20(4): 45–48.

[5] Guo J, Ding X, Zhou X, et al., 2025, Reform and Practice of Electrical Engineering Course Teaching Based on OBE Concept. Papermaking Equipment and Materials, 54(1): 198–200.

[6] Wang R, 2024, Teaching Reform of Motor Speed Regulation Course Design Based on OBE Concept. The Science Education Article Collects, 2024(21): 87–90.

[7] Yi M, Huang Y, Ou X, et al., 2024, Exploration on Project-Based Teaching Reform of "Modern Electrical Control Technology" Course Based on OBE-CDIO. Guangdong Vocational and Technical Education Research, 2024(8): 113–118.

[8] Tang C, Zong Z, Li H, 2022, CDIO Design and Implementation of Experimental Course Teaching for "Electrical and Electronic Technology" Under the Background of New Engineering. University, 2022(S2): 25–27.

[9] Huang J, Wang W, Qiu X, 2020, Application of Outcome-Based Education (OBE) in Electrical Control and PLC Experiment Courses. Application of IC, 37(12): 78–79.

[10] Tong Y, Zhang J, Zhang Y, 2023, Application of BOPPPS Teaching Mode Based on OBE Concept in Electrical Control and PLC Courses. The Theory and Practice of Innovation and Entrepreneurship, 6(10): 35–39.

[11] Tang C, Zong Z, Li H, 2022, CDIO Design and Implementation of Experimental Course Teaching for "Electrical and Electronic Technology" Under the Background of New Engineering. University, 2022(S2): 25–27.

[12] Guo J, Ding X, Zhou X, et al., 2025, Reform and Practice of Electrical Engineering Course Teaching Based on OBE Concept. Papermaking Equipment and Materials, 54(1): 198–200.

[13] Chen W, Huang Z, Yan X, 2025, Exploration on Ideological and Political Teaching in Electrical Control and PLC Courses. Journal of Higher Education, 11(13): 113–116 + 121.

[14] Zheng J, Mao J, Xu Y, et al., 2025, Application of ANSYS Maxwell Virtual Simulation in the Teaching of Motor and Electrical Control Technology Courses. Laboratory Science, 28(2): 150–154.

[15] Shi P, 2025, Research on the Construction of Curriculum Teaching Evaluation Mechanism in Vocational Colleges Based on Post Demand: Taking "Electrical Control Technology" as an Example. Papermaking Technology and Application, 53(2): 71–74.