

Exploration and Practice of Mechatronic Equipment Repair Course Based on The Concept Of "OBE+CDIO"

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Abstract: According to the characteristics and current situation of mechanical and electrical integration equipment repair teaching, the advantages of "OBE+CDIO" teaching concept are given full play, and the theoretical framework of professional curriculum teaching reform is reconstructed. At the same time, the teaching objectives, content design, organization and implementation plan, curriculum assessment plan and other aspects are explored and practiced based on the post needs. The implementation of teaching reform plan and the evaluation of teaching effect to establish the feedback mechanism can significantly improve the teaching effect of equipment construction and using courses, and also open up a new way for the curriculum reform of equipment construction.

Keywords: OBE concept; CDIO teaching mode; Construction curriculum; Teaching reform.

1. Introduction

Mechanical and electrical integration equipment repair course, as the core course of professional maintenance knowledge in vocational and technical education, aims to lay a theoretical foundation for the improvement of professional technical ability through the explanation of construction and electrical principles. According to the investigation and analysis, in view of the particularity of students' learning situation in vocational and technical vocational education and the fact that the course content is mechanical and electrical integration, the theoretical knowledge is abstract and difficult to learn, which requires high requirements on students' circuit foundation and logical analysis ability, and at the same time requires a lot of theoretical knowledge as the basis of use and maintenance. For this situation, the use of multi-level focus analysis and discussion, summed up as a weak theoretical foundation, theory and practical integration of low degree of outstanding problems. This kind of teaching mode is easy to cause the content of the course to be dull, complicated and difficult to understand, resulting in the dilemma of "difficult to speak and difficult to learn" and unable to cultivate the "trinity" of technical talents.

2. OBE concept and CDIO teaching mode

Results-oriented education (OBE) focuses on "students" and "learning outcomes", and focuses more on "learning outcomes". The evaluation methods are diversified, which belongs to results-oriented education, but lacks the vacancy and stiffness of content gaps. The CDIO teaching mode is a relatively advanced theoretical achievement in the reform of international engineering education in the early 21st century. It has been proposed by four schools in different regions and is a new teaching mode integrating conception, design, implementation and operation. Its core concept is the trinity teaching mode combining the cultivation of knowledge, quality and ability, guiding students to take actual subjects as the carrier. Learning from practice, forming the goal of integration of knowledge and practice, belongs to process-oriented education, but it is easy to appear that the process

design can not meet all the teaching objectives, making the teaching content incomplete.

Due to the close internal connection between OBE concept and CDIO teaching mode, combining the two concepts to form a hybrid education concept of "results-oriented education as the target and process-oriented education as the benchmark" can overcome the disadvantages of the new theory and post-practice of traditional applied education curriculum planning, and further integrate the advantages of the two. The establishment of a truly student-oriented new education concept plays a leading role in the classroom teaching reform at the theoretical level.

The training of vocational and technical vocational education personnel is oriented towards skilled positions. The whole process of training is mainly based on post ability, with combat effectiveness as the ultimate goal and the improvement of equipment application and maintenance skills as the focus. The standard of competence is "can do, can do, and know how to do", so the ultimate core and test method is "do". This "do" is not only the original copy, based on the characteristics of equipment mechatronics, so students need to do will observe, can analyze, will comb to "do".

The OBE-CDIO integration concept breaks through the previous educational concept and can improve students' curiosity and thirst for knowledge. Meanwhile, with the realization of the project in the learning process, students' satisfaction and pride can be enhanced. The multi-dimensional evaluation system enables teachers to reform and optimize the inefficient parts according to students' achievements in time.

3. Theoretical framework of teaching reform of mechanical and electrical integration equipment repair course based on the integration of OBE-CDIO concept.

OBE education philosophy is more focused on quality and comprehensive student learning outcomes; CDIO education model focuses on procedural content first, and focuses more on the science, rationality and control of the whole process. For mechatronics equipment repair course reform, mainly

divided into steps. The first step, according to the job requirements, combined with the concept of OBE, clear trinity teaching objectives; Second, in accordance with the concept of CDIO, based on fault analysis teaching content as a breakthrough, reverse thinking, reverse derivation and reconstruction of the course teaching system, so as to ensure that the cases cited in the teaching process can meet the actual post requirements. This makes the course originally designed with only OBE theory, like "enriched flesh and blood on the bone", which makes the teaching design more effective and

the teaching objectives more distinct. Due to the combination of OBE concept and CDIO concept, the course makes the teaching competence, assessment method comprehensive and rectification method concrete, forming the teaching system closest to the job task, so as to ensure the integration of truth and reality, and students can obtain the "doing" ability required for future career positions. The theoretical framework of teaching reform of mechanical and electrical integration equipment repair course combined with the concept of OBE-CDIO is shown in Figure 1.

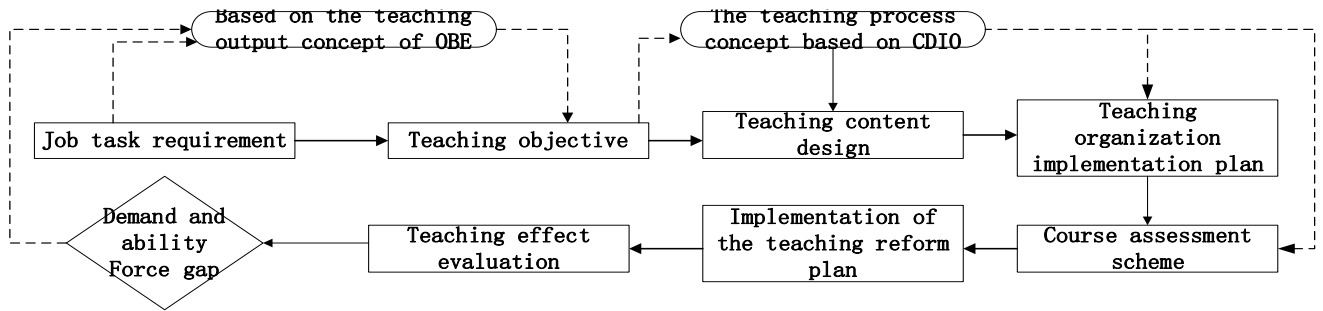


Figure 1. Theoretical framework of curriculum reform based on OBE-CDIO concept

First of all, fully investigate the mechanical and electrical students' job tasks, which are analyzed, designed and optimized; Secondly, based on the task needs of the post, combined with the teaching output theory, the teaching objectives to be achieved by the electromechanical integration course are refined. Taking this as the starting point, the teaching process concept is introduced, from the four dimensions of early conception, early design, middle implementation and late operation, the teaching content is reconstructed, the targeted and scientific assessment method is grasped, the teaching system is reshaped, and a new general reform program is formed. After that, the teaching reform plan is implemented, and the overall evaluation of teaching effect is carried out according to the students' assessment results and the situation of post practice. If it is found that there is a huge deviation between post demand and students' knowledge and actual ability, as well as teaching objectives, it is necessary to refine post demand, renew the original curriculum reform concept and adjust the comprehensiveness and pertinence of teaching objectives based on the principle of cultivating talents by virtue. Therefore, teaching content and overall teaching reform plan should also be optimized generation by generation in line with the change of teaching objectives.

4. Practical framework of teaching reform of mechanical and electrical integration equipment repair course based on OBE-CDIO concept integration

4.1. Refining teaching objective design by combining post task demand and result teaching output theory

Through the post survey, our school after graduation of mechanical and electrical integration equipment maintenance major for the position of chassis repairman, electrical repairman and other technical positions. By analyzing the corresponding job tasks and adopting the OBE teaching output concept, the corresponding knowledge, skills and

quality requirements of the course are summarized in reverse design, so that the education objectives can meet the requirements of the job tasks [1].

4.2. Teaching content design based on CDIO teaching process concept

Based on the analysis of post task requirements, centering on the new teaching objectives and adopting the concept of CDIO teaching process, the specific teaching content of mechanical and electrical integration equipment repair course is systematically and deeply designed. In addition, the addition of classic teaching cases is helpful to achieve the teaching effect. The task-based teaching method is mainly used to reconstruct the course teaching system, and the teaching methods such as situational experience, cooperative learning and question chain are integrated to realize the deep participation of students, improve their awareness of self-learning and active participation, and avoid the old problems of passive acceptance and blind imitation.

In the task-based teaching method [2], the construction of case base should be explored from four aspects: classic fault cases, frequent research problems, sudden cases in daily training and exercises, and spontaneous or artificial fault cases in the teaching process. Through case screening, classification of difficulties and common differences, appropriate cases are selected and integrated into the classroom in the form of tasks. Based on the curriculum theory, the teaching situation is built and completed in the way of group cooperation, so as to realize the transformation of knowledge system into ability system and the extension of quality and ability [3].

4.3. Teaching organization implementation plan

Based on the mechanical and electrical integration equipment repair, different from the traditional mechanical maintenance method, circuit identification and analysis for the ability of logic judgment is higher, so in the process of teaching organization in addition to learning knowledge and skills, more attention should be paid to solving students' unencountered problems and secondary expansion learning

training. Therefore, while task-based teaching relies on situational teaching, the strategy of students as "pioneers" should also be adopted. Teaching methods such as flipped classroom, brainstorming and observation and self-evaluation should be integrated according to different contents and tasks to better stimulate students' curiosity and desire for knowledge, dig deep students' thinking potential, and fully improve students' awareness of active participation and active learning.

4.4. Course assessment plan

Centering on the teaching objectives and contents of the course, according to the curriculum syllabus and curriculum implementation plan, a more comprehensive, multi-angle and diversified curriculum assessment system is constructed. The reformed assessment method adopts the form of formative assessment and final assessment accounting for 50 percent each. At the same time, formative assessment is divided into three stages in the form of concluding notes, oral examinations and examination papers. At the same time, the final examination also adopts practical and oral examination.

4.5. Implementation of teaching reform plans and evaluation of teaching effects

Systematic and in-depth operation and implementation of curriculum reform plan, while collecting the teaching effect of curriculum reform. The curriculum teaching effect plan cannot take the course assessment results as the whole evaluation index, but needs to integrate the results of student

innovation competition, the results of skill appraisal examination, the feedback of post practice and the feedback form of student army work in the past five years, so as to evaluate, evaluate and optimize the situation of curriculum reform.

5. Concluding remarks

The mechanical and electrical integration equipment repair course based on the integration of OBE-CDIO concept breaks the traditional teaching mode, can accurately mark the post needs, clarify the training objectives, reconstruct the appropriate practical curriculum system and effective implementation mode, realize the learning-oriented, closer to the post tasks, in line with the vocational education level students applied talent training goals.

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