

Research and Practice on Teaching Mode of Industrial Robot Technology Course based on OBE Concept

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Abstract

OBE education concept is an important engineering education concept, which plays an important role in promoting the reform and practice of Engineering education. With the rise of industrial robotics specialty, this paper takes the teaching of industrial robotics applied technology as the research object, guided by the OBE educational concept, first designs the real project teaching content based on the results-oriented reverse design, then constructs a student-centered hybrid teaching activity, secondly develops project-driven teaching activities, At the same time, virtual simulation technology is integrated into the course of industrial robotics technology. Finally, a multi-element progressive evaluation system is established to evaluate teaching activities. Practice has proved that the teaching practice based on OBE achievement orientation has a good effect.

Keywords

OBE concept, Industrial Robot Technology, Research and practice, Teaching Mode.

1. Introduction

Industrial robot technology is a new technology, which has been applied in various fields. Industrial robot personnel training is an important research field in Vocational colleges. [1-2] Industrial Robot Technology Course, as the main professional course for the training of industrial robotics professionals, aims to cultivate students' engineering ability of industrial robots. At present, there are the following problems in the teaching of industrial robotics in China:

- (1) The teaching content is comprehensive and the knowledge points of each chapter are independent. This course mainly describes the basic composition of industrial robots, mechanical structure, control system, robot programming and other related content. Learning content is broad, comprehensive and independent. There is no main thread through which students can easily distinguish the causes and consequences in the process of learning.
- (2) Attaching importance to teaching, students think less independently. In the course of teaching, teacher's teaching is the main way. The traditional cramming teaching method is more unreasonable when using modern multimedia teaching methods.
- (3) Emphasizing theory while neglecting practice. This course has a high demand for students' practical ability, but the current curriculum design focuses on the theoretical part, and the practice link is relatively weak. It can not stimulate students' learning enthusiasm, and can not really improve students' practical ability.

Outcome-based education, or OBE for short, can be interpreted as result-oriented education, which is an important concept of Engineering education. Based on the OBE educational concept, this paper explores the application and research of the course mode of industrial robotics technology, studies and analyses the important role of OBE education in the course of industrial robotics, effectively improves the teaching effect of the course of industrial robotics technology,

and seeks an efficient and feasible way to guarantee and improve the quality of the course of talent training[3-4].

2. Design of OBE Teaching Mode for Industrial Robot Course

2.1. Basic ideas of OBE Teaching Mode Design

The basic idea of this research is to construct the course system of industrial robots technology based on OBE concept under the goal of training students'engineering ability of industrial robots technology talents.As shown in Fig. 1, following closely the characteristics of Engineering education's demand for high-level industrial robotics technology, we adhere to the concept of Engineering Education Oriented by OBE.This paper mainly focuses on four key aspects: how to train students, how to teach teachers, how to evaluate curriculum objectives, and how to summarize and improve curriculum teaching. Then, according to the learning results of industrial robotics technology, the teaching content of the course is designed in reverse, and finally the learning output is realized and evaluated, and the teaching method of industrial Robotics course is constantly summarized and improved.

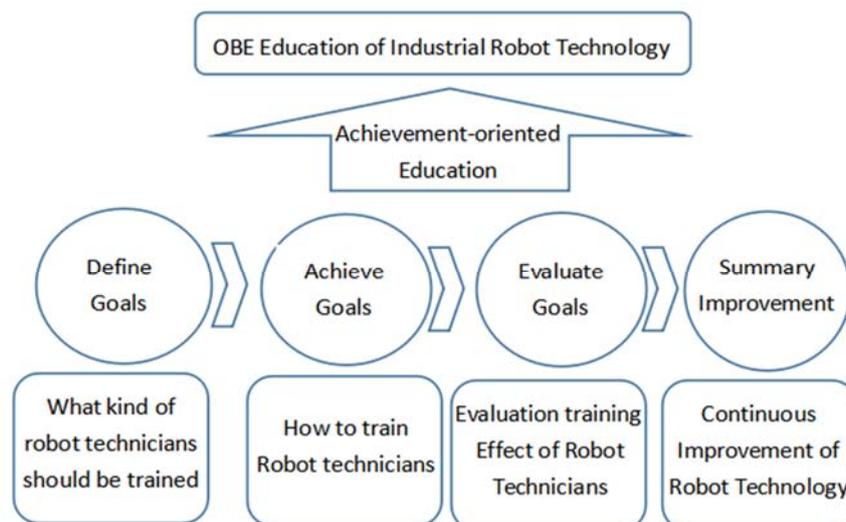


Fig 1. Basic ideas of Industrial Robot Technology Course Based on OBE Teaching Concept

2.2. Reverse Design of Teaching Content

Under the goal of cultivating students'engineering ability of industrial robots, the reverse design of teaching content is carried out according to the concept of OBE.Based on the individualized development needs of industrial robots students and the needs of enterprises, the practical teaching content of the course is divided into application-oriented and research-oriented through the exploration of industrial robots teaching practice.Practice courses focus on practical application and research. In order to meet the students'learning needs, the case study of real industrial robots project is integrated into the course teaching, so that the teaching process is centered on the application orientation of industrial robots' technical ability.

2.3. Teaching Methods and Strategies

Reforming the traditional teaching mode of industrial robotics technology classroom, which is mainly based on teacher's lecture, and constructing a Student-centered Interactive Teaching mode.Teachers, as the leaders of curriculum learning, adopt inquiry teaching method, situational simulation teaching method and task-driven teaching method in the research, and actively explore the optimal combination of teaching methods that meet their requirements.Through teaching guidance, question-and-answer interaction, turning over the classroom, question-and-answer, network course extracurricular practice and other ways[5],

we can strengthen students' main position in teaching activities, deepen their understanding and internalization of knowledge, and then improve the teaching effect.

3. Application and Practice of OBE Course Teaching Mode

3.1. Achievement-Oriented Teaching Goal Setting

Under the guidance of tutors, students teamwork and consulting materials, analyze the results-oriented teaching objectives, determine the application of new technologies needed for tasks, such as three-dimensional technology, virtual simulation technology and PLC electrical control technology, make full use of the pre-knowledge, determine the implementation steps of curriculum objectives, and make full preparations for the implementation of tasks.

3.2. Developing the Classroom Teaching Activities of the "Results-oriented, Project-driven" Teaching Model

Establishing the course system of industrial robotics technology based on ability and professional accomplishment and students as the main body, and developing task-driven teaching scheme with industrial robotics project as the carrier. The project is guided by the engineering capability of robotic project, and the project is introduced, planned, implemented, designed, displayed and evaluated. Finally, the teaching process is completed. In the course of course teaching, we study and explore the real situation of the project to implement teaching. We will use examples, simulation of real scene, role-playing and other methods to interpenetrate in the classroom teaching, and develop the classroom teaching mode at all stages.

3.3. Developing Integrating Virtual Simulation Technology into Robot Course

Virtual simulation technology is to build a virtual environment similar to the real working scene of industrial robots. Project-based teaching method is adopted in the teaching project of industrial robot training. Because of the few sets of equipment on industrial robot workstation, there are many students in the real project, about 40 students in a class. The virtual simulation working scene of robots can be built with the help of virtual simulation software of industrial robots, such as Robot Studio and RT-Toolbox 2, so that students can participate in the project. At the same time, the interaction and verisimilitude of virtual simulation of robots can better enable students to understand the operation and working principle of industrial robots.

3.4. Constructing "Multiple Progressive" Evaluation Method

Through the analysis of classroom teaching links and effects of industrial robotics technology, a diversified evaluation method is constructed. As shown in Figure 2, we should not only pay attention to summative evaluation means, but also to the formative achievements of students in their daily practice and learning progress, and establish a democratic evaluation system with multiple evaluation subjects. In addition to teacher evaluation, let the other students in the group become one of the main evaluation subjects, form a process-oriented curriculum assessment incentive model, mobilize students' enthusiasm for participation, and then improve the quality of learning, and continue to improve.

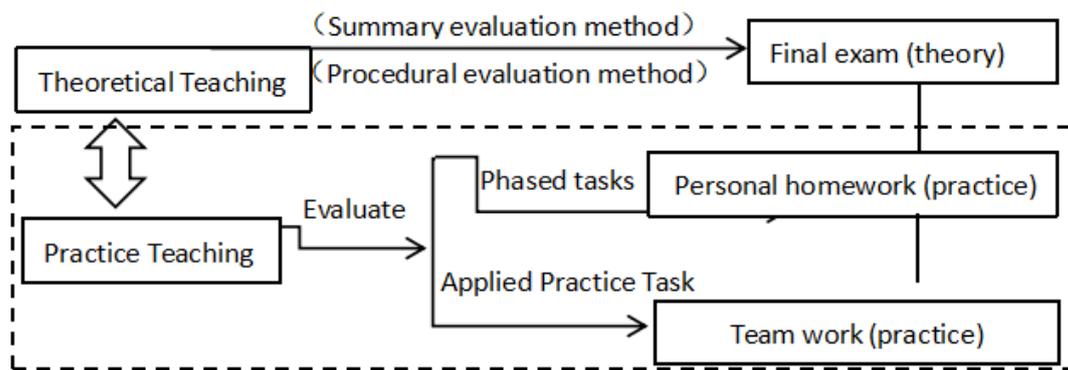


Fig 2. The process and method sketch of "multiple progressive" evaluation method

4. Conclusion

The research of teaching mode in this paper takes the application ability of industrial robot technology as the breakthrough point, introduces the OBE teaching idea, applies the result-oriented teaching content direction design, hybrid teaching strategy, combines the real project of industrial robot, introduces the virtual simulation technology and Multi-progressive evaluation method to practice and reform the course teaching of industrial robot application technology. In the course of teaching, students are the main body and teachers are the guidance to help students understand what they have learned, and carry out real project practice to improve their practical ability. Practice has proved that the teaching practice based on OBE results-oriented has achieved good results.

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