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Research on the Clustering Construction of Object Oriented Curriculum Based on OBE-CDIO Education Concept

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Abstract: *Among the computer majors in universities, object-oriented courses play a connecting role. On the one hand, students need to master the basic theory of object-oriented, on the other hand, coding practice ability also needs to be cultivated. Curriculum group is a course that scientifically and reasonably integrates related and complementary courses of unified disciplines or different disciplines according to the cognitive law and ability training law of the implementing object, and forms a new curriculum system with professional characteristics according to a certain curriculum framework. The concept of results-oriented education (OBE) has been continuously applied to the reform of engineering education, and it has obvious advantages compared with traditional education methods. In this paper, the concept of OBE and CDIO are organically integrated, and the path of course clustering construction of software design specialty under the concept of OBE-CDIO is put forward. In view of the problems existing in the practical teaching of software design specialty, the OBE concept is used to transform social needs into students' ability training objectives at different levels, so as to guide the formulation of curriculum training objectives and push them back into practical teaching.*

Keywords: *Object-oriented curriculum; Results-oriented education; CDIO; Clustering*

1. Introduction

Curriculum is the basic unit of teaching plan composed of several contents of one or several related disciplines according to a certain system structure; It is the main educational link to impart knowledge, cultivate ability and improve quality to students; It is the basic guarantee to realize the goal and specification of talent training and form the training characteristics [1]. Outcomes based education (OBE) is an educational model that organizes, implements and evaluates everything in the education system around the results that students should achieve when they graduate [2]. The achievement is not only the book knowledge acquired by students, but more importantly, the cultivation of students' ability and quality, including the grasp and understanding of the overall structure of knowledge, the ability to solve open problems from multiple angles, the ability to acquire creative thinking, the ability to analyze and synthesize information and the ability to continuously learn and adapt to development through completing more complicated tasks [3]. The concept of OBE has been continuously applied to the global engineering education reform, and it has obvious advantages compared with the traditional education methods [4]. This concept mainly focuses on students' learning goals and achievements, and determines students' mastery of corresponding knowledge and ability by ensuring that students can achieve the established learning goals, thus ensuring that students' knowledge reserves and ability levels can meet the requirements of jobs [5].

In the course education of software design specialty, in order to better achieve the teaching objectives, train students' practical ability and innovation ability, and cultivate a comprehensive talents that can better adapt to the development of the times, it is necessary to effectively integrate the CDIO concept with the OBE concept [6]. CDIO stands for Conceive, Design, implementation and Operate respectively. It is based on the whole life cycle of an engineering project from research and development to operation, organically combines the whole curriculum system through project design, puts the education process into the specific situation in the engineering field, allows students to participate in all teaching links in an active and practical way, and emphasizes that curriculum learning should be linked with project design to cultivate students' comprehensive practical ability [7-8]. In this paper, the concept of OBE and CDIO are organically integrated, and the path of course clustering construction of software design specialty under the concept of OBE-CDIO is put forward. In view of the problems existing in the practical teaching of software design specialty, the OBE concept is used to

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transform social needs into students' ability training objectives at different levels, so as to guide the formulation of curriculum training objectives and push them back into practical teaching.

2. Connotation of OBE-CDIO concept

OBE concept means that the goal of teaching design and teaching implementation is for students to finally achieve learning results through the educational process. It mainly emphasizes five aspects: teaching objectives, teaching needs, teaching process, teaching evaluation and teaching improvement. CDIO teaching mode decomposes the knowledge, ability and quality that engineers should possess, and allows students to learn engineering in an active, practical and organic way [9]. In order to better achieve the teaching objectives and eliminate the contradiction between the two concepts, the specific requirements and related training methods after the integration of the two concepts will be discussed in detail [10]. OBE has turned the previous mode of attaching importance to the input of high-quality teaching resources into a mode of attaching importance to students' final learning achievements, that is, taking "output" as the guide and aiming at students' comprehensive adaptability after leaving school and entering social and professional roles, guiding the setting of professional teaching practice content and specific teaching activity process.

OBE is a teaching that regards students as the teaching service center and takes students' academic achievements and personality development as the teaching core in all teaching processes . Its core is the key ability that students have loaded and can take away after finishing their studies. These abilities include theoretical knowledge solidification, knowledge and understanding, practical operation, interpersonal skills, social adaptability, values and social responsibility. The main course mode is to take CDIO project as the main line of students' practical courses, establish a progressive practical teaching mode, and cultivate students' abilities in different aspects through the explanation of each teaching link. Constantly pay attention to the cultivation of students' professional ability, and at the same time realize the detection of students' professional ability by establishing a diversified comprehensive assessment mechanism, thus forming a complete practice-based teaching model. The new education mode of OBE-CDIO education concept breaks the traditional teaching mode, scientifically constructs the achievement-oriented and project-driven professional training system, takes students as the center, strengthens the foundation, broadens the specialty, strengthens quality education, pays attention to the cultivation of ability, and pays attention to engineering practice teaching, so as to better adapt to the requirements of modern engineering technology and national economic development for talent training and establish a talent training mode that emphasizes theory, practice and innovation.

3. Problems existing in practical teaching of software design specialty at present stage

At present, practical courses are set up in the curriculum system of software design major in colleges and universities, and their teaching forms are mainly in-class practice, which are usually arranged at the same time as theoretical courses, such as product modeling design, text and logo design, computer-aided software design, comprehensive design, graduation design and so on. At present, the relevant teaching of software design major is mainly based on the curriculum. Even if practical teaching is set up, the goal of practical teaching is not clear enough in the practical class. As a result, many students can't learn knowledge and cultivate their practical ability in practice class. Students just blindly practice, and teachers don't give the exact direction of ability training and the degree of mastery of practical ability.

Any teaching reform, implemented and changed to the depth, is still the curriculum reform and the undertaker of the curriculum. In this process, teachers finally realize the pain of curriculum reform, so OBE reform is to solve the problem of "people" in the final analysis. Only people's ideas and understanding can put the reform into practice, not just at the virtual strategic level. At this stage, many colleges and universities do not have a complete teaching system for the practical teaching of software design, or there are many problems, which makes many practical courses independent after development. The correlation between courses is very poor, and it is impossible to achieve effective connection between courses, so it is impossible to effectively extend and deepen the course content.

As a supplement to professional classroom teaching, there is no clear plan for students' practical ability. At present, the courses of software design major are mainly course-oriented. Although practical hours are set, there is no clear practical teaching goal. There is no clear plan for the specific design practice ability that students need to master after learning, to what extent and how to cultivate it. Its

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description is often a general and vague sentence, that is, to master the corresponding design practice ability. This leads to the neglect of the importance of practical teaching in the process of talent training for software design majors, and only regards it as a supplement to theoretical knowledge. It is precisely because of these problems that many practical teaching contents can't really cultivate students' ability. Practical courses only deepen students' understanding of the course contents, but can't really link the modules effectively. It is precisely because of this lack of curriculum cohesion that students' abilities cannot be effectively integrated, which makes students' comprehensive ability literacy lower.

Teachers of software design also agree with the importance of practical teaching in the training and output of software design professionals. Excellent design practical ability is not only to meet the needs of enterprises, but also an effective means to enhance the employment competitiveness of graduates. At present, many colleges and universities have some shortcomings in the evaluation of practical courses for software design majors. At present, the evaluation is mainly based on courses, and there is no detailed evaluation standard. These results are mainly arranged by the teachers themselves according to the course situation. In addition, the scores of practical courses in many colleges and universities are judged subjectively by teachers. Such teaching evaluation standards not only lack the judgment of students' practical ability but also the practice process, so they cannot accurately guide and supervise the teaching.

4. Clustering construction of object-oriented courses based on results

4.1. Constructing teaching objectives

The important role of practical teaching in teaching effect has been affirmed by many professional course teachers, and it is also an important way for graduates to improve their core competitiveness. However, the problems in this respect need to be corrected in time to ensure the implementation effect from the system. Only by reforming the system can we really ensure that students and teachers are no longer bound by the system, and can we really maximize the role of practical courses. It is necessary to use the ultimate training goal to reverse the sub-goals of each link and apply these sub-goals to the curriculum. Using the project-based teaching method in CDIO concept, we can promote it according to the project, and connect and expand scattered knowledge with students as the main body. CDIO project-based teaching is the key link to implement software design practice teaching. Under the guidance of CDIO concept, with the project as the main line and students as the main body, the original piecemeal practice content is connected into a line and expanded into a surface, so that students' innovative design ability and comprehensive quality can be improved step by step in the complete practice teaching process. The instructional design model of OBE course is shown in Figure 1.

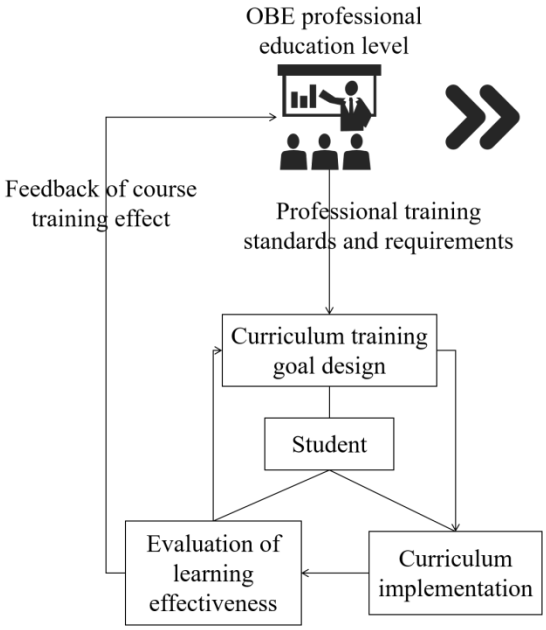

Figure 1: OBE course instructional design model

The development of OBE's teaching strategy lags behind, and it sticks to the traditional situation of

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clear teaching boundaries of teachers in different courses and one-sided independent teaching and teaching materials. It lacks communication and cooperative learning, integrated collaborative teaching, cooperation between teachers and teaching management teams, and cannot form a multi-party learning community. This lagging phenomenon stems from the fact that teachers are not really committed to the ultimate goal of developing the knowledge, ability and realm of teaching objects. Accurate focus is the most basic and important starting point in implementing teaching strategies.

4.2. Change the course format

Pay attention to the cultivation of students' different levels of ability, divide the course content according to the requirements of target ability, and explain it from the basic practical content, so that students can master the basic practical ability. For basic professional courses, starting from their course characteristics, the teaching process and teaching content should be rearranged and divided into reasonable stages, and the teaching content should be decomposed into different design units, and the knowledge points of the course should be decomposed into each unit topic. The first half of each unit is explained by the teacher, and the second half is arranged by the teacher according to the knowledge points and skills in the unit, and the students can practice on the computer and submit the unit design homework. After mastering the basic ability, we should use design projects to train students' comprehensive design ability, and finally let students participate in actual scientific research projects to train their innovative ability and the ability to transform theory and practice, so that students can have an all-round grasp of practical ability step by step. Gradually advance from low-level practical ability and comprehensively deepen students' practical ability. The connotation of teacher professionalism in object-oriented courses is shown in Figure 2.

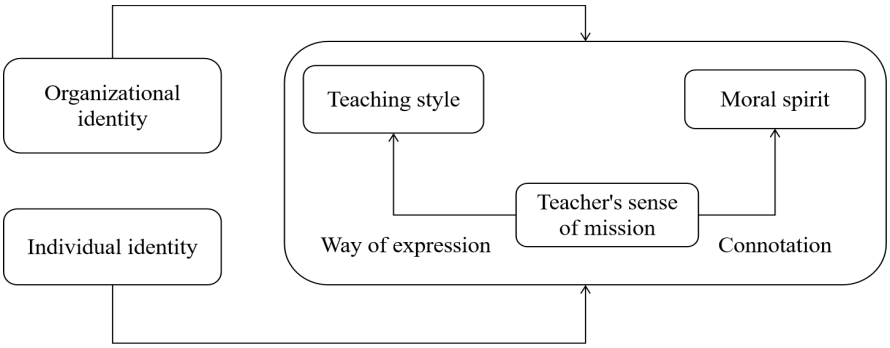

Figure 2: The connotation of teachers' professionalism in object-oriented courses

Special design promotes students to change from passive homework to active design, gives full play to students' subjective initiative, and provides students with space for thinking and creation. Cultivating students' innovative design ability and engineering consciousness is the ultimate goal of software design course teaching. On the basis of students' independent special design, relying on scientific research projects and based on the integration of science and education, innovative practice activities of scientific research exploration are carried out. At present, teaching should make good use of network resources, explain knowledge through multimedia, and also practice teaching through entering the enterprise. Make good use of the opportunities of various design projects and design competitions, and constantly change the course form, so as to really improve students' interest in learning and ensure students to achieve the ultimate goal of ability training.

5. Conclusions

The core goal of the practical course of software design specialty is to cultivate students' practical ability and innovation ability. By exploring the construction of practical teaching system of software design specialty under the guidance of OBE-CDIO concept, students' comprehensive quality and innovation ability can be better cultivated. As an advanced educational concept, OBE has been explored in theory and practice in some countries such as the United States for many years, and has formed a relatively complete theoretical system and implementation mode, which has proved to be the correct direction of higher engineering education reform. In the later stage of construction and improvement, we should constantly update teaching concepts, intensify teaching reform, build teaching teams, improve innovation, improve the construction quality of curriculum groups, and make unremitting efforts to improve teaching quality.

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