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Research on the Construction of First Class Professional Clustering Based on OBE-CDIO Education Concept

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Abstract: *With the continuous growth of various software technologies in China, there are still many problems in the practice teaching of software design in China universities. Facing up to these problems, many students majoring in software design have not been fully trained in many abilities and qualities, cannot adapt to the requirements of work and lack core competitiveness. With the rapid growth of science and technology in today's world, the demand of enterprises for innovative and applied talents is increasing. As the core concept of engineering education professional certification, achievement-oriented is the starting point of tertiary education teaching design, and it is also the correct direction of pursuing excellent education with students' learning output as the guidance. In order to meet the needs of enterprises, tertiary education should pay more attention to the ability training of college students during their school days. Aiming at the problems existing in the practical teaching of software design courses, aiming at cultivating students' abilities at different levels and comprehensive quality, this article probes into the construction of practical teaching system of software design courses under the concept of OBE-CDIO. In-depth analysis of the needs of society, market and enterprises, focusing on ability training, positioning the teaching objectives of professional practice courses. Taking the software design major as an example, this article studies the idea of first-class professional clustering construction based on OBE-CDIO education concept.*

Keywords: *OBE-CDIO educational philosophy; First class professional; Cluster construction*

1. Introduction

As a comprehensive interdisciplinary subject combining art and science, software design involves many fields such as aesthetics, art, machinery, engineering, materials, man-machine and service, aiming at cultivating comprehensive talents with high-level design application ability [1]. With the growth of society and market, the demand for software design talents in the industry is further improved. On the basis of mastering solid design theory knowledge, the design practice ability, engineering application ability and innovative design ability are more emphasized. These ideas will play a vital role in improving teaching quality, achieving training objectives, meeting social needs and promoting professional construction and teaching reform. Practice teaching is an important way and link to achieve this goal, which is of great significance to the growth of software design specialty and talent training, and is also a key issue for deepening education reform and improving the quality of talent training in universities [2].

In recent years, under the background of internationalization and globalization of education, the reform of tertiary education is constantly innovating with the growth of the times. The concept of OBE (outcomes-based education) engineering education, which was put forward in 1994, has been widely valued and applied in the global engineering education reform [3]. This concept clearly gives the personnel training standards, curriculum planning methods, learning achievement evaluation methods and other elements. 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. 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 [4]. CDIO concept is a brand-new innovative mode of international engineering education and personnel training. This concept advocates the teaching mode of comprehensive training on four levels: basic knowledge, individual ability, team communication and cooperation ability and system ability [5]. In order to build a practical teaching system for software design courses, improve the quality of

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practical teaching, and cultivate students' innovative design ability and comprehensive quality, this article organically integrates the OBE concept and CDIO concept, and puts forward the construction of practical teaching system for software design courses under the OBE-CDIO concept.

2. Problems existing in the existing practice teaching system of software design specialty

2.1. Ambiguous Goals

At present, practical courses are set up in the curriculum system of software design major in 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 courses of software design major are mainly course-oriented. Although practical hours are set, there is no clear practical teaching goal. 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 [6].

At present, the related 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. 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. It can only lead to the embarrassing situation that students don't know what to learn and teachers don't know what to teach, which makes the practical ability of software design specialty not cultivated [7].

It is precisely because the training goal of students' practical ability is unclear that students' practical ability cannot be effectively cultivated in practical courses, which leads to the waste of class hours. Due to the lack of ability training, students cannot adapt to the working environment well.

2.2. The Course Links Cannot Be Connected, and the Teaching Form is Single

At this stage, many universities do not have a complete teaching system for the practical teaching of software design major, or there are many problems, which makes many practical courses independent after development. Although practice teaching has been carried out in many courses, there is a common problem of fragmented and even repeated teaching. The correlation between practice, curriculum design, graduation design and innovative training for college students is weak, and there is a general lack of horizontal correlation and vertical depth. 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 all modules effectively [8].

The single teaching form is a common problem of education in China. Education in China is basically based on textbooks, and a lot of knowledge is limited by teachers. At present, the practice teaching of professional courses is mainly based on verification teaching, ignoring practicality, and the teaching methods are outdated and single. Verification practice causes the lack of effective interaction between teaching and learning, which often fails to stimulate students' interest in professional practice and their enthusiasm and creativity in learning. Some teachers think that the relevant knowledge outside the content of the textbook belongs to the super-outline content, which is ignored by teachers, but any knowledge may play a role in future work and study, and teachers think that the super-outline content may become the weakness of students.

3. Construction of practical teaching system of software design specialty under OBE-CDIO concept

3.1. Construction Ideas

Training requirements need to support the achievement of training objectives, and at the same time play a guiding role in daily teaching activities, which is conducive to clarifying the responsibilities of everyone who undertakes teaching tasks [9]. The result oriented concept is guided by students' learning output, and all educational activities are carried out around achieving the expected learning output,

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thereby highlighting the achievement of teaching design goals. The goal is to achieve the ability that students should achieve after 5 years of graduation, which is to independently undertake and solve complex design projects in research and design work, have some practical experience in design and research work, have good team communication and writing skills, and be able to complete comprehensive qualities such as expression, elaboration, and report writing. Guided by this ability goal, introduce project-based teaching and establish a diversified assessment system. Evaluate the practical process and learning outcomes according to teaching objectives, forming an OBE-CDIO based practical teaching system (as shown in Figure 1).

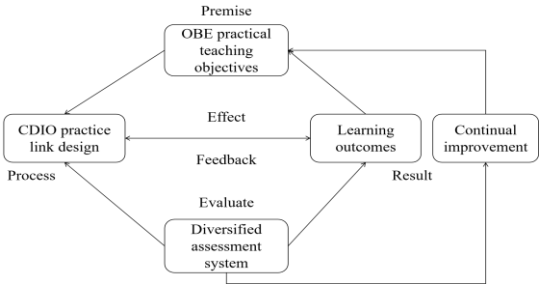

Figure 1: Practical teaching system of software design courses under the concept of OBE-CDIO

3.2. Cultivate Students' Practical Abilities at Different Levels

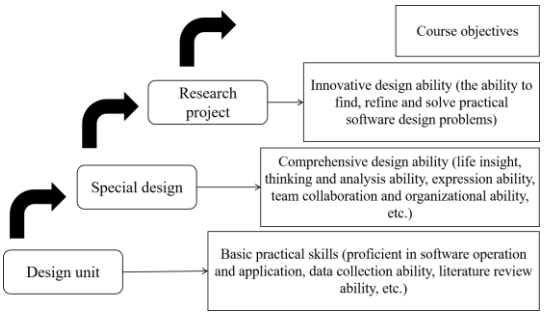

Figure 2: CDIO progressive practical teaching mode

To cultivate students' abilities at different levels, course practice projects are divided into three categories. For basic practical content, design units are mainly used as carriers, and various teaching methods and means are adopted to cultivate students' hands-on and practical abilities; After completing the practical content of the basic course, with the help of specialized design, students will be familiarized with the design process, learn to comprehensively apply various design knowledge, and cultivate their comprehensive design ability; In extracurricular comprehensive practical courses, relying on teacher research projects, students' innovative design abilities are cultivated, thereby constructing a progressive practical teaching model (as shown in Figure 2), and gradually cultivating students' various practical abilities.

For basic professional courses, the teaching process and teaching content should be rearranged and divided into reasonable stages from their curriculum characteristics. The teaching content is decomposed into different design units, and the knowledge points of the course are decomposed into each unit topic. Cultivating students' comprehensive design ability and quality is a higher-level goal of course teaching. On the basis of completing the task of basic practice design unit, teachers arrange special designs in the comprehensive practice class to exercise students' comprehensive design ability. 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 [10]. This practical activity mainly takes teachers' scientific research projects as the main carrier, carries out research and exploratory design practice, and strengthens students' independent innovation consciousness and design interest.

4. Conclusions

Professional certification of engineering education is an important link in China's education quality assurance system, and it also shoulders the historical mission of engineering education reform and

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innovation in China. By exploring the construction of practical teaching system of software design specialty under the OBE-CDIO concept, the training goal of practical courses with the cultivation of students' abilities at different levels as the core is defined. Different universities and majors can formulate various forms of positive implementation strategies for the educational model of the result-oriented concept according to the school orientation and professional orientation. By integrating CDIO concept into the whole teaching system, students can better grasp knowledge and innovative thinking, realize the coordinated growth of practical skills, and grow into professional and applied talents with practical operation ability, so as to achieve the training objectives of CDIO concept and engineering specialty and meet the needs of society. The practical teaching system of software design major under the concept of OBE-CDIO has a short running time, and it needs to be reformed, improved and perfected in the future practical teaching. The exploration and application of CDIO engineering education is of great value for improving the innovation ability of China's software design, accelerating the transformation and upgrading of China's engineering manufacturing field, and is also of great significance for the talent training mode of other majors. Only by ensuring the effective implementation of each practical process, can students achieve each ability goal, so as to cultivate an all-round growth of high-quality talents.

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