Research on Innovation Application of PBGS Teaching Mode Based on EIP-CDIO Concept——Take the Database Curriculum System as an Example

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Abstract

In view of the lack of engineering design ability, insufficient personal qualifications, and the inability of IT companies to meet the needs of engineering graduates, our institute combined the EIP-CDIO concept with project-based Group Study learning and introduced it into the database curriculum system, which explored “theoretical teaching + basics Experiment + curriculum design + application training + assessment work "a new curriculum system. The new system has solved the problem that the theoretical knowledge is out of line with the engineering design, mobilized the students' enthusiasm and initiative, improved the students' morality and integrity, and cultivated students' engineering design capabilities.

Keywords

EIP-CDIO, PBGS, Database, Curriculum system.

1. Introduction

At present, China’s engineering education still focuses on subject knowledge and lacks the necessary understanding of society, history, and the environment. Morality and integrity are seriously missing. In this environment, various problems have come one after another. For example, personal interests are paramount, team awareness is weak, and so on, making engineering graduates far from meeting real needs. In response to these problems, China has strengthened its theoretical innovation work and proposed the EIP-CDIO training model.

In recent years, Chinese universities have also begun to attach importance to project-based learning methods and applied to innovative experimental practice in college undergraduate teaching, college students' extracurricular science and technology innovation, corporate internships, and graduation design projects. Similar to foreign countries, the research and practice of domestic project-based teaching methods are mainly directed to the teaching of engineering courses such as computer science, mechanical engineering, and numerical control. However, the integration of the EIP-CDIO mode and the PBGS teaching mode, and the organic integration of the internal relationship between the two, and the formation of a set of PBGS features integrated EIP-CDIO engineering inquiry, team cooperation teaching mode is still relatively rare[1-2].

The database theory and application course is a professional basic course of the School of Information Engineering of Hubei University of Economics. The teaching goal requires that students have a solid database basic theory and have a strong ability to design and implement a database. The traditional teaching process has more theoretical links than practice, and the assessment is based on written tests. Therefore, students have to put emphasis on theory and practice. Therefore, how to apply the PBGS teaching model of the concept of transplanting EIP-CDIO to the database curriculum system, how to

integrate it with the database curriculum system, how to realize the integration of teaching content, teaching methods and means, integrated teaching process and evaluation system The reform will become a key issue and a difficult issue that we must face.

2. EIP-CDIO Concept and PBGS Teaching Model

2.1 EIP-CDIO Engineering Education Model

The EIP-CDIO engineering education model is the latest result of the international engineering education reform in recent years[1]. It inherited the concept of engineering education reform in Europe and the United States for more than 20 years. This model was formed on the basis of CDIO, emphasizing the combination of professional ethics, integrity, professional quality, concept design, implementation and operation. In improving the level of engineering education, this model has extremely important theoretical and practical significance. The training mode of EIP-CDIO put forward by Shantou University is to pay attention to Ethics, Integrity and Pro-fessionalism, and integrate organically with CDIO. This innovative education model emphasizes the combination of being a man and a job, behaving by doing things, doing things by relying on human beings, and emphasizing the humanistic spirit in the cultivation process, so that the cultivated engineers have good professional ethics, honesty and integrity, and a sense of responsibility. As shown in Fig.1.

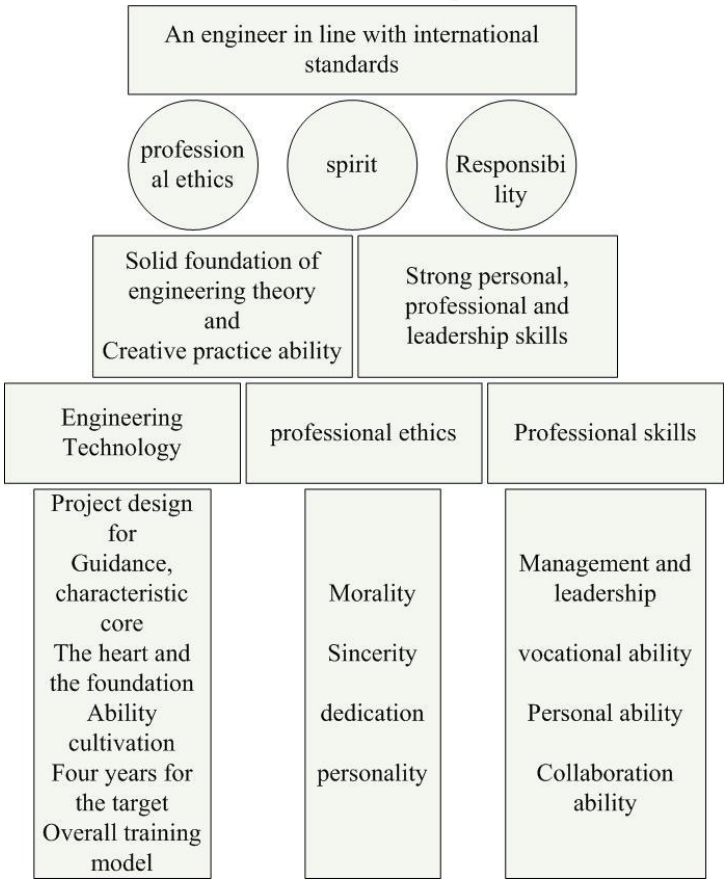

Fig. 1 Two or more

2.2 PBGS Teaching Mode

PBGS, or Project Based Group Study, is a model of ability education that fully embodies the competence-based thinking. The method is to design the teaching project by the teacher, introduce the student team into a simulation or real situation, and master the knowledge and ability in guiding, inspiring and encouraging students to complete the teaching project collaboratively[3-5]. The PBGS teaching model fully embodies the student's dominant position. Its team independent learning is different from the traditional self-study, discussion, experiment, and other learning activities

conducted under the teacher's arrangement. It does not have the teacher's deliberate arrangement, it is a completely open type, Autonomous, creative learning process. This kind of "autonomous and interactive learning" encourages team members to participate in, self-manage, and self-discipline, and is conducive to cultivating students' interpersonal communication skills such as communication, communication, role change, task division, teamwork, negotiation, and compromise.

3. Build a New Database Course System Based on EIP-CDIO PBGS Teaching Model

3.1 Training Mode

The main goal of the database curriculum system is based on software engineering theory, which allows students to understand and master the methodology and engineering knowledge in software development and apply it to practice[6]. Students master the design methods of software engineering through learning and practice, and can be applied to the course of the course of database theory, and efficiently develop software and perform effective maintenance. Develop student data abstraction and data modeling capabilities, certain system analysis and design capabilities, strong database design and application development capabilities, ability to use and maintain databases, and develop good self-directed learning, innovation, and team collaboration. Based on the EIP_CDIO PBGS mode database course system shown in Fig.2.

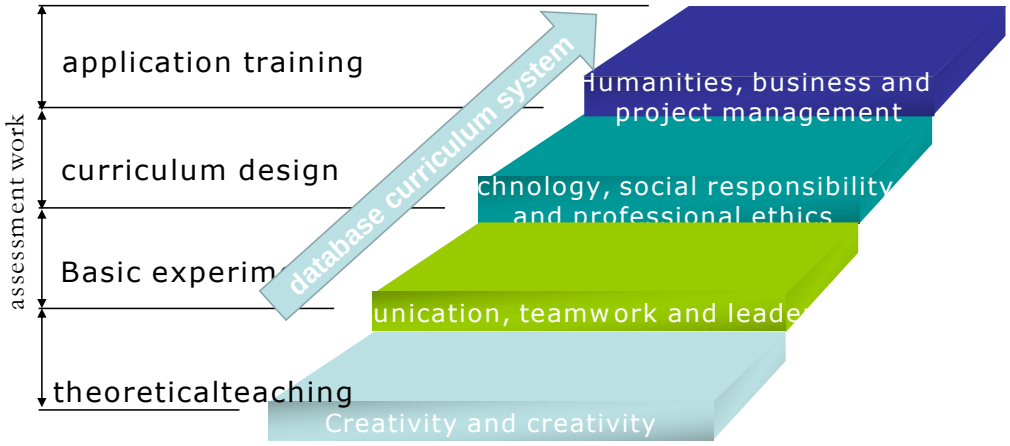

Fig. 2 Database Course System Based on EIP_CDIO PBGS Mode

Theoretical teaching and basic experiments are all prepared for project design. Curriculum design and practical training are the specific implementation of project design. The entire course system is organically and systematically combined through project design. Its characteristic is that all the content that needs to be learned and mastered revolves around the core of project design and integrates with this core to form a whole. All the projects are team cooperation projects. Students learn to explore, apply knowledge in the process of the project, develop team spirit, learn basic project organization and management, and develop CDIO capabilities.

3.2 Theoretical Teaching

The purpose of theoretical teaching is to lay the foundation for subsequent application development. Diverse teaching methods are used in theoretical teaching. Classroom lectures, class discussions, and online teaching are often combined to complement each other. Classroom teaching mainly focuses on highlighting difficulties, setting problems, and stimulating students' enthusiasm for learning under the guidance of teachers. Class discussions involve students in the teaching in the form of inspiring discussions, forming interactions between teaching and learning. Online teaching is the use of excellent course teaching websites to provide downloads of teaching videos, courseware, and experimental materials to answer students' questions and problems after class. It can promote student self-study, improve students' initiative in learning, and enrich the teaching process.

In the teaching process, teachers not only teach theoretical knowledge of the classroom, but also teach the engineering design problems of large cases to students in the form of tasks during the teaching process. Students work in groups as a unit to collaborate and discuss in accordance with the design steps of software engineering. Analyze the engineering tasks in the case, identify ways to solve the problem, complete the tasks in steps, and finally form an engineering design plan. The teacher timely guides and feedbacks the problems in the student's design, and finally selects excellent designs to show to the students, compares them with the scientific research cases, and comments on design deficiencies.

3.3 Basic Experiment

Parallel to the theoretical teaching is the basic experimental teaching. The experiments include data definition language (DDL), data manipulation language (DML), cursors and stored procedures, triggers, database integrity, database security, and database recovery. Connect with each other, step by step. The experimental platform selected the current mainstream database software product SQL SERVER 2005 database of large and medium-sized information system engineering.

In the experimental teaching process, in order to clarify the experimental content and improve the operational efficiency, the students are required to complete the requirements of the internship instruction before the experiment class, write specific operating instructions and anticipate the corresponding experimental results, and give the final computer operation after the experiment. Results, and compare the accuracy of the expected analysis. Through the SQL SERVER user management, mode management, storage management and instance management to further understand the database system principles of classroom teaching related knowledge. Through practice, students can not only master the basic operations of the database, but also deepen the understanding of the principle content.

3.4 Course Design and Application Training

Learning from the teaching philosophy of CDIO, using the teaching objectives of the database course as a guide, based on the application requirements of the industry, implement curriculum design. The teaching requirements are based on the design of students, supplemented by teachers' teaching guidance and focus on the cultivation of students' comprehensive abilities. Guided by the theory of database, it meets the requirements of the application, cultivates the students' ability to apply theoretical guidance, discovers problems, analyzes problems, and solves problematic thinking, teamwork, coordination, and innovation. The teaching requires students to complete the database application system design and development of small-scale simulation industry functional requirements in units of about 3 people each. In terms of specific implementation, we can simulate the form of the enterprise development team, assign the students to the team, and the team leader is responsible for arranging the specific task schedule. Among them, the role of the team leader in this team can not be ignored, not only the design of the sub-system, but also the improvement of the organization of the sub-system, but also arrange for specific assessment and discussion. At the same time, the role of this team form is also very prominent. It not only improves students' communication skills, collaboration skills, and leadership skills, but also cultivates students' engineering reasoning and logical thinking skills. During the experiment, students have made great progress. On the one hand, they personally experienced the significance of teamwork; on the other hand, they improved their ability to analyze and solve problems. In the process of the experiment summary, students' ability to express themselves and their ability to think independently have also been greatly improved. In addition, this type of team greatly eases the pressure on teachers and improves work efficiency.

Application training is an elective part of the database system theory course teaching system structure. It aims to further strengthen the practical experience of application development and improve the employment competitiveness of students. Based on the completion of theoretical teaching, basic experiments, and course design, summer practical training for graduating classmates was established.

Using the school-enterprise joint training approach, employ enterprise training instructors with extensive development experience to guide students in the design and development of industry-related database application projects.

These are the basic requirements for the EIP-CDIO training model, and they are the principles that we must adhere to or follow in practice. In order to give full play to the function of the EIP-CDIO training model, we must take the corporate case as a background to actively explore and innovate the applied talent training model. This approach not only improves the students' knowledge level, but also enhances the students' comprehensive ability. It also cultivates the attitude required by the society.

3.5 Assessment Work

Compared with most engineering majors, the evaluation content under the EIP-CDIO training model is more comprehensive and scientific, not only to assess subject knowledge, but also to evaluate basic skills. Most engineering majors only focus on assessing subject knowledge. In practice, we will use various effective methods to measure students' learning effects. Different capabilities will be assessed in different ways. For example, professional knowledge can be used for test papers, and CDIO-related skills can be reported, recorded, and graded. Assessments, self-assessments, and peer assessments are conducted in various forms. Diversification of assessment methods promotes the broadening of learning methods and enables the establishment of more complete and reliable evaluation systems. The application of these methods is not fixed, but will change according to changes in the situation. For example, we can use a written or oral approach to assess student understanding or mastery of the concept; we can use a rating or product evaluation, reporting methods to assess students' overall ability.

4. Advantages of the Database Course System Based on EIO-CDIO PBGS Mode

Advantages are shown below:

(1) The design of curriculum objectives and projects is based on social reality and production practices. The teaching model is based on the cultivation of students' abilities. The determination of the curriculum objectives and the design of the project are based on the needs of students, the needs of social life, the development of disciplines and career development. It is closely linked to the social reality. And production practices.

(2)Combining production, teaching and research, highlighting practical links, integrating the theoretical teaching with practical activities, allowing students to complete tasks accepted through real practice activities, so as to cultivate the ability to solve practical problems.

(3)Emphasizing teaching in accordance with individual aptitude and personality development and encouraging independent innovation. The goal of the project is clear, and the task is implemented to the people. However, how to accomplish the task will enable students to give full play to their own advantages, independently innovate, and show their best skills.

(4)The realization of the team project goals and the completion of the team members' respective tasks require the combination of independent thinking, independent learning, and team learning, so as to better train students' comprehensive ability and promote their overall development.

(5)Emphasizing that students take responsibility and manage independently. Responsibility awareness is a very important aspect of comprehensive ability. Students should take responsibility for the completion of their tasks and the realization of team goals. The PBGS teaching model based on the EIP-CDIO concept fully reflects the cultivation of responsibility awareness and other qualities.

5. Conclusion

In the database system principle course teaching model of industry colleges for application-oriented personnel training, the teaching concept of EIP-CDIO project is used for reference, and the PBGS teaching model is integrated. According to the database curriculum system, "theoretical teaching +

basic experiment + curriculum design + practical application + + assessment work" is proposed. It is a new system of teaching and training. In the implementation of teaching in the future, we should pay attention to the mutual infiltration of each link, pay attention to the training of students' professional quality and comprehensive ability, encourage and guide students to study independently, think positively, and be bold in innovation. After the practice of database teaching in the past two years, the feasibility and effectiveness of the research have been proved.

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