Discussion on the Teaching Reform of EIP-CDIO in the Core Basic Courses of Electronic Information in Applied Universities

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Abstract: Taking EIP-CDIO as the concept of teaching reform, project-based teaching as the premise, students'theoretical and practical abilities as the foundation, this paper changes the original syllabus, optimizes the curriculum design, formulates the teaching mode suitable for double-classroom teaching, and adopts three-level classified assessment method to improve teachers' teaching ability and students'learning ability. In order to solve the problems of less class hours and heavy tasks faced by the core basic courses of electronic information in our university.

1. Introduction

At present, in order to meet the needs of modern engineering education, many universities in China have absorbed advanced CDIO [1] engineering education concepts from Europe and the United States, and combined with the characteristics of Applied Undergraduate Talents Training in general engineering colleges, carried out the research and practice of engineering education model featuring CDIO. However, mere integration of CDIO teaching concepts into China's current higher education and teaching, there is a contradiction between the large capacity of engineering teaching content and the limited time of classroom teaching, while the training of vocational teaching is weak. With the deepening of engineering education research and practice, Shantou University introduced the EIP concept into CDIO engineering education model in 2005, thus forming EIP-CDIO [2] education concept, which has achieved remarkable results so far.

2. The Necessity of Implementing EIP-CDIO Education in Electronic Courses

2.1 The current teaching situation of electronic courses cannot meet the teaching orientation of new engineering

As an application-oriented college featuring electronic information, our school is positioned as an information industry business school. The core course of electronic information has always been the theoretical basis of our school's communication engineering, computer, automation, electronic science and technology. Although the status of these courses has never wavered since the school was founded, the teaching has never been relaxed. However, the current state of teaching effect still cannot meet the school positioning requirements put forward by the university under the new engineering background. At present, the teaching status of the core information course of electronic information in our school and the demand gap of the school in the new engineering background of our school are shown in Table 1.

Table 1 The gap between the positioning needs of new engineering in our school and the teaching status of core courses in electronic information

Our school's new engineering positioning needs	Teaching Status of Core Courses in Electronic Information
Guided by information technology ability and combining with practical engineering problems, the teaching content is designed to cultivate students'innovative spirit, management ability, business thinking and professional engineering ability requirements in the process of guiding students to plan, brew and discuss projects.	Guided by curriculum knowledge system, emphasizing on teaching and neglecting learning, practical teaching focuses on a single validation experiment, and without paying attention to the correlation between teaching content and students'actual vocational ability and engineering ability training.
For theoretical and practical teaching, classical case analysis and project-oriented teaching methods are embedded according to the situation, focusing on the cultivation of students'abilities. The whole teaching process should be reflected in the syllabus and plan.	The syllabus and plan only embody the summary of knowledge points of theory and practice teaching. There is no specific design and planning of teaching methods. Class hours and credits only include theory and practice teaching in traditional courses.
The quality evaluation system takes theory as the secondary factor and practice as the main factor. The main focus is on the application and practice of various knowledge throughout the teaching process, as well as the ability to enhance and self-grow.	At present, the learning effect is mainly based on the final exam results, and the usual learning performance is supplemented by evaluation. The evaluation content is limited to the mastery of professional knowledge.

2.2 Students' learning needs to be further improved, and teachers' teaching needs to be further strengthened.

Our students have their own characteristics, such as: students' interest in learning is not high, no pre-study before class, and not active in class, but in order to meet the teaching orientation of new engineering in our school, reflecting the role of business education, our school will increase 8 courses in business education related courses, which will inevitably reduce some professional basic courses and professional courses. The curriculum is cut, but the training ability requirements are not falling, so it is necessary to improve the students' learning ability by improving the current teaching mode. In addition, the main young teachers of the core courses of the electronic information class of our school have taught fewer courses, have less teaching methods and less teaching experience.

In conclusion, in order to conform to the background of the new engineering, insist on our school's talent training program, this paper integrates the EIP-CDIO education concept into the teaching reform of the electronic basic course to change the original syllabus, reshape the new teaching ideas, and improve the teaching ability of teachers to solve the problems faced by the current core electronic courses of our school.

3. Teaching mode based on EIP-CDIO

3.1 Revise the syllabus and re-integrate the teaching content

The EIP-CDIO stands for professional ethics, integrity, professionalism, conception, design, implementation and operation. In order to take the EIP-CDIO concept as the guide and follow the principle of “integrated engineering knowledge, engineering technology ability, professional ethics”, the core theory of electronic information core course is established in accordance with the law of internal development of engineering education under the background of new engineering in our school. when setting up the curriculum system, it is necessary to start from the current professional accomplishment and practical engineering ability, with professional ethics, personal ability and engineering knowledge application as the guide, taking the improvement of professional quality as

the core, taking the engineering ability as the basis, breaking the barriers between the courses. Guidelines for the development of syllabus based on EIP-CDIO are shown in Table 2.

Table 2 Guidelines for the Development of Teaching Syllabus Based on EIP-CDIO

First competence and knowledge requirements	Secondary competence and knowledge requirements	Unde-rstand	Master	Applic-ation
Engineering knowledge and logical reasoning ability	(1)Basic knowledge of circuit analysis	▲	♦	★
	(2)Basic Knowledge of Low Frequency Circuits	▲	♦	★
	(3)Basic Knowledge of Digital Circuit and Logic	▲	♦	★
	(4)Basic Knowledge of High Frequency Circuits	●	♦	♦
	(5)Basic Mathematical Knowledge and Thinking	●	♦	♦
Professional ethics	Having noble morality, personality, paying attention to honesty and dedication	▲	★	★
Vocational ability	(1)Ability to solve engineering problems independently	★	★	★
	(2)Ability to learn new knowledge independently	♦	★	★
	(3)Knowledge Architecture of the System	♦	♦	♦
Personal, Collaborative, Management and Practical Ability	(1)Interpersonal Communication and Communication Ability	▲	♦	♦
	(2)Teamwork ability	♦	♦	♦
	(3)Sensitive Ability of Social, Enterprise Environment	▲	♦	★
	(4)Ability to fully implement projects (conception, design, implementation and operation)	★	★	★

Description: Symbols ●, ▲, ♦, ★ are required to achieve the degree, and increase in turn.

3.2 Use the mind map to clear the ideas and use the project classification method to determine the content

When the teaching plan is formulated, the knowledge points of the electronic information core foundation course can be reorganized by means of mind mapping, combing the knowledge structure according to the characteristics of knowledge points in each basic course of electronic information. For example, for the key knowledge points in the course, you can use the point-to-face radiant mind map; for complex components or circuits that involve a wide range of aspects, you should use a concentrated focus mind map; for common application circuits based on some core devices, It is advisable to use a categorized mind map. The course system is systematized and modularized, with clear hierarchy, clear organization, strong logic and clear causality.

Based on the actual engineering design project and the current students' knowledge level, the three-level project grading is used to optimize the combination of course knowledge to confirm the final Course Contents. In the classification of three-level projects, the first level is the highest level. It is an electronic information project aiming at the positioning and talent training objectives of our school. It can combine the characteristics of the core course of electronic information, and the electronic for practical and practical applications. The second level is the intermediate level. It

contains the comprehensive knowledge points and ability requirements of the electronic information core foundation course, which can realize students' in-depth understanding and integration of relevant knowledge. The third level is the lowest level. It is the basic ability requirement of the core course of electronic information core. It contains the core knowledge points of each basic course, so that students can realize the application of course knowledge.

3.3 Double classroom teaching, six-step teaching mode

In order to solve the contradiction between the reduction of class hours and the improvement of Engineering ability, we can adopt double classroom teaching, which is traditional classroom + mobile classroom. when constructing double classes, teachers need to use advanced means and powerful functional software, such as using Camtasia studio and other software to produce micro-lesson video, and using Focusky to made PPT with rigorous ideas and rich content, In addition, we should give full play to the function of the network teaching platform, such as QQ, WeChat and other Internet+ technologies, to build the mobile core course of electronic information. and provide the students with information downloading and answering questions by using virtual community and Baidu cloud. In order to effectively carry out double classroom teaching, we can combine the teaching mode of Internet technology + BOPPPS [3]. Among them, BOPPPS teaching mode includes six steps: Bridge-in, Outcome, pre-test, Participation, post-test and summary. In the process of teaching, teachers need to combine the six steps of BOPPPS teaching mode with the double classroom reasonably, and skillfully assign each step to the traditional classroom or mobile classroom. Through the teaching model of "double classroom + six steps", teachers'teaching ability and level can be improved, students' interest in learning can be enhanced.

3.4 Three-level Classified Assessment to Ensure Teaching Quality

With the improvement of students'abilities as the center and the suitable teaching orientation as the premise, and starting from the characteristics of the three-level project teaching content, the multi-dimensional assessment methods are implemented. The assessment methods of the first level project teaching are process evaluation (40%), mutual evaluation among team members (20%) and project reply (40%). The assessment methods of the second level project teaching are theoretical achievement (50%), experimental achievement (30%) and classroom performance achievement (20%). The assessment method of the third level project teaching adopts the in-class examination results (50%) and the usual results (50%). The final score of each level is considered to be above 60. This assessment method abandons the relatively single assessment and evaluation method. The multi-dimensional assessment can realize the all-round monitoring of the teaching and learning situation of the basic course of electronic information science.

4. Conclusion

In order to meet the requirements of our school's current teaching orientation in training programs, this paper proposes the idea of EIP- CDIO, guided by mind map as knowledge collation method, using Internet + technology as the means, adopting two classroom teaching mode, and using the three level classification examination. In this way, multi-faceted teaching evaluation provides guarantee for teaching, so as to ensure that teaching costs are reduced and teaching benefits are improved.

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