

# Teaching Reform and Exploration of Web Programming Technology Course Based on CDIO Mode

Zhangbin Chen

Fuzhou University of International Studies and Trade, Changle 350202, China;

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**Abstract.** Based on the actual teaching situation of Fuzhou University of International Studies And Trade, aiming at the training of applied talents, the problems in the teaching of Web programming technology for information management and information system are based on the CDIO model. Teaching content, designing diverse assessment methods and exploring new teaching methods. From the perspective of teaching effects, students' teamwork ability and self-learning ability have been improved.

## 1. Introduction

Fuzhou University of International Studies and Trade is an applied undergraduate college, based on solid foundation, broadening the profession, attaching importance to practice and cultivating ability; in order to stimulate innovation, develop individuality, pay attention to comprehensive, improve teaching, and cultivate the principle of high-quality talents of pragmatic innovation and entrepreneurship To guide the teaching reform of the college. In recent years, with the development of the school, the teaching reform of colleges and universities has been deepened, the basic conditions of teaching have been improved, and the training programs and teaching plans have been greatly reformed. However, there is still a gap between the curriculum system and social needs. The teaching status of the professional web programming technology course of the professional management, combined with the contemporary educational standards, aims to cultivate students' practical application ability, and proposes the teaching reform based on CDIO mode in the Web programming technology course.

## 2. Theoretical Basis

The CDIO education model is an innovative model of international engineering education reform, and it is also a teaching model based on “project education and learning” and “learning by doing”. CDIO represents the four stages of Conceive, Design, Implement and Operate. It takes the cycle from project development to operation as the carrier to cultivate students' comprehensive practice and innovation ability and advocate problem-driven. Through the project through the learning process, the balance between the theoretical knowledge learning and practical ability in engineering education is solved[1]. On the subject of teaching, CDIO emphasizes the student-centered educational thoughts and guides students to take the initiative to learn. The teaching goal is mainly to cultivate students' innovative spirit, practical ability, comprehensive ability, teamwork ability, communication and expression ability; The CDIO model refers to the needs of the social industry, from which the corresponding teaching plans and syllabus are formulated, and the modular curriculum teaching meets the industry's ability requirements for students. In terms of teaching methods, CDIO adopts diversified teaching methods to realize the combination of traditional and modern technologies[2].

## 3. Web Teaching Technology Course Teaching Status and Problems Analysis

Web programming technology is a professional core course for information management and information system in our school. This course is practical. The course has a total of 64 hours of semester, the overall goal is to learn through theory and practice, to better master the knowledge of all aspects of the scripting language PHP, master the basic website development and design skills, have certain Web programming thinking ability, and be more skilled in application. The PHP language is used to program web sites. Develop technical and technical professionals with PHP website design capabilities. According to past practice teaching, most

students only have a basic knowledge of PHP grammar after the course, and they do not know how to deepen the knowledge into the code during the actual project development process. The following questions have been extracted in the course of web programming technology course:

### **3.1 The class structure is unreasonable, and the theory and practice are out of touch.**

The program is planned for 64 hours, and the ratio of theoretical and experimental courses is 1:1. For a highly operative course, there are too few experimental classes. In practical teaching, the basic grammar knowledge is mainly taught in theoretical courses. The writing of algorithms and codes leads to the boring process of students in the “listening” process. The mastery of knowledge is not solid. When practicing in class, they often feel awkward and overwhelmed. They can only do it according to the teaching materials; this leads to learning. An "infinite loop" with low efficiency and poor performance.

### **3.2 Dependence on teachers, lack of active thinking**

Throughout the course of the course, students are highly dependent on teachers. They only know the range of knowledge points taught by the teachers and do not understand the expansion of learning. Most of the existing experimental contents are case operations of knowledge points. Students will only follow the textbook. In the process of debugging the program, encountering difficulties is not to fully exert the subjective initiative to actively explore, nor to discuss cooperation with the students or to find solutions to the relevant information, but to choose to put the problem on hold. Ignore the cultivation of computational thinking and active thinking; over time, I lose the ability to analyze and solve problems[3,4].

### **3.3 Teaching content lags**

According to the traditional teaching methods, the basic data types, operators and expressions of the PHP language related to Web programming technology are introduced first, and then the grammar rules are introduced. In practice teaching, the practice tasks are generally arranged first, and then the experimental operation is performed; the existing experimental cases in the existing practice tutorials are based on the relevant operations of the corresponding chapters. The content of the course is not closely integrated with the professional characteristics of the students and the actual development and application. It is difficult to mobilize the students' interest in learning and enthusiasm for learning. Leading students to master only the basic concepts and typical cases of each chapter, I do not know why.

## **4. Curriculum Practice Teaching Reform Combined with CDIO Mode**

Combining the CDIO engineering education concept and professional characteristics, following the principle of “work project as the main line”, we can “do, learn, and learn while doing”, truly embody the teaching concept of “project-oriented, rational and integrated”. It is able to master the learning and operational skills of theoretical knowledge, work process knowledge and other related knowledge in the realization process of the work project. Aiming at the above problems in the Web programming technology course, this paper puts forward the teaching reform in the three aspects of teaching content, teaching methods and assessment methods.

### **4.1 Teaching content organization under CDIO education mode**

The teaching content organization is driven by the project as the core. Through the teacher to release the project tasks, the student group receives, organizes and completes the project tasks, thus achieving the purpose of active teaching. The Web programming technology course is 64 hours of study, which organizes the course teaching content system with a modular structure, and organically integrates various knowledge points and skill points into the project composition of a single actual website case. Among them, 32 hours of practical hours, accounting for 50% of the total hours, and 2 hours of comprehensive practical hours. The entire process increases the proportion of time spent on student practice and project conception, design, implementation, and improvement, with a greater focus on student-teacher interaction, student-assisted assistance, and project progress. The teaching content organization table shown in Table 1 is shown.

**Table 1 Teaching Content Organization Table**

Teaching unit	total period	lecture	Discussion Class	experiment	Supporting project	teaching activity
PHP opening	4	1	1	2	Project 1: Set up PHP development test server under WINDOWS	Publish project tasks,
PHP syntax basics	8	2	2	4	Project 2	Knowledge point explanation (teacher)
PHP operation database	8	2	2	4	Project 3: Staff Information System	
Web Forms and Session Technology	6	2	1	3	Project 4: User Registration Page	Project analysis and design (student)
Document and image technology	8	2	2	4	Project 5: Online network disk	Project implementation (student)
Object-Oriented Programming	8	2	2	4	Project 6: Upload test images and autoload pages	Project demonstration (student)
PDO database abstraction layer	4	1	1	2	Project 7: Article management system	Project evaluation (teacher student)
ThinkPHP framework	8	3	1	4	Comprehensive case	Perfect project (student)
Project combat - e-commerce website	10	1	1	8		

#### 4.2 Attempt to teach methods in CDIO education mode

Based on the educational theory of CDIO, it is necessary to organize teaching with the goal of cultivating practical ability. In the process of teaching, the basic policy of “taking the project as the main line, teachers as the leader, and students as the main body” is formed. Students are encouraged to study independently, teamwork, strengthen vocational ability training, and use a variety of interactive teaching methods to complete the course teaching tasks[5]. For example, the project-based teaching method, the teacher plans the project through the teaching content, analyzes, designs, implements and operates the project, so that the students can follow the operation from the beginning to the end of the whole project; the in-class and out-of-class discussion combined with the teaching method ends at the end of the project cycle. The teacher arranges the content to expand the knowledge points, so that the students can conduct self-learning. During the period, the questions can be exchanged and asked by the teacher. This allows students to further master the knowledge they have learned and achieve the integrity and systemicity of knowledge.

#### 4.3 Course evaluation method under CDIO education mode

The development of a sound assessment mechanism helps to supervise and motivate students. The Web programming technology curriculum has developed detailed assessment methods including periodic assessment, process examination, and comprehensive examination. The final score of the student is composed of 20% of the usual grades (including the performance of the subject performance), 30% of the experimental project (on the machine), and 50% of the final grade (the theoretical knowledge point). This kind of assessment method requires students to master basic theoretical knowledge and students to have certain hands-on and practical ability. The usual results focus on the student's homework completion, class performance and class attendance; the experiment (on the machine) focuses on the students' practical ability, experimental (on the machine) report completion. The course assessment method is shown in Table 2 below.

**Table 2 Course Assessment Items and Weight Allocation Table**

Course assessment type	Examination content			Weights
Phased assessment	The effect of routine assignments; classroom performance and attendance.			20%
	Special assessment of project skills (projects for each project)			
	Project unit	Completion level	Grading	
Process assessment	Each project unit is assessed separately	Level A: Reflecting the characteristics of innovation	A	30 %
		Level B: Implementing extensions	B	
		Level C: Implement basic functions	C	
Comprehensive assessment (knowledge point)	Comprehensive assessment of knowledge points of each module project			50 %
	The main assessment of theoretical knowledge, based on the theoretical knowledge of each module to conduct the final exam. Mainly based on the results of the roll.			
Total score: Phased assessment + Process assessment + Comprehensive assessment results $\geq 60$				
Note: The total score is up to 100 points.				

## 5. Conclusion

Introducing the CDIO education model into the course of Web programming technology, through the reform of the organization of teaching content, teaching methods and curriculum assessment, fully realize the student-oriented, let them do "learning and doing middle school" in the project. The educational goals have reached the goal of "knowledge, ability and quality" emphasized by CDIO[6]. From the perspective of teaching effects, students' enthusiasm and participation are enhanced, the classroom atmosphere is active, and the learning efficiency is significantly improved. At the same time, in addition to mastering the basic knowledge of the course, the students improve their practical ability and self-learning ability, the ability to solve analytical problems, and enhance teamwork and interpersonal communication skills.

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