Research on Hybrid Teaching Model of Fusion Project Leading and Flipped Classroom

Caimao Li and Shaofan Chen

ABSTRACT

Based on the theory of CDIO, this paper carries out the concept of "project leading education and learning", and studies the teaching mode combining with project leading and flipped classroom. In view of the computer specialized curriculum teaching, project lead mixed mode of teaching, according to the requirements of the project, design meet the requirements of the CDIO teaching, completely broke the original curriculum system. The practice proves that the mixed classroom teaching model led by the project is a better teaching mode, which is welcomed by students and has better teaching effect.¹

INTRODUCTION

CDIO is an advanced teaching mode based on education, which is popular in the world in recent years. It enables students to learn in an active and practical way. The CDIO mode includes Conceive, Design, Implement and Operate, and Implement the life cycle from product research and development to product operation [1].

For computer specialty course teaching, according to the basic theory of CDIO, we carry out the concept of "project lead to education and learning", look project as the main line, the CDIO ability training as the basic characteristic, use the project lead learning, teaching reflection and flip to the overall design of specific teaching course, practice CDIO core ideas effectively.

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EXISTING PROBLEMS IN PROFESSIONAL COURSE TEACHING

That traditional teaching model is not only outdated in teaching methods and weak in experimental links, but also prone to the situation of emphasizing theory over practice. The problem results are as follows [2]:

A. Students are not competent enough

The traditional teaching mode is based on the examination evaluation way, therefore, students only pay attention to study some theoretical knowledge and technology. Students are not grasp the analysis and development ability systematically, can't solve the practical problems by flexible application of knowledge, can not to make fast and efficient software project of conception design, programming implementation and deployment operation.

B. There is no clear goal of ability training

In traditional teaching, the learning goal of computer major series courses is only to clarify the learning knowledge point, but no specific ability training goal. This kind of course teaching is stuck in the most basic stage of knowledge indoctrination and is not conducive to cultivating students' ability. Therefore, the students' abilities cultivated by computer major courses should be clearly set in the teaching objectives of the course. Students' understanding of knowledge points is the basis, students' flexible application of knowledge points is the process, and students' ability improvement is the ultimate goal [2].

C. It lacks reflection and flipped learning

Reflection and reversal is an interactive teaching activity, which binds teachers and students into a community and focuses on successful sharing, cooperative learning and joint improvement between teachers and students in the community [4]. Reflection and reversal in the course teaching refers to the dialogue and discussion on the problems encountered in the course teaching, project development and implementation with students as the main body. Active introduction of effective reflection and reversal will not only promote students' deep understanding of knowledge and achieve the ultimate teaching goal, but also facilitate teachers to redesign teaching and improve teaching level.

For this reason, we redesign the teaching of computer major courses to train students with both inner ability and practical ability to learn, think and express themselves. By implementing the core spirit of CDIO, we will change the project guidance and case teaching mode taught by teachers into the CDIO project-led learning mode based on active student-oriented learning, so as to improve students' subjective initiative, creativity and self-learning ability [4,5].

MODULARIZED TEACHING GUIDED BY THE PROJECT

The basic idea of project-led teaching is to take project-oriented classroom teaching as the main line. Through the analysis of the project tasks, the project is disassembled into several sub-projects. According to the knowledge difficulty and
progressive relationship required by the sub-project development, the order of sub-project development is sorted out. Each research and development sub-project corresponds to a knowledge module, including the knowledge points and relevant basic knowledge needed for the research and development of this sub-project [6].

In teaching, knowledge learning is closely combined with the research and development of sub-projects, which requires students to learn the knowledge modules of each sub-project as well as complete the research and development of sub-projects. With the deepening of project learning, the technical level will be improved by one level for each sub-project of module learning and research and development.

The project leads the classroom teaching to build knowledge modules according to sub-projects, thus forming a new core curriculum content system based on CDIO specialty. Students can complete the research and development of corresponding sub-projects after learning a knowledge module. After completing several module studies and research and development of sub-projects, students will get a complete research and development training of a practical application project, so as to basically achieve the ability of enterprise-level project application and development.

MIXED CLASSROOM TEACHING

The mixed mode is the classroom teaching mode that combines the traditional teaching mode with the flipped classroom teaching mode. Traditional classroom teaching and flipped classroom teaching have the following different advantages and disadvantages, as shown in table I [7]:

<table>
<thead>
<tr>
<th>Classroom subject</th>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers</td>
<td>Assist the students in their studies without giving too much to them</td>
<td>Spend more time preparing teaching resources and extracurricular discussions</td>
</tr>
<tr>
<td>Students</td>
<td>Give full play to students' subjective initiative</td>
<td>Students with poor self-discipline will tend sheep</td>
</tr>
<tr>
<td>The teaching content</td>
<td>More abundant resources can meet the needs of students</td>
<td>Students with poor learning ability have difficulty grasping key points and solving difficult problems</td>
</tr>
<tr>
<td>Teaching form</td>
<td>Rich, diverse and highly interactive</td>
<td>It is difficult to manage the learning effect of each student</td>
</tr>
<tr>
<td>Management form</td>
<td>High degree of freedom</td>
<td>It is difficult to manage a small number of students</td>
</tr>
</tbody>
</table>
Flipped classroom makes full use of information technology and resources to carry out teaching. Before class, teachers provide students with teaching materials, electronic teaching plans, video and other course contents. In class, teachers mainly play the role of participants, coordinators and guides. The teaching process mainly consists of students' explanation, discussion and answering questions. After class, students can discuss and learn through the network teaching platform, and teachers can also participate in the discussion, answer questions and guide through the network teaching platform, so that teaching and learning can be everywhere at all times. Flipped classroom teaching is shown in Figure 1 [7].

The traditional classroom teaching is mainly aimed at the theoretical, basic, integrated, more content and more suitable teaching content. Flipped classroom teaching is mainly practical, small knowledge point, relatively scattered knowledge point and suitable for self-study.

Figure 1. Flipped classroom teaching.
PROJECT LEADS THE TEACHING DESIGN AND PRACTICE OF FLIPPED CLASSROOM

This paper takes the Java EE series as an example to design and practice "mixed teaching of project leadership and flip mode".

A. Set up the Java EE Curriculum Development Project

According to the professional training objectives of CDIO and the analysis of relevant projects suitable for teaching, this research selects the representative enterprise-level application project "online book purchasing system" as the learning and training program of Java EE course teaching.

THE PROJECT SPLIT

We divided the "online shopping system" project into four sub-projects: page design, website navigation, user and product management, testing and deployment. Project-led teaching is to learn the corresponding knowledge modules and complete the development tasks according to the development sequence of the four sub-projects.

PROJECT IMPLEMENTATION

First, learn and develop the knowledge module for the first subproject, "page design," which requires a "JAVA WEB development overview." Students focus on learning how to create applications, HTML and other knowledge points.

Secondly, students still need to learn the knowledge module of "CSS and JavaScript" to complete the development of "website navigation" sub-project.

Therefore, progressive transformation project leads development, gradually completed the page design, site navigation, user and commodity management, test and deployment of the development of the four components.

B. Project-Led Flipped Model Teaching

The modularized flipped teaching guided by the project requires the preparation of supporting project materials, courseware, video and other classroom teaching resources according to the teaching contents divided by the project, and the preparation of flipped classroom teaching. Then, flipped classroom teaching is carried out, including: pre-class task release, independent learning, interactive learning, and physical classroom links [7,8].
PRE-CLASS ASSIGNMENTS ARE RELEASED

Pre-class task release includes: clear learning objectives, learning tasks, pre-class form and suggested learning methods. Inform the class in advance and prepare the students.

AUTONOMOUS LEARNING

Students learn independently from the learning tasks assigned by teachers in advance, read textbooks, study plans, watch video, etc., and then complete the course exercises.

INTERACTIVE LEARNING

Interactive learning is conducive to improving teamwork and team spirit. Interactive learning needs to group students' independent learning, and each team member should work together to complete the learning tasks. It is also necessary to review the results of each group's advanced practice.

THE ENTITY CLASS

The physical class mainly tests students' learning level. In physical classroom teaching, different forms are adopted according to the flipped content. We divide the physical classroom teaching tasks into basic tasks and advanced tasks. The team members work together to complete the project tasks, present the results and answer questions from other groups.

C. Practical Feedback Analysis

The project studies the different teaching modes of the two classes. The two classes respectively adopt the traditional teaching mode and the mixed teaching mode of the project-led flipped classroom, and then investigate and analyze the teaching results. The statistical results of students' test scores in two different teaching model classes are shown in table II.

The mixed classroom teaching model led by the project not only fully absorbs the advantages of flipped classroom teaching model and traditional classroom teaching model, but also strengthens the practice of professional teaching, so as to achieve a better teaching effect.
TABLE II. RESULTS OF TRADITIONAL AND MIXED TEACHING.

<table>
<thead>
<tr>
<th></th>
<th>Number of samples</th>
<th>Average</th>
<th>The variance</th>
<th>The highest</th>
<th>The lowest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional</td>
<td>40</td>
<td>77.2</td>
<td>11.8</td>
<td>96</td>
<td>43</td>
</tr>
<tr>
<td>Mixed class</td>
<td>40</td>
<td>87.2</td>
<td>7.9</td>
<td>99</td>
<td>62</td>
</tr>
</tbody>
</table>

CONCLUSIONS

Our research not only led the project, but also adopted the mixed mode of traditional classroom and flipped classroom teaching. According to the requirements of the project, we designed the course teaching that meets the requirements of CDIO, completely breaking the original course teaching system. The practice proves that the mixed classroom teaching model led by the project is a better teaching model, which is welcomed by students and has better teaching effect.

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