Flipped Classroom Practice Under the Emerging Engineering Education
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Abstract. In the Flipped Class, students can control the learning progress according to their own situation. In this paper, the flipped model was applied in the "installation of engineering measurement and pricing" course, the flip teaching mode were designed and implemented, the course content was structured and designed in detail process and steps for the flipped classroom. The implementation of the program for the promotion of higher education were Summarized, it can provide a reference for the effective implementation of the classroom.

Introduction

Under the background of new scientific and technological revolution, new industrial revolution and new economy, Emerging Engineering Education was proposed in 2016. It is a major strategic choice for China's Engineering Education reform. Adhering to the "people-oriented, process control, results-oriented", it is imperative to promote the reform of teaching methods in the Internet era.

Flipped Class is a new teaching mode that turns the traditional classroom over, it allows students to learn the knowledge before class and complete the absorption and mastery of knowledge in the classroom. By adopting the flipped classroom teaching mode, students can control the learning progress according to their own situation. In the flipped class, Students' participation is increased, teamwork awareness is strengthened, personalized guidance is provided, and classroom discussion is concentrated.

Flipped classroom teaching mode is shown in figure 1.

![Flipped classroom teaching model](image)

Figure 1. Flipped classroom teaching model.

In this paper, the flipped classroom model is applied to teaching. Taking the course "installation engineering measurement and valuation" as an example, according to the problems in the course teaching, flipped classroom teaching mode was designed and implemented. The implementation scheme of flipped classroom is summarized to provide references for the effective implementation of flipped classroom.
The Problems in Course Teaching
In spite of the introduction of the teaching measures such as PPT and video, the students are less interested in the boring, lengthy and theoretical study, which can lead to students' poor attention and imagination, and the class is not working.

Feasibility Analysis of Flipped Classroom Model
The course is very hands-on, and the students have the ability to download and watch video, and use the Internet tools to interact with their peers and teachers. The school has an online platform, and it provides a platform for the inversion of classes.

Flipped Classroom Teaching Design
The key to the effective implementation of the flipped class is the careful design and organization of the teaching process. The teaching process of flipped classroom is shown in figure 2.

![Figure 2: The teaching process of flipped class.](image)

Preparation before Class-- Knowledge Transfer
Not all teaching contents are suitable for the flipped classroom teaching mode. Firstly, the course content is divided into small knowledge points, and the teaching video was made in this unit. Take the course "installation engineering measurement and valuation" as an example, the content structure is shown in figure 3.
In Class-teaching Activities

The core of flipped classroom is to realize the internalization of knowledge and ability expansion in class based on the theoretical knowledge of independent learning of courses. The key to flipped classroom is the careful design and effective implementation of in-class teaching activities. The teaching process in the class adopted the four-step method of "testing, homework, collaboration, demonstration," and the teaching design is in minutes. The process of teaching activities in flipped classroom is shown in table 1.

Table 1. The design of flipped classroom teaching activity.

<table>
<thead>
<tr>
<th>content</th>
<th>methods</th>
<th>requirements</th>
<th>learning subject</th>
<th>Time (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study and summarize before class</td>
<td>PPT report of the group Check self-test</td>
<td>Construct the knowledge system according to the pre-class task list and self-test questions</td>
<td>students</td>
<td>10-15</td>
</tr>
<tr>
<td></td>
<td>The teacher explains the key points</td>
<td>For the group report and self-test completion</td>
<td>teacher</td>
<td>10</td>
</tr>
<tr>
<td>test</td>
<td>PPT Paper version</td>
<td>The same difficulty as the pre-class task; Students can experience the sense of achievement in learning</td>
<td>students</td>
<td>10-20</td>
</tr>
<tr>
<td>homework</td>
<td>PPT Individual/group students</td>
<td>Higher order, you have to show the gradient</td>
<td>students</td>
<td>10-20</td>
</tr>
<tr>
<td>Collaboration and presentation</td>
<td>Group discussion</td>
<td>For the confusion in the assignment</td>
<td>students</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>teacher</td>
<td>5</td>
</tr>
</tbody>
</table>
In Class- process Evaluation

The evaluation of flipped classroom focuses on the learning process rather than just the learning results. The happy, conscious and active learning process is the essence of flipped classroom.

In the process of classroom teaching, after the test, the teacher find out the problem through the evaluation. It stimulates the enthusiasm of students and enhances their sense of achievement in the learning process.

Guarantee Measures for Effective Implementation of Flipped Classroom

(1) students' pre-class homework was used as a case to explain in class, which stimulated their enthusiasm and increased their participation;
(2) students' pre-class learning tasks were recorded into the attendance score through the learning record of online course resources;
(3) detailed design of classroom teaching activities, which were specific to the minute;
(4) process evaluation.

Summary

As a new innovative teaching mode in the information age, flipped classroom conforms to the current trend of education informatization reform in China. Education informationization has to be guided by Education concept innovation, learning and education is the core of innovation.

In the current situation which reform is urgently needed, the introduction and practice of flipped classroom can make up for the defects of college teaching to some extent.

The flip class is an accurate way to grasp the objective regularity development, to maximize the student's subjective ability, to improve the learning efficiency, and to inject new energy into the course of teaching reform.

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References


