The Application of the Flipped Classroom on Electronic Information Experiment

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Abstract. With the development of computer, multimedia and network, it is demanded to reform the traditional teaching mode. Flipped Classroom is a good method to improve the teaching quality by application of modern information technology and multimedia and micro video network teaching. The Impact of the flipped classroom on Electronic information experiment is described. The teaching mode and teaching method of electronic information experiment are summarized. It shows with the flipped classroom, the teaching effect, students' learning ability and innovation ability is improved.

Introduction

With the development of computer, multimedia and network, there are many ways to learn knowledge, such as micro video courses, multimedia online, MOOC, information on the internet and so on. It is a challenge for many teachers. Teachers need to change their teaching ideas, reform the teaching methods, adjusts the quality structure to adapt the request of today’s society.

Flipped classroom is a good method to improve the teaching quality by application of modern information technology. Due to Khan Academy’s popularity, the idea of the flipped classroom has been accepted within education circles. The number of flipped classrooms has increased.

Background

The content of electronic information experiment covers many aspects, such as electronic techniques, computer, power electronics, single chip microcomputer control technology, programmable logical controller, etc.

The class hour of Electronic information experiment is limited. Most experiment courses hours are only 16 class hours. It is hardly to accomplish the teaching task well for some comprehensive experiment and design experiment.

Teaching problems is how to take an effective way and method to increase the student’s studying passion, how to solve the conflict between limitation class hours and teaching task to improve teaching effectiveness, to improve the students' learning ability and innovation ability.

Teaching Mode of Flipped Classroom

A flipped classroom is a pedagogical model in which the typical lecture and homework elements of a course are reversed. Short video lectures or instructional materials are viewed by students at home before the class session, while in-class time is devoted to exercises, projects, or discussions [1].

Flipped classroom is an instructional approach that includes 3 components of the class: before-classroom, during-classroom, and after classroom sessions [2].Jackie Gerstein has showed the flipped classroom model. This model involves four stages: experiential engagement, concept exploration, meaning making and demonstration & application[3]. Robert Talbert has putted forward a new model, the inverter class structure is composed of only two sectors: before class and during class [4]. At “before class stage”, students will watch the video lecture and do the practice according
to the guide. At “before class stage”, there are three segments: fast light assessment, assimilation oriented problems and debrief/feedback.

Educators work on theoretical study around flipped classroom, many types teaching mode of flipped classroom have been proposed and been putted in practice and formed better results.

**Application of the Flipped Classroom**

Electronic information experiment is a strong theoretical and practical course, focus on student’s ability training. To sole the conflict between limitation class hours and teaching task, it is the best way to bring Flipped classroom teaching model based on traditional teaching model. According to the character of electronic information experiment course, it’s demanded to reverse the teaching idea and reconstruct a new teaching model that combines flipped classroom teaching mode with traditional classroom teaching mode.

**Figure 1. The flipped classroom model.**

<table>
<thead>
<tr>
<th>Before class</th>
<th>During class</th>
<th>After class</th>
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<tr>
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<td>Virtual simulation experiment</td>
<td>Solving problem</td>
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</table>

**Comprehensive competition**

Assistant

QQ, Email, chat online, etc. Feedback on problem
Adjust the key knowledge points and teaching method
According to the features and design principles of flipped classroom and the practicality features of electronic information experiment, the new teaching mode of electronic information experiment is shown in Figure 1. Flipped classroom teaching model is constructed of four sections: “Before class”, “During class”, “After class” and “Assistant”.

**At Stage of “Before Class”**
Teacher need to clarify the character and orientation of electronic information experiment, to establish the theme and main clue of the course, to design the task list and short quiz for the task, to gather the materials for the experiment, to provide the software environment for the virtual simulation experiment, to record short video tutorials. It is a complex and hard work, especially to design task list, knowledge model and record video.

Students need to complete the task according to the teacher’s guide. Students have to watch video tutorials and to learn the concepts related to the topic being covered. In this section, students should learn basic theory and knowledge, experimental methods, instrument usage, introduce of electronic Product and introductions of software.

Because the electronic information experiment has features different from other disciplines, it focused on the characteristics of train students’ practical ability, innovating ability and engineering ability, The major tasks of the third stage is inspiring and guiding students, guiding them to understand new knowledge, Review prior knowledge, then applying knowledge to analysis of the requirements of the experiment.

This stage gives students a relaxing learning environment; cultivate them to learn on their own method.

**At Stage of “During Class”**
Teacher and students will communicate face-to-face in the classroom, just like in traditional class, but it is different from traditional class. This teaching mode is the combination of flipping the classroom with the traditional classroom. Teacher exposes the key knowledge, to interact with students, according the question that feedback at stage of “Before class”. Teacher put questions to students, demonstrate the electronic product.

Students do experiment in group, answer teacher’s questions, access information, design and develop electric product, collect the data, and process data. They will experiment step by step after deep thinking.

Students have more time to practice and operate independently than traditional class owing to the flipped classroom mode. Again, they have more time to find a solution to the problem during experiment.

**At Stage of “After Class”**
Teacher summarizes the class teaching and activities, and design test questions.

Students continue course by themself, optimize design scheme, simulation, Write the experiment report, summary and reflection about the puzzling problem.

**At Stage of “Assistant”**
This stage is an auxiliary link of the flipped course. It provides a forum where problems could be discussed, ideas of teachers and students could be exchanged.

It is a feedback and adjustment link by application of modern information technology and computer technology, such as QQ, Email, chat online. Teacher adjusts the key knowledge points and teaching method according to the feedback on problem.

Comprehensive competition belongs to this stage; it is useful to stimulate student’s interests as well as appetite for knowledge.
Application Effect

The flipped classroom teaching mode has been applied in some electronic information experiment courses, such as automation engineering training, electronic products manufacturing craft. Students study hard, draw circuit diagrams, write programs, and debug electronic products in spare time. They design and manufacture a lift control device model on their own. According to the survey, student comment favorably on the flipped classroom teaching mode. With the impact of this teaching method, students’ initiative, creativity and self-determination have been strengthened.

Summary

Flipped Classroom is a good method to improve the teaching quality by using of modern information technology, multimedia and micro video network teaching. The application and impact of the flipped classroom shows the teaching effect, students’ learning ability, comprehensive ability and innovation ability is improved.

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References


