Design and Application of Computer Flip Classroom Teaching Platform

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Abstract. With the development of Internet technology, flipped classroom has gradually become popular in the United States and spread to other countries. Primary, middle and even higher schools in China are also actively exploring flipped classroom based on national conditions and school conditions, and give flipped classroom different names such as open classroom, efficient classroom, learning before teaching and so on. So what flips the flipped classroom and what subverts it is an important premise for designing the flipped classroom teaching platform and exploring this teaching mode. Based on this, this paper discusses the design and application of the computer flipped classroom teaching platform.

Keywords: Flipping Class, Platform, Teaching Design, Application

1. Introduction
In the past teaching, under the influence of the environment, teaching methods are constantly innovated, and new teaching ideas are constantly produced, and students' learning ability is becoming stronger and stronger. However, since ancient times, how to make students' learning more active and effective has always been the focus of teachers' thinking. The same teaching time, some students can master the learning content, some students do not. The birth of flipped classroom is a good compensation for the characteristics of such students. It shortens the learning time required for the key points of knowledge and allows students to complete the learning of the key points before they lose their concentration.

2. Construction of flip classroom teaching model

2.1. Flipping classroom theoretical framework
The flipped classroom teaching model divides the course into several parts and clarifies a number of small goals. Students make use of the core knowledge points in the preparation process of the teacher before class to preview, deepen the content in class, and carry out the training of knowledge application transfer under the guidance of the teacher [1]. Figure 1 shows the theoretical framework of flipped classroom constructed on a foreign website [2]. It can be seen from the framework that educational technology and learning activities are the key factors of flipped classroom, which create conditions for learners to construct personalized and information-based collaborative learning environment. To guarantee the smooth development of flipped classroom, it needs the support of information technology,
that is, hardware and software. Therefore, both teachers and students need to be able to operate the computer skillfully; Secondly, students are required to have high autonomous learning ability; Finally, teachers are required to have high educational technology competence.

Flipped classroom

Learning activities

Educational technology

Academic environment

Figure 1. Flipping the theoretical framework of the classroom

2.2. Analysis and construction of teaching model of flip classroom

American scholar Gerstein first constructed the teaching model of flipping classroom in 2011, and divided the classroom into four stages: experience learning stage, concept exploration stage, meaning construction stage and display application stage[3]. Later Tall bert also put forward the flipping classroom structure map, Chinese scholars Zeng Zhen and Zhang Jinlei also combined with their own teaching practice, constructed the flipping classroom teaching framework[4]. Based on the views of many scholars, combined with our teaching needs and learners' characteristics, we construct the flipping classroom teaching model diagram shown in figure 2.

We divide the whole process of the model into two parts: before class and in class. Among them, teachers and students undertake different tasks before class, teachers are responsible for making micro-video courses, providing abundant resources, arranging tasks, and so on. Students learn independently according to the teacher's arrangement: teachers as instructors guide students to exchange discussions and consolidate exercises[5]. This model pays attention to communication and evaluation, pays attention to cultivating students' autonomous learning ability and self-control before class, and promotes the internalization of knowledge in cooperative exploration. At the same time, teachers, as classroom instructors, students' learning helpers and resource providers, guide students to the deep thinking of inquiry, in order to tap the potential of learners' learning, give full play to learners' active learning enthusiasm, pay attention to the exploration process, and cultivate students' scientific literacy[6].

3. Design of teaching platform

3.1. System requirements analysis

According to the teaching needs, the design of the system platform should attract students to actively participate in interactive learning. Its basic requirements are simple and beautiful system interface, simple and convenient system operation, complete function, and meet the interactive needs of teachers and students. Prevent information damage and ensure safe operation of the system.

The flipping classroom teaching platform is mainly prepared before class, and is designed as the following three functional modules: administrator module is responsible for online communication, student management, user management, information modification[7]. The teacher module is responsible for online communication, curriculum management, review, upload information, assign curriculum, download information, information modification and so on. The student module is responsible for online communication, viewing results, downloading materials, completion, submitting tasks, information modification.

3.2. Selection of development tools and database systems
The system is a network version of the database software, WIN7 flagship version as the underlying platform, using ASP development tools, using version Microsoft Visual Studio 2010. Database system selection Microsoft SQL Server 2010, website page editing Dreamweaver8.0.

3.3. System design and realization; system design and implementation

The first is the system architecture design: using browser, server three-tier architecture, including presentation layer (USL), business logic layer (BLL), data access layer (DAL). The following is the data table: for the above three functional modules requirements design database main tables as shown in Table 1(similar database tables for teachers and students), Table 2, Table 3, Table 4:

Table 1. Administrator

| Field name               | Data type |
|--------------------------|-----------|
| Manager_Id(landing ID)   | int       |
| Manager_User(Login)      | varchar   |
| Manager_Pwd(Login Password) | varchar |
| Manager_Type(Account Type) | varchar |
| Manager_state(Audit status) | varchar |
| Manager_Code(number or number) | varchar |

Table 2. List of names

| Field name               | Data type |
|--------------------------|-----------|
| Subject_ID(Course Design Number) | int       |
| Subject_Name(Course Name) | varchar   |

Table 3. Online Exchange Messages

| Field name               | Data type |
|--------------------------|-----------|
| Message_ID(No.)          | int       |
| Message_Content(Message content) | varchar |
| Message_Date(release time) | Datetime |
| Message_Author(Publisher) | varchar   |
Table 4. Submission of task records

| Field name                  | Data type |
|-----------------------------|-----------|
| Task_ID(Course Name Number) | int       |
| Work_State(correction status)| varchar  |
| Work_Score(Score)           | int       |
| Work_ID(Task number)        | int       |
| Work_Date(Time of submission)| Datetime  |
| Work_File(file path)        | varchar   |
| Work_User(file path)        | varchar   |

After the curriculum is successfully downloaded, it is an effective management button, teachers, students can enter the user name and password to log in to the teaching platform, open the website home page login, login to the teaching platform, click on the online communication button, click on the input box to enter information to communicate with other members, and view the communication records. After the teacher logs in, carries on the curriculum management, clicks the curriculum management button, enters the curriculum name to click "add" can add the curriculum successfully, checks the corresponding curriculum, clicks the delete button to delete the curriculum.

4. Teaching design based on flipping classroom teaching mode

Based on the teaching model based on flipping classroom mentioned above, we take the course of "basic computer application" as an example to design the whole teaching process. First, analyze the conditions of curriculum implementation[8]. This course is taught to freshmen, with certain information acquisition ability and autonomous learning ability: the class size is 36, the students are divided into 12 groups, teachers can take into account the cooperative communication process of each group and give individualized guidance as far as possible; The school has basic hardware and software facilities. Therefore, it can ensure the effective development of flipping classroom.

4.1. Before class

Teachers should prepare teaching resources before class, and can provide some reference books, electronic courseware and teaching plans, micro video tutorials, related topic learning websites and other types of materials. We generally divide resources into two levels, basic resources and extended resources to prepare learners with different bases. Among them, the production of micro video is the core content of resource preparation. According to the classroom objectives of each class, we prepare 1 or 3 micro video for learners, each micro video only introduces one knowledge point or presents a case. And we use Camtasia studio 6 To micro video recording and post-production, the picture is clear and easy to operate. After production, upload video and other electronic resources to the Huawei disk for students to download and watch[9]. After the preparation of the resources, the teacher should clearly inform the learners of the learning tasks before class, and after the students' self-study, count the students' problems and understand the students' self-study situation in time. Students should fully understand the tasks assigned by teachers, learn the micro video content prepared by teachers, and students with ability can browse the learning expansion resources. After that, the students should sum up their knowledge and existing problems, and feedback the problems to the team leader, who will summarize the problems and feedback them to the teacher. The biggest benefit of this way is to achieve personalized learning, students can choose their own resources and self-determined learning time.
4.2. **In class**

(1) Cooperative exploratory phase

The cooperative inquiry stage is arranged by the teacher or related questions, which are completed by the group students. Students can make full use of this time to discuss problems encountered in autonomous learning with their learning partners, or to express their views according to the teacher's task.

(2) Personalized guidance phase

Personalized guidance stage for teachers to answer questions for each group process. Each group will encounter different problems in the stage of cooperative inquiry, so the teacher carries on the individualized instruction according to the student's different question, answers the doubt for each group, implements the teaching according to the aptitude.

(3) Consolidation stage

According to the teacher's individualized guidance, the students in the group sum up the harvest, consolidate the difficulties and deepen the impression.

If you have plenty of time to practice, you can communicate with other groups. Share your problems and attention with others.

(4) Summary of points identified

In the summary stage, the student representatives of several groups summarize the achievements of the course and the problems they have solved. Then the teacher focuses on the key problems and key knowledge in view of the problems in each group, systematically combs the knowledge of the whole class, causes the students' attention, and summarizes the course learning process.

(5) Feedback evaluation phase

The feedback evaluation stage is the final link of the curriculum. Teachers should evaluate the curriculum as a whole from the point of view of the students themselves, each group and the whole, pay attention to the diversity and fairness of the evaluation, and focus on motivation. After that, the teacher can guide the students to review after class. At the same time, teachers should pay attention to guide students to explore actively and cultivate the spirit of communication and cooperation, and improve students' self-study ability and problem-solving ability.

5. **Analysis of experimental process and learning effect**

5.1. *Empirical method*

This course is carried out in a controlled experiment. The subjects were freshmen of a vocational college. First of all, we tested the students in the two classes. The results of the questionnaire showed that most of the students had been exposed to computers in high school, but they were not familiar with the Office software. Second, experimental class 36 students, control class 38 students, the same number. Therefore, it meets the conditions of the control experiment[10]. With regard to the four modules of "basic computer knowledge"," Word 2003","PowerPoint 2003" and" Excel 2003" in this course, our control class is taught in the traditional way of "teacher speaking student practice ". After two and a half months, we tested the students' operation skills and investigated the students in the experimental class.

5.2. *Comparison of test results*

The test scores of the two classes are sorted from high to low, and the curve of the two classes is shown in figure 2. The average score of the experimental class was 85.44, the average score of the control class was 82.07, and the score of the experimental class was 3.37 points higher than that of the control class.
We divided the two classes into four grades: 90, 100, 80, 89, 79, 60, 69. The score distribution statistics are shown in figure 3. As you can see, the proportion of students in the four grades is 25%, 61%, 33% and 56% respectively. The proportion of students in the control class in these four grades was 53%, 55%, 95% and 26% respectively[11]. The rate of excellence above 90 was 47% higher than the control, Far higher than the control class, The ratio between 80 and 89 was 85% higher, And the ratio below 80 was 32% less than the control, There has been significant progress.

5.3. Questionnaire analysis
At the end of the course, we distributed 36 questionnaires to the students of the experimental class, in order to understand the students' attitude towards the flipping classroom teaching mode and their opinions on the implementation of the course. The survey showed that most students thought that the teaching model had aroused the enthusiasm of learning, increased communication with students and teachers, and promoted their own learning, but some students pointed out that in group cooperative learning, Some students did not actively participate, excessive number, lazy attitude affected the study of other group members[12]. In the survey, there are three main opinions on the course. First of all, teachers should upload learning resources as early as possible to facilitate students to arrange autonomous learning time; second, teachers are expected to provide more group reporting activities for students, and timely comments and encouragement; third, Net disk has certain limitation, hope can use better platform.

5.4. Summary and reflection
To sum up, the essence of flipping classroom is not what high-tech or information technology it uses, but the innovation of thinking mode. Of course, there is no perfect teaching model in the world suitable for all teaching. Although the flipping classroom has various advantages, it is found that there are some drawbacks in the process of implementation, so that its implementation process is not smooth, facing many obstacles.

First of all, under the teaching of this model, teachers upload micro-video resources and related text files to the web disk at the same time before class[13]. Therefore, the design and implementation of this course will not help students to improve their ability to extract and collect information.

Secondly, flipping the classroom teaching mode has obvious effect on the students in the middle of learning. In this mode, they will take the initiative to learn independently before class, which effectively stimulates their learning motivation. The students with good grades often assume the responsibility of team leader. This model has cultivated their sense of responsibility and organizational ability, but at present, the help to their own achievements is not obvious.
At the same time, the implementation of the flipping classroom is limited by the number of people. In this experiment, there are 3 people in a group, and the experimental class is divided into 12 groups. In the process of classroom implementation, due to the limited energy of teachers, they cannot take into account the learning situation of all groups, and can not solve all the problems in time when the content of the course is difficult, which hinders the effective implementation of the flipping classroom.

Finally, the teaching design scheme of "computer Application Foundation" course is a simple teaching scheme based on the support of our existing hardware and software. Teachers can not monitor students' self-study before class or understand the completion of students' pre-class tasks. If we can use some learning platforms to support learning, help teachers collect learners' learning information and create a cooperative environment, we believe that the effect will be more prominent. For the design of teaching mode based on flipping classroom, we are still in the preliminary research stage. We need to do more research on how to design to give full play to its advantages and avoid its disadvantages[14]. It takes time for the application of flipping classroom to popularize on a large scale, and we also need to test and break through all kinds of obstacles in practice, and do further research and exploration.

6. Conclusion
The author believes that flipped classroom is more in line with the natural way of learning and is also the trend of schools in the future. Already, schools at home and abroad are exploring it. Flipped classroom could one day become the norm in schools, colleges, and adult education. Therefore, the design and application of the computer flipped classroom teaching platform is particularly important.

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