Research on Teaching Model of the Flipped Classroom based on MOOC

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Abstract. The Flipped classroom is a powerful tool for the communion between teachers and students, which really reflects the education concept called “student-centered”. The authors put forward new teaching models of flipped classroom named “Model of substituted by MOOC videos” and “Model of the mixed classroom teaching based on MOOC” by combining MOOC and auxiliary machinery. Suitable teaching models are chosen according to the situation, it promotes the teaching effect of the flipped classroom.

1. Introduction

In the traditional classroom, the teacher teaches in class, assigns homework and students take practice after class. Students of different levels study the same courses. It ignores students' individualities, belittles practice and students' capacity building. The flipped classroom is the reversal of knowledge teaching and internalizing. It reverses the teaching structure of the traditional classroom. In flipped classroom students study by watching teaching videos before classes, while communication, discussion, projects, and experiments are carried out in classes. So students can study anytime and anywhere that suits before classes. In classes, the teacher becomes the students' coach, communicates with the students one to one, participates in students’ discussion groups, answers students' questions and gives individual instructions to improve classroom interaction and creates a student-centered classroom.

The effect of flipped classroom mainly depends on two aspects: firstly, students learn new knowledge through videos provided by teacher before classes. Do videos attract students? Are they convenient for students to watch? Are the explanations of the knowledge points thorough? All these call for higher requirements to grasp the knowledge system and to make video. Secondly, the objective is to achieve knowledge internalization through classroom activities. Kinds of classroom activities, such as cases study, projects selection, problem-solving designs, organizations of process and form of classroom activities directly affect the improvement of students' ability and the comprehension and internalization of knowledge. Therefore, it puts forward higher requests for the design of teacher's classroom activity. The internet has provided a powerful tool for the dissemination of knowledge and information, and MOOC comes [1]. MOOC facilitates the sharing of knowledge worldwide and creates opportunities for teaching and learning of different subjects. Because of the revolution of MOOC, which breaks the original educational system and organizational structure, students can choose courses all over the world. And it also provides high-quality educational resources for the teaching reform in universities. With the background of the rapid development of MOOC, it is a thorny problem that how to make full use of the resources of MOOC to overcome the limitation of the ability of teachers in local colleges. The main objective of this research is to improve the teaching effect of the flipped classroom.

2. MOOC and Flipped Classroom

2.1. The emergence and development of MOOC

Massive Open Online Course (MOOC) started in 2007, when David Wiley, professor of the University of UTAH created an Online Open Course called Intro to Open Education (INST 7150) based on Wiki. Dave Cormier and Bryan Alexander from Canada put forward MOOC in 2008[2], then George Siemens and Stephen Downes designed the first truly MOOC course: Connectivism

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and Connective Knowledge Online Course (CCK08) [2]. In 2011, Stanford put the course called Machine Learning , by Andrew Ng, online for free and more than 100,000 students from all over the world signed up for the course. In February 2012, Sebastian Thran, a computer science professor in Stanford, with his colleagues David Stevens and Mike Sokolsky, started a for-profit organization called Udacity [3]. In April 2012, Daphne Keller and Andrew Ng, professors of Stanford, started a profit aimed organization called Coursera [3].

Since May 2013, Peking University, Tsinghua University, Shanghai Jiao Tong University and Fudan University joined in the MOOC ranks. At present, more and more famous professors and scholars in the world start to design courses in this way, and students all over the world have been taking MOOCs.

2.2. The Current Research Situation of the Flipped Classroom

Foreign scholars' researches on the flipped classroom mainly focused on the exploration and application of teaching, the theoretical research of teaching methods, the comparative research with traditional teaching mode and the empirical research of teaching practice effect. Such as Bergmann J. and Sam A, who published a book -Flip Your Classroom: Reach Every Student in Every Class Every Day in 2011[4]. It mainly introduced their personal experience and summarized the theory of the flipped classroom. The domestic scholars' research on the flipped classroom has been increasing rapidly since 2012; mostly focus on the connotation and function, the teaching model, the curriculum application strategy and the empirical research of the flipped classroom.

Several typical classroom teaching models proposed by domestic and foreign scholars are as follows: Robert Talbert, professor of the Franklin Institute in the United States summed up the flipped classroom model and achieved good teaching results [5]. Domestic scholar Zeng Zhen combines Saltman's viewpoints and draws the teaching diagram. It includes three steps: firstly, learn before watching the videos; secondly, learn while watching the videos and find out the answers to the questions; thirdly, learn by applying and solving problems [6]. Zhang Jinlei constructs a flipped classroom model based on information technology, according to the connotation of the flipped classroom and theory of systematic teaching design [7]. The support of information technology and the smooth development of learning activities ensure the construction and generation of personalized collaborative learning environment [8]. However, there are few research results on how to apply high-quality MOOC resources to the classroom teaching and the second classroom, especially how to construct a new-type flipped classroom teaching model and improve the teaching effect.

3. Design of the Flipped Classroom Teaching Model Based on MOOC Resources

3.1. Principles of instructional design of flipped classroom

The flipped classrooms of Woodland High School in American, Khan Academy and Jukui Middle School of Chongqing are all influential teaching model. By comparing the components of the flipped classrooms, the principle of instructional design for the current curriculum is summed up, as shown in figure 1.

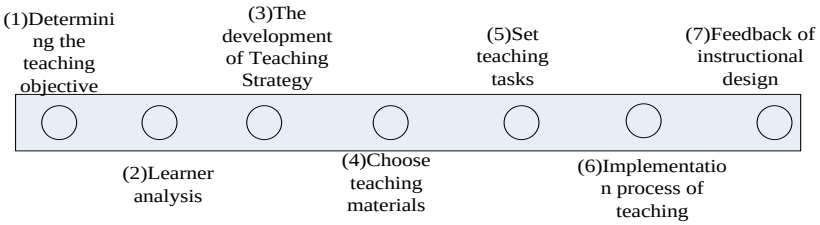

Figure 1. Principle of instructional design of flipped classroom

(1) Determining the teaching objective

The teaching objective is the incipient point and final destination of the teaching activity. It

includes two aspects: clarifying the direction of implementation of the teaching activity and the expected results of teaching.

(2) Analysis of learners

Analysis of learners includes the analyses of students' cognitive ability, basic ability, attitude and motivation, and learning situation. It provides evidence for the determination of teaching strategies.

(3) The development of teaching strategy

Teaching strategy is the optimization of three factors, including method, teaching philosophy and technical means in the process of teaching implementation. Then the combination of these factors is applied to teaching activities.

(4) Choosing teaching materials, including assistive tools for teaching.

(5) Setting tasks of teaching

Assigning a teaching task to students, which makes them think more actively while autonomic learning.

(6) Implementation of teaching

Implementation of teaching includes three parts: pre-class knowledge studying, internalizing in class and summarizing after-class.

(7) Feedback of instructional design

Feedback of instructional design is to collect data through a series of teaching evaluations to improve the teaching activities after the completion of teaching design. The feedback of instructional design does not mean the completion of teaching activities, but the beginning of the next round of teaching analysis.

3.2. Instructional model design of the flipped classroom based on MOOC resources

3.2.1. Model of substituted by MOOC videos

Combining with the domestic and foreign typical flipped classroom models, construct the model of substituted by MOOC videos, as shown in figure 2. This model includes two stages: pre-class and in-class.

Students learn MOOC videos instead of videos recorded by teachers, and finish the MOOC exercises instead of those designed by teachers. Firstly, the teacher who initiates the course issue information including course summaries, course resources and activity notifications through a MOOC central platform, which is managed and maintained by administrators. Course resources include micro-videos aimed at explanation of knowledge, aided by micro-courseware, micro-cases, micro-projects, micro-experiments and other resources, as well as micro-homework exercises and other self-directed learning activities such as online Q & A, online testing. Then, the teacher divides the course into several parts according to the characteristics, the teaching objective and the general requirements of the knowledge system of the course. Contents of the course are fragmented; micro-videos that suit can be searched on MOOC platforms. Students would be guided to register, download on the platform to join in the course, pay attention to the course information and schedule though forums, QQ or other social networking sites they could get. Students are required to follow the teacher's instructions to learn the videos and finish the exercises required.

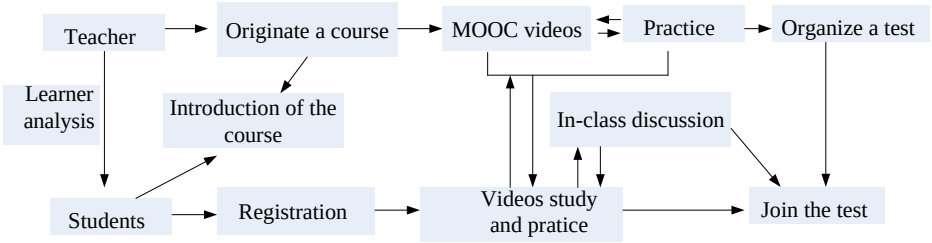

Figure 2. Model of substituted by MOOC videos

In class, students participate in the classroom activities organized by teachers to internalize the knowledge. The key to improving the efficiency of the flipped classroom is how to achieve the maximum of knowledge internalization through a classroom activity. The classroom activities designed by teachers should give full play to students' initiative. While answering the students'

questions and providing some theoretical knowledge, the teacher guides the students to think more deeply. In this way, the students are constantly promoted in the process of "studying-discussing-Q&A- innovating". The teacher induces, evaluates and summarizes the whole teaching process, and gives feedback to the next teaching design. The way of the flipped classroom increases the interaction and communication time between the teacher and students. The teacher becomes the instructor and facilitator during the learning process. Students become active participants in teaching activities. The classroom becomes the place where students carry out training projects and solve problems.

3.2.2. Model of the mixed classroom teaching based on MOOC

The model of the mixed classroom teaching integrates MOOC with the traditional classroom, which displays the advantages of MOOC and traditional classroom teaching. In this way, the teacher can not only play the role of guidance, supervision, inspiration, but also mobilize students' initiative and creativity. It ensures teaching efficiency maximal. This model provides students with the opportunity to learn online. And offline classroom activities are organized. It encourages students to participate in interactive learning actively.

3.2.2.1. Online activity

This stage is often the beginning of a course, but also the most important stage. The successful implementation of this stage will lay a solid foundation for the improvement of teaching results. It includes three steps:

(1) Preparation

Since students do not have much knowledge about the course and do not have the ability to search and mine the knowledge independently. The teacher constitutes a teaching program to clear learning goals and key points.

(2) MOOC learning

Students can take a course of MOOC anytime and anywhere by mobile devices. They make plans for the pace of learning through videos and course materials.

(3) Finish the after-school test

Students should complete the after-class test as soon as possible after completing the pre-class work.

3.2.2.2. In-class activities

In-class activities mainly include: solving difficulties in MOOC videos, completing class activities combined with the results of the handouts according to the teaching objectives. The students are divided into groups. At the same time, the teacher organizes interactive discussion. In this process, the teacher observes the performance of the students, and judges whether the teaching goal has been realized. After activities, the teacher evaluates teaching activities from the quality of learning tasks, interactive discussion and so on. During the in-class activities, the main contents of the student activities include: accomplishing tasks according to the teacher's assignment, then the team leader summarizes the situation of the task and the existing problems. Each member of the group grades for others. The group leaders give reports about the discussion and conclusions to the teachers. Finally, the teacher conducts a comprehensive evaluation according to the quality of activities and teamwork. The offline teaching process is shown in figure 3.

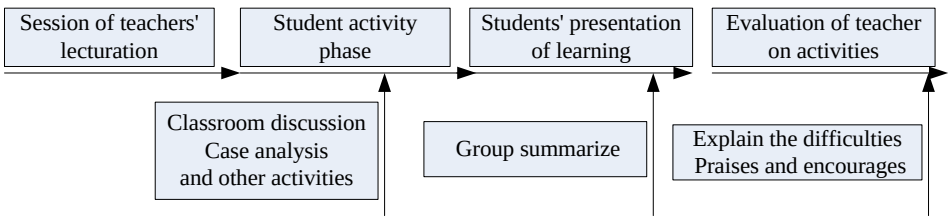

Figure 3. Offline teaching process

(1) Session of teachers' lecturation. Based on the statistical results of the evaluation and feedback of the students in the online class, the teacher focuses on the key points of this chapter, using

multimedia, blackboard writing and other forms to finish teaching contents.

(2) Students' activity phase. The specific forms of offline classroom learning activities include classroom discussion, case analysis and other activities. The teacher should guide students to think positively and express their true feelings. This form of learning discussion improves the ability to collect information and oral expression, analysis, teamwork, and so on. Online courses offer abstract learning materials, but in offline classes, students are exposed to real cases. It makes learning more concrete.

(3) Students' presentation of learning. After all the students' activities are completed, each group needs to summarize the results (this can be conducted by the group leader or by team member). The content depends on the types of activities. It could be the result of a discussion posed by the teacher, or the conclusion of a keynote speech.

(4) Evaluation of activities. In this section, the teacher explains the difficulties, praises and encourages the team and the member who does well. The teacher would make a summary of the teaching results through other forms, such as examination or Q & A in class.

3.2.2.3. After-school activities

Sometimes, the contents carried out in mixed-classroom can't meet the needs of some students. So multi-level teaching guidance modes including online consultation system, mailboxes, forum and so on through MOOCs are carried out. In this way, students can ask questions anytime, anywhere. It not only solves problems left in the class, but also extends the class discussion. It becomes more convenient for students to consolidate and deepen knowledge.

4. Conclusion

This paper combines the advantages of MOOC and flipped classroom. In this way, online and offline teaching methods are compatible. A new mixed classroom teaching model is constructed. The application of the mixed classroom teaching model on auxiliary machinery is carried out. We get conclusions as follow:

(1) Compared with traditional classroom, the mixed classroom teaching model can effectively enhance students' academic performance.

(2) Compared with traditional classroom, the mixed classroom teaching model can improve the students' ability to analyze and solve problems.

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