

Research on Flipped Classroom about Java Programming Course Based on MOOC

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Abstract: In view of the problems in the teaching of Java programming courses, based on analyzing the characteristics of MOOC and flipped classroom, the flipped classroom teaching model and learning model based on MOOC are constructed. In this paper, the implementation of the model is introduced in detail. The experiment results show that the flipped classroom based on MOOC makes students leading roles of study, and improves the students' programming skills and communication ability.

1. Introduction

MOOC(Massive Open Online Course) is a new teaching model of online course learning that has emerged in the E-Learning field in recent years. MOOC transfers the classroom teaching activities of traditional colleges and universities to the Internet of Things platform by using modern information technology and Internet platform, so that more learners can study freely in this virtual classroom. MOOC usually has no special requirements for learners. It mainly provides a general learning schedule in the form of weekly topic discussions and tests the learning effect with frequent quizzes, which are usually scored by students. The introduction of MOOC teaching mode has further promoted the reform and innovation of education and teaching in colleges and universities in China, and it has provided a platform for the presentation of ideal classroom, enriching and it makes education more open and easier for all students to get personalized education. Therefore, the biggest characteristic of MOOC is easy to use, wide coverage, rich resources and support for independent learning. However, it also has obvious defects, that is, teachers do not have direct contact with students and lack effective interaction.

Flipped Classroom is a new teaching mode, which refers to readjusting the time in and out of class ,and it transfers the decision-making power of learning from teachers to students. Its goal is to enable students to acquire more real learning through practice, and they are turned into the leading role in learning. In this teaching mode, teachers no longer take up time in class to teach information, which requires students to complete self-study by watching videos and consulting materials before class. Teachers mainly help students with problems encountered in self-study in class, or provide help to students who have difficulties in doing experiments.

The combination of MOOC and flipped classroom can not only make full use of the existing Internet platform to meet students' individual learning needs, but also use the advantages of the classroom to train students' communication and thinking ability in the classroom.

2. Problems of Traditional Teaching Methods in Java Programming Teaching

Java programming is a core professional course in the development direction of computer software in Zaozhuang University. Students are required to use Java to solve practical problems by learning this course. In the past teaching process, we mainly used the traditional teaching method, that is, teachers taught knowledge points in class, assigned homework for students to practice on the computer after class, and teachers explained and answered questions for students during the experiment in class. Because the learning ability and acceptance ability of different students are

different, teachers must unify the teaching schedule and requirements when teaching directly in class, so they can't give consideration to every student, This creates a sense of ability for students who are capable, and a loss for students who are weak. For a long time, the enthusiasm of the students is greatly affected, and the teaching effect is naturally poor, ultimately affecting the students' ability to write codes, which eventually affects the students' ability to write codes.

Based on our practical teaching experience in the past five years, we have summarized the following problems in Java programming teaching.

2.1 The students' programming level is uneven

For our school, Java programming is not the first programming language course offered, and students have already studied C programming language in the early days. Java and C language have many things in common, which may lead to the repetition of teaching materials. Some knowledges have been taught in the C programming language, students are not interested in the contents of the textbook and have no novelty. In addition, the students' programming foundation is uneven. Some students have good programming ideas and programming foundation by learning C language and have strong self-study ability. Some students are just getting started and have general programming skills. As a result, some students think that Java programming is too deep, some students think it is too shallow, and some students simply don't understand what the teacher is saying. The teacher is very difficult to handle. So it is not easy to have a good Java programming class.

2.2 The teaching hours are compressed and the teaching effect is not good

Due to the emergence of some new computer technologies, our school has continuously improved or added new teaching courses, continuously revised teaching syllabus, and continuously reduced Java programming teaching and experimental hours. Three years ago, the total teaching and experimental hours of Java programming courses were 80, and now the total hours are 48. With the gradual compression of teaching hours, many knowledge cannot be explained in detail in class, and the teaching content has also been compressed, This has led to a decline in the teaching effectiveness of Java programming courses.

3. Design of Flip Classroom Teaching Model Based on MOOC

Justin.g.Gardner pointed out that the flip class is mainly suitable for the following three courses: Firstly:Subjects that emphasize problem solving skills and critical thinking.

Secondly: Subjects that require the combination of theory and practice.

Thirdly :Experiment - based courses.

The Java programming is just in line with the above features. Therefore, we introduced the concept of MOOC and flipped classroom in the Java curriculum. We designed a teacher's teaching model based on flipped classroom mode as shown in Figure 1 and a student's learning model based on flipped classroom mode as shown in Figure 2.

The basic idea of the model design is: teachers design and make digital teaching resources on the basis of in-depth analysis of learning situation and teaching goals, and publish them on the learning platform before class. Students use the platform to carry out independent learning and complete the learning test. In the process, they can communicate and discuss with classmates and teachers on the platform, The teacher can check and evaluate students' learning on the platform. The teacher designs learning activities in class by collecting difficult problems of student feedback in the discussion area of the platform. Students focus on teaching activities designed by teachers, display their pre-class works in class, report their results in class, and discuss and explore the problems encountered in pre-class learning with teachers and classmates face-to-face.They carry out diversified learning evaluation in this process. Teachers collect evaluation feedback and carry out teaching reflection in order to revise the teaching design after class. Students review and consolidate, practice, test the learning situation, reflect on the gains and shortcomings of learning.

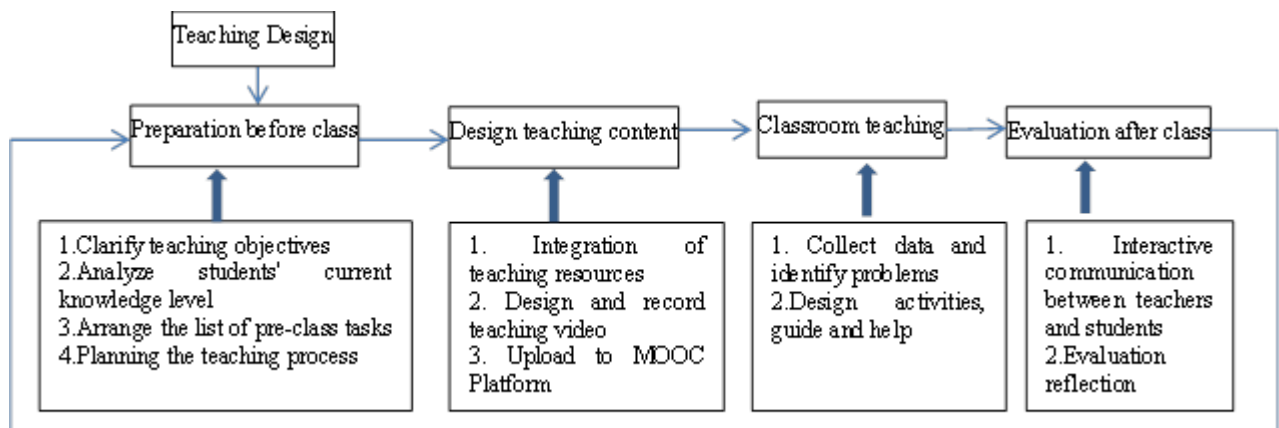


Fig. 1 Teacher's teaching model based on flipped classroom

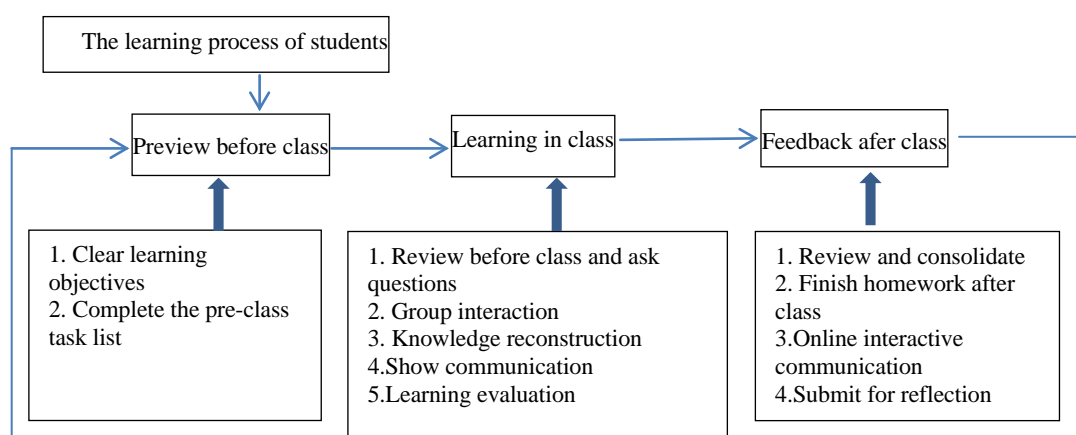


Fig. 2 Students' learning model based on flipped classroom

4. Implementation of Flip Classroom Based on MOOC

According to the design of flipped classroom teaching mode, we take the "inheritance and polymorphism of classes" section of Java programming as an example to elaborate the implementation process of the flip classroom teaching mode.

4.1 Pre - class Preparation for Teachers and Students

Teachers define the teaching goals of the course, formulate teaching tasks and plan the teaching process according to the students' existing knowledge level. Then they make video for knowledge points or knowledge groups. In addition, they also found some related videos and materials of online courses for students to view and read. As far as possible, students can have a deeper understanding of knowledge points through abundant materials.

Students should understand the teaching goals and tasks and be prepared for learning.

The teaching goal of this section is: To understand the meaning of inheritance and polymorphism; Master the definition of subclass; Master the key points of method rewriting and the implementation of polymorphism.

Teaching Tasks of this section is: Release "Learning Task List" before class; Submit the assignments assigned in the class after the class.

In addition, in order to urge the students to watch the video, we arranged an intellectual test in the middle of the video, mainly aiming at understanding the basic concepts. The types of questions are usually judgment questions and filled-in questions.

Test questions:

Judgment: All classes are obtained by directly or indirectly inheriting Java. lang. object.

Fill - in: The keyword used to call the overridden parent class method in the subclass is _____.

homework:

Using inheritance and polymorphism to define and test people, students and teachers.

After preparing these materials, the teacher released them to the MOOC platform in advance for students to learn.

4.2 Organization of Classroom Activities

According to the homework submitted by students online learning, the teacher collects and organizes the "problem sets" to design classroom teaching.

Classroom activities are generally divided into three parts.

The first part is: At the beginning of the course, we ask some students to explain the knowledge test questions assigned before class, The purpose is to ensure that students have seen the relevant videos and urge them to implement the pre-class learning. This part takes about 5 - 10 minutes. This part of the explanation combines the completion of the homework before the class and will be included in the students' total scores in a certain proportion.

The second part is: Programming practice. The teacher arranges programming exercises and students complete them independently in class. This part of the programming exercises is a variation of the programming exercises and examples arranged in the video, and it will not be very difficult. Students who have studied the video carefully can do so.

The homework completed in this part of the classroom will be submitted after class, and the teacher will give grade after correcting it and count it into the total grade.

The third part is: Classroom discussion. The problems discussed in the classroom are mainly derived from three aspects: First, teachers are carefully designed according to the content of the course; The second is to collect the problems encountered by students in the online learning process, and the third is the problems raised by students in programming practice.

The discussion generally requires students to express their opinions in groups. For the conclusions reached after the group discussion, the teacher randomly selects the members of the group to answer to ensure that everyone can participate in the discussion. The performance of the classroom discussion is also counted as the final result.

4.3 Tasks after Class

In addition to completing the programming tasks assigned in the class, students also need to complete the programming tasks assigned by the teachers in groups. There are many options here. Each group can choose its own topic, but it is not allowed to choose one of them. Students can communicate with each other in the process of completion, but they cannot copy. After the small projects are submitted within a given time, they will be assessed in the form of a reply in class. Each group writes software development documents, makes slides, and teachers randomly select members from the group to present the software and explain it. Teachers and students from other groups asked questions on the spot and scored according to software performance and defense. Project completion points account for the largest proportion in the final assessment.

4.4 Summary Evaluation

After class, students independently complete their assignments according to the knowledge points that teachers guide and summarize. And students reflect on and improve their own learning situation. Teachers can assess students' basic knowledge and practical programming ability from the aspects of students' learning progress, homework submission time, submission quality, speaking times in class, speaking quality and final results. During the whole teaching process, teachers can dynamically adjust the teaching progress according to the students' situation.

5. Analysis of the Achievements and Existing Problems

After implementing the curriculum reform, we conducted a questionnaire survey for students majoring in network engineering and computer science and technology. The survey results show that

the teaching model can enable students to make better use of their spare time and combine the individual lectures of teachers to study the basic knowledge of the curriculum, so that teachers can pay more attention to the training of students' programming practice ability. This is of great significance for training applied software developers.

However, there are still some problems in the course implementation:

First, some students are accustomed to the traditional teaching mode and are not good at asking questions. They cannot ask questions during watching videos and programming.

Second, the initiative of learning is not strong. Although we have adopted a series of assessment methods to urge them to learn, some students are too dependent on other members of the project team and are not good at thinking independently.

Third, students' expression ability needs to be strengthened. Some students can write programs, but they are not good at explaining in the defense link, which is also a necessary skill for software development engineers.

The above problems have a direct impact on the effect of the course and the students' love for the course.

6. Conclusion

This paper analyzes the application of flipped classroom in the teaching of Java Programming, and constructs the Teacher's teaching model and Students' learning model, and illustrates the concrete implementation process with the knowledge point of "class inheritance and polymorphism" in Java Programming as an example. This model changes the traditional teaching method of Java programming class, so that students can watch the teacher's explanation at home or after class. In class, teachers and students meet face to face and complete homework. Through the Internet, students can communicate with their peers and teachers at almost anytime and anywhere.

Practice shows that the flipped classroom teaching model based on MOOC can not only meet students' individual needs, mobilize students' learning enthusiasm and improve teaching effect, but also help improve students' ability to learn independently and cooperatively and think independently. The students' ability to analyze and solve problems will also be improved. At the same time, this mode also provides valuable reference for the teaching reform of computer language courses under the information environment.

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