

# *Application of MOOC+ Flipped Classroom in the Teaching of Basic Programming Course*

Qiuli Yang, Xia Hang, Na Zhou

*Haikou University of Economics, Haikou, 571127, China*

**Keywords:** MOOC+Flipped Classroom; Programming; Course Teaching; Application

**Abstract:** MOOC is a large-scale open network course, which has received more attention in the development of college education in recent years. By combining MOOC teaching mode with flipped classroom, and applying it to the teaching of basic programming courses, we can achieve better teaching effect. The article explores the teaching method of integration of the two, and analyzes the reform and development path of basic curriculum teaching from different perspectives such as curriculum teaching and assessment methods. It also hopes that the content of the article can bring some reference value to the current basic curriculum teaching of program design.

## 1. Introduction

The mixed classroom teaching mode of MOOC+flipped classroom has been favored by many educators, and has improved the teaching efficiency of the classroom without being limited by time, space and place. As long as students have the network, they can understand the learning content of professional courses through online learning, which is particularly in line with the current development characteristics of students' fragmented time. The MOOC+flipped classroom teaching mode has opened up the career of students, enriched the teaching content and teaching methods, so as to effectively stimulate students' interest in learning, and better realize the cultivation of students' independent learning and innovation ability, which conforms to the teaching characteristics of the current basic program design curriculum.

## 2. Analysis on the characteristics of MOOC+flipped classroom teaching mode

Since 2012, MOOC has developed rapidly and has been widely used in higher education, basic education and vocational education. MOOC is a brand new education method, which has promoted the reform and development of education. Reviewing the development process of MOOC, it contains two different teaching ideas and characteristics, cMOOC and xMOOC, and xMOOC is a brand new MOOC method. The learning cycle of MOOC is shorter than that of traditional classroom teaching, and there is time for preview. Students should be familiar with the introduction and arrangement of the course in advance. [1] The MOOC platform can provide a variety of curriculum elements in the process of teaching implementation, including curriculum videos, discussion areas, electronic textbooks, examinations, etc. In class, teachers should often release courseware, homework, videos, etc. Students can learn and communicate through online and offline discussion groups. "Mutual

learning" is a teaching mode. The teacher divides the students into several mutual help groups. Under the guidance of the teacher, the students ask questions, discuss, communicate and brainstorm with each other.

Secondly, students must complete their homework after class and obtain it through online automatic scoring, self-evaluation scoring and peer evaluation. When evaluating others' homework, there should be clear and specific regulations and requirements, and different evaluation standards should be set according to different homework contents, so that students can continuously accumulate and consolidate their knowledge and experience when evaluating others' homework. MOOC is a self-conscious, active and self-organized learning method. The most prominent feature of MOOC teaching is that students can make their own choices. Students can arrange their studies according to their own interests and learning progress, or they can quit at any time. Because of the particularity of MOOC, we often encounter various problems when we use MOOC. As far as colleges and universities are concerned, due to the differences between schools, courses and students, the open "MOOC" courses cannot fully meet the needs of students. Therefore, MOOC courses must be designed according to the specific conditions of courses and students, so as to develop strengths and circumvent weaknesses, and constantly improve the teaching quality.

### **3. Common problems in the teaching of the basic course of programming**

Based on the analysis of the problems existing in the basic teaching of the current professional courses of programming, it is found that more teaching content is biased towards theoretical knowledge, the content is boring and single, and students are not interested enough in learning. [2]Especially for many beginners, the professional courses of program design are very difficult. If teachers describe them in simple language, students will feel more pressure to learn. Once students have problems in a certain link, their knowledge logic cannot be connected, which may lead to more pain in subsequent learning.

Secondly, the teaching mode is relatively simple and the teaching means are relatively old. The traditional classroom mainly adopts the multimedia teaching method. The teachers cooperate with the multimedia technology to demonstrate and explain some programs. This spoon feeding teaching method mainly focuses on teachers. The students can't concentrate, their participation is low, and their motivation for learning is low.

Finally, in teaching activities, theory and practice are separated from each other, and the knowledge that students learn cannot be applied in time, which cannot achieve the educational goal of applying what they have learned. Some majors even do not even have too many experiments, students can only stay in the textbook knowledge learning, the knowledge learned is only the basic educational content. The knowledge structure of students lags behind the current social needs, and the student knowledge system is updated slowly.

### **4. Application of MOOC+flipped classroom in the teaching of basic programming course**

By adopting the mixed teaching mode of MOOC+flipped classroom, students' learning ability is strengthened, and more students can learn the basic professional courses of program design in their spare time. Collect and sort out relevant learning materials through the network system, and feedback the problems that they do not understand to the teachers to complete the problem communication in the shortest time, so as to realize the students' personality learning, growth and development, help each student find their own learning weaknesses, and improve the students' comprehensive quality and professional ability[3].

#### **4.1. Application of video resources**

Short video is an important application point of the current MOOC teaching mode. Students can receive and master a little knowledge in the short video learning. The video duration is about 10 minutes to ensure students' concentration. When playing the video, the teacher will insert some test questions so that students can better understand what they have learned and avoid boredom and distraction. In order to reflect the characteristics of short video online teaching, the video content should also include some application examples to arouse students' interest. The teaching video should be recorded by the teacher himself. Attention should be paid to the dynamic display of the teaching content in the teaching, so that students can actively participate in, follow the teacher's thoughts, and control the body language and speech speed, so that students can have more understanding of the video content.

#### **4.2. Application of interactive design**

Under the MOOC+flipped classroom teaching mode, the interaction mode that teachers should design is discussion area and study group. In the discussion area, students can put forward questions, leave messages, and express their views. Teachers and students can also discuss and communicate in the discussion area. The topic and direction of discussion is determined by teachers according to students' needs and understanding of the course. Although there is no need to limit the time and number of classes, teachers will evaluate the performance of the discussion group and determine the teacher's score according to the teacher's score.

#### **4.3. Application of classroom teaching organization**

In the classroom, teachers should adhere to the principle of "more encouragement, less criticism" to stimulate students' enthusiasm for learning, cultivate their logical thinking, and improve the teaching effect. The problems, reference materials and solutions that students encounter in their study can be exchanged and discussed together. The teacher will summarize and improve the problems in MOOC through group discussion, and students can better understand their knowledge and solve some difficult problems. In class, students can ask questions at will. Let students ask the questions they want first, and then let other students answer them. During this period, students can read books, consult relevant information through the Internet, and further review through MOOC. By using the closed book online random test, students can find their own learning problems, and teachers can immediately understand the students' learning situation. The teacher will analyze and explain the difficulties students encounter in autonomous learning in detail, and add more interesting topics to enhance students' programming ability.

#### **4.4. MOOC+flipped classroom teaching improvement ideas**

The result display of the flipped classroom is the embodiment of students' learning, speech and performance abilities. The integration of ideological and political elements into the flipped classroom will certainly play a great role in promoting the flipped classroom. Professional courses have their own characteristics. The purpose is to organically combine the education of subjects and courses, so as to improve the quality of classroom teaching and achieve the two-way unity of teaching and education. Teachers should break through the existing thinking structure in the whole process before, during and after class, and incorporate values, methodologies and other ideological content into the teaching content, so as to achieve the effective teaching goal of establishing morality and cultivating people.

In the classroom teaching, after the students have finished the answers to the questions and the homework reports, the teacher will evaluate the students and evaluate each other with other students to achieve better teaching results. In the implementation of the "flipped classroom" course " in Fundamentals of Program Design, students are divided into different groups, and representatives are selected to evaluate their advantages and disadvantages according to the scoring between groups and mass voting. Students regard it as a good evaluation mechanism to highlight students' professional ability and better remember knowledge points.

#### **4.5. Students' program programming design ability training**

The learning of programming language is to make the programming language better understand and use programming tools to solve problems. In teaching and learning, teachers should guide students to form a good learning state, and give full play to the advantages of MOOC course teaching. In terms of grammar, we should help students to form a better learning ability. Basic programming courses usually take no more than 72 credit hours, or even less than 40 credit hours. In order to teach students the key points and teaching methods, teachers should choose the "intensive" way. Because college students have a certain self-study ability, and most of them have a certain knowledge of grammar, the grammar should be simplified as far as possible, without spending too much time.

Secondly, pay attention to students' ability to analyze and solve problems. In most courses, a large amount of time should be used to analyze and explain the examples similar to the practical problems. The teacher can demonstrate and analyze, after the students master the basic knowledge, and then let the students express their views. In general, there are many different solutions, can let the students discuss together, compare the advantages and disadvantages of various methods, to the excellent students, to the poor students to reward; let the students say their own views. In this way, it can not only consolidate the knowledge learned, but also activate the classroom atmosphere, and overcome the fear after repeated practice, and naturally learn to analyze and solve problems. In teaching, teachers should pay attention to guide students to analyze it step by step.

Moreover, the teacher explained the steps of the algorithm, and detailed the algorithm used in the problem. Teachers analyze, summarize and define the variables to be used in the program; summarize, organize and write the steps; through this method, students can understand the problems that the teacher cannot understand in teaching, deal with them, and gradually develop the ability to analyze and solve the problems. With the skills of analyzing and solving problems, you have the skills of programming. In this process, teachers can cultivate excellent program design style. A good programming style is to be organized and orderly in the writing process. Teachers should pay attention to the good style in the process of writing, so that students can get a good influence. This means that a good programming style should start with the teacher.

In the classroom to try a new way of teaching, namely "class" and "classroom", students after class through the MOOC way to learn new knowledge or content, teachers will give students on some important knowledge, and guide students to discuss, practice, or specifically, after the students saw the MOOC video and preview, can be arranged as follows. The first section can be divided into six parts: (1) the teacher teaches key knowledge and questions; (2) let the students answer questions in class and tell their learning experience; (3) the other students make comments; (4) all the students participate in the group discussion and ask questions and give answers; (5) the teacher summarizes and comments the students based on the discussion; (6) let the other students comment on the last task, and the teacher will arrange new tasks. The second class is based on practical practice. The teacher arranges classroom practice and practical teaching. The students can ask questions freely, and the teacher will give one-on-one tutoring. In the last ten minutes, the leaders of each study group will report the learning and problems encountered to everyone. The performance of each class is

accounted for in the daily grades of this course.

In teaching, teachers should pay more attention to experimental teaching, change the traditional teaching mode with teaching as the main and experiment as the auxiliary, adopt the way of "intensive speaking and more practice", increase the experiment time, adjust the experiment content and improve the quality of experiment. For students, the textbook is very abstract, and the program is also written by others. It is impossible to rely on memory alone. After the experiment, the written software on the computer debugging, if you can get the right results, can make students get pleasure and pride, without the teacher forced, can get the fun of learning. Some examples can be added. Computer teaching should be practice-centered and try to be combined with students' professional skills. The focus of programming language course is basic knowledge. If professional knowledge can be integrated into the course and students are encouraged to conduct relevant course design, they can achieve the purpose of applying what they have learned and killing two birds with one stone.

## 5. Conclusion

In summary, the MOOC+flipped classroom teaching mode is applied to the basic program design course. On the carrier of course implementation, specific teaching platforms can be used for interaction. Realize the "flipped classroom", "assignment", "report" and other functions of the classroom system, and build an effective carrier of "flipped classroom" teaching. In addition, this online teaching mode, including students' homework comments, unit summaries and other parts can also be realized, which meets the needs of the current educational reform.

## Acknowledgement

Fund Project: General Project of Research on Teaching Reform and Practice of Basic Courses of Applied Undergraduate Program Design Based on MOOC and Flipped classroom in Hainan Province in 2022 (Project No.: Hnjg2022-110).

## References

- [1] Zhou W, Zheng Y, Ma Yu, Tan Z. Research on mixed teaching mode based on "MOOC+flipped classroom+onlineJudge"—taking the national first-class undergraduate course as an example [J]. *Intelligent computer and application* 2021; 11(12):175-178.
- [2] Zhang X. Mooc's C++programming course flipped classroom teaching reform and exploration [J]. *Modern vocational education* 2021;(03):232-233.
- [3] Lai X, Zhao H, Liu Y, Cheng L. Exploration and practice of mixed reaching mode for programming courses [J]. *Fujian computer* 2020;36(10):157-160.