Research and Application of Group Cooperative Learning + SPOC Mixed Teaching in Programming Course

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**Abstract.** In the course of programming, the author used SPOC teaching mode to carry out teaching activities, improve student achievement, but the results were polarized. In order to avoid polarization and improve the performance of each student, this paper proposes an improvement scheme: combining group learning and SPOC to carry out mixed teaching. Before class, students take a group study on the BB network platform. In the classroom, each group of students under the guidance of teachers to carry out project-style teaching and a variety of ways to mix the flip classroom teaching mode. After teaching practice, this teaching model has a better teaching effect, and in many courses are applicable, it is worth promoting.

**Introduction**

In recent years, MOOC (Massive Open Online Courses) has developed rapidly, MOOC has been well known. People can share quality teaching resources through MOOC, and can learn at any time and any place. MOOC has changed people's learning styles and learning habits. In the United States, several top universities have launched a completely free MOOC platform, such as coursera, EDX and Udacity. MOOC has been favorable for people. In China, the more famous MOOC platform including Tsinghua University school online, love courses and the Chinese University MOOC and so on. However, MOOC also has some shortcomings, such as the number of participants is very large, but the completion rate is low. In order to make up for the defects of MOOC, SPOC (Small Private Online Course) was born. Compared with SPOC and MOOC, SPOC is more suitable for classroom teaching.

In the course of programming, the author used SPOC teaching mode to carry out teaching activities to improve student achievement, but the results were polarized. In order to avoid polarization and improve the performance of each student, this paper proposes a mixed teaching model combining group learning and SPOC, and conducts online self-study on BlackBoard platform and offline classroom teaching activities. After teaching practice, this teaching model works well.

**SPOC**

SPOC (Small Private Online Course) Small-scale restrictive online course was first proposed and used by Professor Armando Fox of the University of California at Berkeley. SPOC and MOOC compared to the number of students in general dozens to hundreds, is small. In the SPOC, choose to meet the conditions of students to participate in the course, not everyone can participate. Compared to the Open of the MOOC course, SPOC is private.

There are two main forms of the current SPOC course. The first, for students in the school to carry out SPOC teaching. Students have the same knowledge structure and foundation. Students use the online MOOC program for extracurricular learning. Before the class, students watch the video, read the information, learn the knowledge points. In the classroom, the teacher learns about the student's learning by asking questions. Teachers according to the degree of knowledge of students to start
discussions and difficult Q & A. And guide students to understand frontier knowledge. So as to master the knowledge more deeply. The whole teaching process is to flip the classroom teaching mode. Second, the students come from the world, but need to choose hundreds of people from the applicant according to some conditions to participate in the course. Participants are required to ensure that they are able to complete their homework on time. The course team will conduct online questions and instructions for students' questions. After the course is completed, the examiner will obtain a certificate.

Compared with SPOC and MOOC, there are many advantages.

a) SPOC courses have the same level of students, and the difficulty of teaching content is suitable for students.

b) SPOC course teaching effect is better, all students can finish the course from beginning to end.

c) SPOC courses require teachers to teach online and classroom, teachers are more likely to master the student's learning effect. The SPOC program provides teachers with more counseling students and face-to-face communication with students.

d) The number of students in the SPOC program is small and it is easy to teach individually according to the characteristics of the students. Teachers according to the student's learning effect, divided into different levels of teaching. So that each student has progress.

**Group Cooperative Learning**

At present, the group of cooperative learning is the world's many countries generally adopted a creative teaching theory. Group cooperative learning is based on the cooperative learning group as the basic form, the system uses the interaction between the dynamic factors in teaching, and promote the students' learning effect. Group cooperative learning through the results of the group as the evaluation criteria, is a progressive for each student teaching activities.

An important step in group learning is grouping. Teachers need to be excellent students, ordinary students and poor students in the same group. The members of the group are different in character, some members are extroverted active, and some members are introverted. At the same time, the members of the group's gender is different, there are boys and girls. Through grouping, in teaching activities by group to carry out teaching activities. Group cooperative learning will not only help each group to compete, but also help each group to help each other. Each group of excellent students can counseling, to help poor students, so that each student has progress.

**Group Cooperation Learning + SPOC Teaching Process**

In the course of programming, the author through the BB platform for fixed class students to carry out SPOC flip classroom. The results show that the average student achievement is improved obviously. However, new problems have also been found: student achievement is polarized. Excellent grades are very good, poor grades are very low grades. Summary of reasons, because poor students lack of self-control ability, can not be completed on time pre-class study, or pre-class study is very difficult, lack of help. For a long time, the problem has accumulated and the results have become worse. And excellent students not only easy to learn the specified content, but also in-depth study, learning scores become better and better.

In order to solve the problem of polarization, the author combines the group cooperative learning and SPOC to carry out teaching. The teacher examines the group's learning situation and encourages students to collaborate in the group. This method avoided the polarization of student achievement. Because in order not to affect the team scores, excellent students can help more poor students to solve academic performance and affect the results of other students, more willing to study hard. So it can improve academic performance and reduce the occurrence of polarization. In addition, in the teaching of programming courses, students often need to complete the project case. Group cooperative learning will greatly improve the quality of the project.

Group cooperative learning + SPOC mixed flip classroom teaching process shown in Figure 1:
In Figure 1, the teacher needs to know the student situation and has group before the first class. Each group is fixed. Before each class, students need to conduct online learning, according to the list of teachers to provide learning, students watch the video, learn documents, read the information, complete pre-class test and so on. The teacher passes the grade center to check the student's pre-class test. In the classroom, the teacher asked the students of each group to get the pre-class learning effect. Teachers summed up the unit knowledge points, explain the difficulties, answer questions, and further consolidate the knowledge learned. Teachers make project requirements, and each group can complete different projects. During the process of completing the project, each group discusses the project functions, implementation steps, technical routes, programming implementation and so on. When the student has a problem, the teacher immediately instructs. After completing the project, each group shows the completion of the results, teachers and other group evaluation project performance, given the perfect advice. After the class, each group is to improve the project and submit, and complete the homework. The whole process back to pre-class state, continue to cycle. This is the group to learn + SPOC mixed flip classroom teaching process.

Deploy the Course on the BlackBoard Platform

BB (BlackBoard) platform is the United States BlackBoard company developed online teaching management platform. Teachers can set up courses on BB, students choose courses for independent study. Teachers and students use BB platform for teaching activities. More than 100 countries around the world use the BB platform.

The programming course uses the BB platform to carry out group collaborative learning and SPOC rollover classes. In the BB platform to establish pre-class, classroom teaching system. In accordance with the teaching plan, the weekly pre-class video, reading materials, pre-class test, project introduction, project difficulty and other teaching materials uploaded to the BB platform. And grouped in the BB platform, each group members in their own group can exchange discussion, upload files, share learning experience. Other groups do not have permission to view. When there are problems, you can ask questions in the BB platform forum, teachers or other students can be timely answer.

Throughout the BB platform, teachers can earn student achievement through the Achievement Center and can view the number of times a student watches and reads, and can view the course's visits. The teacher clearly gets the learning status of each student and each group. The BB platform makes it easier for teachers to get students to learn the state.
Summary

In the course of programming, this paper carries out group cooperative learning and SPOC combined teaching practice, combined with project-based teaching and other methods of mixed flip teaching, effectively avoiding the student achievement of the polarization, greatly improved student achievement And learning initiative and initiative. Through the project-based teaching, making the students' practical ability and teamwork ability has also been improved. At the same time, this teaching model can deepen the exchange and cooperation between students. It has a reference and worthy of promotion.

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References


