

Research on the "SPOC+BYOD" Hybrid Flipped Classroom Teaching Mode under the Orientation of Engineering Thinking

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Abstract: Aiming at the current situation and existing problems of computer professional courses in applied universities, this paper proposes a hybrid flipped classroom teaching model based on "SPOC+BYOD", and constructs a hybrid teaching model that combines the advantages of timely interaction in offline classrooms with the advantages of SPOC resources. Under the guidance of engineering thinking, the concept of hybrid flipped classroom teaching is integrated into project teaching, and the hybrid flipped classroom teaching model based on "SPOC+BYOD" is reconstructed, which organically relates pre-class preparation, in-class discussion, and after-class reflection and evaluation. Teaching practice shows that the new teaching model has effectively stimulated students' interest in learning and effectively improved the quality of teaching.

1. Introduction

With the progress of society, the research center of computer science has begun to shift from "algorithm" and "program" to "system" level, and higher requirements are put forward for the goal of training computer professionals in the system ability. Computer majors in application-oriented universities, how to improve students' system analysis and comprehensive application capabilities on the basis of strengthening students' engineering thinking in order to improve the competitiveness of computer majors in application-oriented universities has become a very important issue in the field of computer education.

Compared with 985 college students, students in applied colleges have weaker self-discipline and lack of motivation to learn. However, computer majors generally have problems such as large curriculum content, fewer hours of study, and strong practicality. Under the direction of engineering thinking, integrating the SPOC+BYOD hybrid flipped classroom teaching innovation model into applied university curriculum teaching is conducive to cultivating students' independent learning ability, practical operation ability, and system analysis ability, and promotes the engineering thinking of computer majors in applied universities. Cultivation of system capabilities

2. SPOC

With the popularization of high-quality video open courses and NetEase open courses, the form of online learning has become more and more popular and gradually evolved into a large-scale open online course, namely MOOC[1-2]. MOOC is rich in learning resources, low entry barriers, and the number of registered students is as high as millions, but there are problems with high registration rates and low pass rates [3]. Students simply watch online video learning, and lack an environment for efficient communication and interaction between teachers and students. In response to the shortcomings of MOOC, SPOC has developed a "school-based" learning platform based on MOOC, and a new teaching model that combines online course resources with classroom teaching and "online and offline". SPOC can Create a better teaching and learning experience, which is well recognized by the academic and educational circles [4-6].

Bring Your Own Device (Bring Your Own Device), referred to as BYOD, refers to the practice of people using laptops, smart phones, iPads and other mobile devices to connect to the network to carry

out mobile office or mobile learning [7], and its popularity is based on SPOC The implementation of the hybrid flipped classroom provides good hardware conditions.

Flipped classroom is a new type of teaching mode that subverts the "one application" in the traditional classroom and emphasizes "individual learning". It "flipped" the standard classroom. Let students watch online resources before class, and conduct student-centered exploration and problem-solving learning activities during class. Flipped classroom as one of the applications of blended learning has gained popularity in the past few years.

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The research on the "SPOC+BYOD" hybrid flipped classroom teaching mode under the direction of engineering thinking belongs to the research category of the university flipped classroom teaching based on SPOC.

3. "SPOC+BYOD" hybrid flipped classroom teaching mode

This research takes computer teaching in applied universities as the main foothold, and under the guidance of engineering thinking, constructs a hybrid flipped classroom teaching model based on "SPOC+BYOD". The model includes: formulating engineering thinking-oriented teaching goals, constructing and publishing SPOC resources, student self-learning, online collaborative learning, feedback learning in the pre-class stage; BYOD interaction, group collaborative inquiry and discussion projects, personalized guidance, group mutual evaluation and The in-class stage of teacher evaluation; relying on the SPOC platform and BYOD to carry out learning effect testing, learning achievement improvement and mutual evaluation exchanges, review of key and difficult knowledge, and after-class reflection evaluation stage of intelligent online evaluation.

3.1 Teaching model

The model is shown in Figure 1. The entire teaching process is divided into three parts: pre-class, in-class, and after-class. The pre-class online preparation stage, the in-class and offline seminar and guidance stage, and the after-class online evaluation and expansion stage.

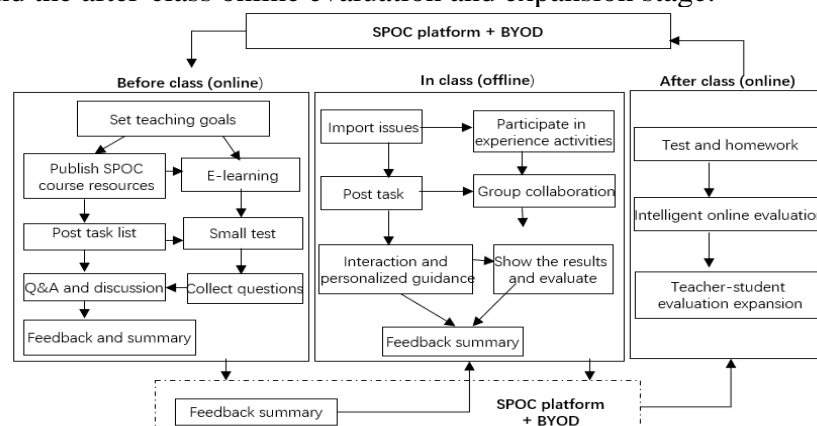


Figure 1. Engineering thinking-oriented hybrid flipped classroom teaching model based on "SPOC+BYOD"

Students learn independently of SPOC resources such as courseware, micro-classes, and project videos in the platform before class to reduce the time for teachers to teach in class; develop and

discuss real enterprise projects in class, and rely on the physical classroom teaching environment and BYOD to participate in a variety of teaching. The activity completes the internalization of knowledge; after class, relying on the SPOC platform and BYOD to conduct learning effect testing, Improvement of learning outcomes and mutual evaluation exchanges. The "SPOC+BYOD" hybrid flipped classroom teaching model is shown in the figure 1.

3.2 Teaching implementation

Under the guidance of engineering thinking, the research team created the SPOC course "Database Principles and Applications" that is in line with the characteristics of the school's teaching and students. With the support of SPOC+BYOD, the hybrid flipped classroom teaching concept was integrated into the project teaching, and the offline A hybrid teaching model that combines the advantages of real-time interaction in the physical classroom with the resource advantages of SPOC.

Applying this teaching model to the course teaching process of "Database Principles and Applications", a new teaching resource of "Database Principles and Applications" was developed, a new teaching resource environment was built, new teaching processes were implemented, and new teaching evaluations were carried out. In 2020, a school-specific SPOC course was opened on the MOOC platform. In the first phase, 294 people completed the study. The implementation process of the specific teaching process is divided into three stages: students' autonomous learning before class, construction of teacher and student activities in class, and evaluation and expansion of teacher and student after class.

Pre-class stage: online self-study before class. Students complete the teacher's designated autonomous learning before class, and complete the corresponding pre-class quizzes to find problems and discuss them online, and the teachers answer questions and discuss online and summarize them.

In-class stage: the construction of teacher-student activities in class. Teachers import questions and post tasks and activities, such as: sign-in, questionnaire, poll, rush answer, quiz, etc. Students participate in learning activities such as project learning, group collaborative learning and case learning in a task-driven manner, and carry out problem exploration, and submit learning results as required. Teachers participate in communication and interaction and provide personalized guidance in this process. After the activity is over make a feedback summary.

After-school stage: After-school teacher and student evaluation expands. After class, we mainly rely on the SPOC platform and BYOD for learning effect testing, learning achievement improvement and mutual flow, combining student self-evaluation, student-student mutual evaluation and teacher reviews.

3.3 Teaching effect

In the one-semester teaching practice of "Database Principles and Applications" course, the author found that compared with the previous period, students' enthusiasm for classroom participation has been significantly improved, and the quality of subsequent database principles course design has improved significantly, and the excellent rate and pass rate of the final assessment results of the course Increases by 4.7% and 8.2% respectively. Based on the "SPOC+BYOD" hybrid flipped classroom teaching mode, compared with traditional teaching methods, teaching advantages are obvious.

(1) Higher quality teaching resources. The research group added some elements of national excellent MOOC course resources to SPOC course. At the same time, the company database design project is introduced into the practice part of the course to guide students to design with the project as the main line

(2) The enthusiasm of student interaction. The use of BYOD in the classroom shows the interactive situation of answering questions in a timely manner and enhances students' enthusiasm for interaction.

(3) Teacher-student interaction is more effective. After adopting the SPOC blended teaching mode, students complete part of the knowledge learning after class and enter the class with questions.

(4) The comprehensive ability of students is effectively improved. The rich classroom interaction and multiple evaluation systems stimulate students' enthusiasm for learning.

4. Summary

Under the guidance of engineering thinking, the research group created the SPOC course "Database Principles and Applications" that is in line with the characteristics of the school's teaching and students, and integrated the hybrid flipped classroom teaching concept into project teaching, and integrated the advantages of offline physical classrooms in time and SPOC's resource advantages. Give full play to effectively stimulate students' interest in learning and mobilize students' initiative. Students complete the internalization of knowledge by participating in and experiencing rich and varied activities, which promotes the formation of engineering thinking, and students' satisfaction with teaching evaluation has improved significantly.

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