Teaching Mode Reform of Environmental Biotechnology with SPOC

Xiaohong Xu and Ebin Gao

ABSTRACT

SPOC that is "Small Private Online Course", is the inheritance, perfection and transcendence of MOOC. SPOC combines high quality MOOC resources with flipped classroom to complete the reform of teaching mode. Based on SPOC, The graduate course Environmental Biotechnology carried out the teaching mode of "SPOC-Classroom". The mode is to guide students to strategically learn before class, in class and after class, so that different tasks can drive students to acquire knowledge and reconstruct knowledge systematically. The new teaching mode has made up for the shortcomings of traditional classroom teaching, promoted students' learning initiative, and effectively improved the quality of teaching.¹

INTRODUCTION

In recent years, MOOC has brought great impact on traditional higher education, and its new educational philosophy and teaching methods have attracted much attention[1]. MOOC has the characteristics of large-scale, open and network, which is no restriction on identity and number and highly praised for the sharing and utilization of educational resources[2]. There is no doubt that MOOC has great advantages in curriculum design and massive visits. The practical experience shows that MOOC also faces difficulties and challenges in production costs, business models, teaching and learning methods, high dropout rates and learning management, which may be related to the characteristics of MOOC's large-scale access, unlimited identity, complete online teaching and so on.

¹Xiaohong Xu, Ebin Gao. School of the Environment and Safety Engineering, Zhenjiang, Jiangsu University, Jiangsu, China, 212013.
Therefore, although MOOC has the advantages that traditional teaching can't compare, it can still not erase the unique value of the face-to-face course. Only by combining the advantages of both sides can MOOC achieve lasting vitality. In 2013, Professor Armando Fox of University of California at Berkeley first proposed the concept of SPOC [3], which is to combine the high-quality MOOC resources with the face-to-face teaching in the classroom. It needs to improve the teaching quality by flipped classroom and teaching mode reform.

Environmental biotechnology is a new interdisciplinary subject formed by modern biotechnology and environmental science and engineering. It involves many fields, such as biotechnology, engineering, environment and ecology. It is a professional course for the graduate students of environmental science and engineering. The purpose of this course is to enable graduate students to systematically grasp the application of biological technology in environmental pollution control, and to provide a theoretical background for the future development of waste, wastewater biological treatment, bioremediation of contaminated sites and the development of environmental products.

The teaching team constantly seeks suitable development mode in the process of interacting with traditional teaching mode. The "SPOC- classroom" has established an effective teaching method and method suitable for Environmental Biotechnology.

**SPOC TO ENVIRONMENTAL BIOTECHNOLOGY**

The primary goal of classroom teaching is to enhance the participation and interaction of campus students. The "privacy" of SPOC allows students in a limited range to produce a sense of pride and urgency with limited resources, thus stimulating the enthusiasm and motivation of students[4]. Some scholars believe that the great significance of SPOC is that it is trying to make online learning transcend the replication of the classroom teaching and will create more flexible and effective results[5].

Therefore, the introduction of SPOC concept to the traditional teaching of Environmental Biotechnology can be used as a supplementary material for the classroom teaching of campus students. That is to design and use excellent MOOC resources, to change or reorganize the teaching process, to promote mixed teaching learning, and to improve the quality of teaching and learning.

**SPOC RESOURCES PRODUCTION**

The theoretical system of Environmental Biotechnology is divided into two parts: modern biotechnology and biotechnology application in the environment. Among them, modern biotechnology mainly includes enzyme engineering, gene engineering, cell engineering and fermentation engineering. The application of
biotechnology in environment involves pollution control, pollution prevention, clean energy, waste resource, environmental biological monitoring and safety evaluation.

The teaching team first focuses on the key knowledge points. Design the topic, clarify the teaching content, and record the micro videos (within 15 minutes). During the teaching process, we also collect network resources such as case and engineering practice which make students further understand the practical application of microbes. Teaching videos are uploading to the network platform Sakai, supplemented by courseware PPT, practice and test, and homework. These resources are used for the graduate students to study under the class.

TEACHING IMPLEMENTATION BASED ON SPOC

Preparation

For students accustomed to traditional teaching mode, there is no doubt that the teaching method based on SPOC is a novelty. Therefore, it is very necessary for students to accurately guide. Before the course, a teaching arrangement meeting will be held. The new teaching mode and teaching arrangement are introduced one by one, including what SPOC / MOOC is, how to arrange the course, what to do in the discussion, what to be completed after class, etc.. What is more important is to tell students that through this teaching mode, they will gain more experience that they cannot experience in traditional theory teaching.

Main Implementation Process

The implementation of SPOC-Classroom of Environmental Biotechnology teaching mode mainly includes the following parts:

The first step is learning and testing before class. Around the chapter knowledge points, the group opens resources in advance online. The students watch the teaching videos autonomously and complete corresponding tests to evaluate the mastery of theoretical knowledge before class.

The second step is classroom teaching and discussion. In the flipped classroom, teachers organize students to discuss with each other. Then each group elects student representatives to exchange reports, and at last the teachers make comments and guidance.

The last one is rethinking and interaction after class. After studying and discussing online and offline, students reflect on teaching contents and discuss with teachers in depth.

Learning Evaluation

A good evaluation mode is the key to promoting students' development and ensuring the quality of education[6]. Evaluation methods tend to be the guidance of
the teaching direction[7]. The traditional evaluation mode is mainly composed of usual and final grades according to different proportions. The usual proportion of the results is about 20%, generally including homework, attendance and so on. This traditional evaluation model can no longer satisfy the characteristics of online courses. Therefore, it is very necessary to set up a suitable evaluation model to meet the requirements of teaching reform courses. At the same time, the proportion of ordinary grades should be larger than the traditional classroom teaching, which more emphasis is placed on the process assessment.

The teaching process of Environmental Biotechnology with SPOC mainly includes online learning and offline communication. The content of online is based on resources, including video learning and corresponding tests and homework after class, while offline communication includes flipping classes and answering questions under line. In general, learning evaluation is mainly divided into: (1) online learning. Students watch videos, complete corresponding tests and interact online. This link accounts for 30% of the total. (2) Offline discussion. The flipping class is grouped by 4-5 students. Students were reported by group PPT and teachers were graded. This link accounts for 30% of the total. (3) Course papers. The postgraduate course is mainly based on students' autonomous learning, so the final examination is carried out in the form of curriculum paper, which accounts for 40% of the total. This new method of assessment based on SPOC mode can objectively and comprehensively reflect students' attitudes and abilities in the learning process.

CONCLUSIONS

The SPOC-Classroom has greatly promoted the innovation of teaching mode of Environmental Biotechnology. In the course of teaching, the team pays more attention to the learning effect and the practice and then establishes a scientific and rational evaluation mechanism, which tends to train students' self-learning and innovation ability.

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