Application of Flipped Classroom Based on MOOCs and "Micro lesson" in the Teaching Process of 《Pathology》

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Abstract. Flipped classroom is an autonomous, interactive and personalized teaching mode based on the network technology environment. In order to solve the problems existing in the traditional pathology teaching and improve the teaching effect, the teaching mode of flipped classroom was put forward based on the MOOCs and "micro class" Taking the students(n=56) in class1405 of clinical medicine in Shaanxi University of Chinese medicine as the research object, the teaching mode of the Flipped classroom was applied to the 《Pathology》 teaching, and the empirical study was carried out by evaluating, analyzing and concluding the standardized tests, comprehensive ability tests and questionnaires, the result showed that students in the experimental group were significantly better than those in the control group in the standardized test and comprehensive ability test($P< 0.05$) , and 83.92% of the students were willing to continue the flipped classroom model. It is suggested that flipped classroom can not only enhance the basic knowledge, but also improve students' comprehensive ability and be accepted by most students.

　　《Pathology》 , a medical basic subject to study the law of the occurrence and development of diseases, plays an important role in the medical knowledge system as an transition course. Therefore, it is imperative for pathology teaching to apply the theoretical knowledge to enhance students' ability of comprehensive analysis and problem solving. MOOCs is Massive Open Online Courses, which is called "large-scale open online course" in China. "Micro class"is the abbreviation for "micro video network course", is a kind of online video curriculum resource [2], which is designed and developed for the knowledge point or teaching link of a certain subject. In order to solve the shortage of MOOCs, a new classroom teaching model, "Flipped Classroom or Inverted Classroom"has been popular in American schools since 2011. The flipping class is a kind of teaching form [1] for students to watch video created by teachers before class or famous teachers' lecture video, and then go back to the classroom to communicate with teachers face-to-face and finish their homework.

Method [1,3,4]:

To Establish a Network Platform for 《Pathology》 :

(1)Establishing the 《Pathology》 network platform based on the MOOCs curriculum network resources, school level excellent course platform and social networking software. Establishing a communication platform between students and teachers by using network resources. (2)Selecting "Respiratory diseases" as the teaching content (8 class hours) and organizing teachers in the pathology department to prepare lessons collectively, (3) Establishing a self-test question bank and a self-test system. (4)The syllabus, lesson plan, curriculum PPT, video and test questions of 《pathology》 were distributed through the network platform.

Students Grouping:

　　With an average of 8 groups; 7 people in each group, class1405 of clinical medicine (n=56) were selected as the experimental group and a teacher was assigned to track entire process, setting up a QQ group, and selecting a group leader, a recorder and a speaker. while class1406 (n=57) of

clinical medicine were selected as the control group,and adopted the traditional teaching method.

Preparation Stage Before Class (students' autonomous learning stage before class):

(1)In the 2 weeks before class, the task list was distributed according to the teaching arrangement of 《Pathology》 , and the key contents were separated to determine the content of the course. The "Task list" is the guidance of questions, helping students understand their learning goals and achieve efficient and autonomous learning. (2) Students could self-test and learned the micro videos courses through a course platform that supports MOOC. (3) Group discussion 2-3 times before class, place and time were determined by their own, and then discussed and communicated with teachers through network platform, each group determines 1-2 discussion questions.

The Classroom Internalization Stage (class discussion stage):

(1) The group issued questions; (2) Class discussion for 2-3 minutes; (3) A student was selected randomly in other groups to answer questions; (4) Answered and debated (1-5 students); (5)The group released the answer; (6)Teachers summarized and evaluated the discussion process and answers to each question.

Consolidation After Class (analyzed and summarized after class):

After summarized the teaching situation in each class,the teacher released the good learning resources or key learning contents to the network platform again in the form of "micro class" for students to review after class. Meanwhile, the forward-looking content related to the course would be posted to the internet for students with special needs or continuing medical education.

The Test and Evaluation of the Teaching Effect:

The students' interest and initiative in pathology studying were examined through the group discussion and questionnaire survey, the students' ability to master the system knowledge of 《Pathology》 was tested by standardized examination to evaluate the teaching effect. What's more, The students' imagination, creativity and the ability to identify, analyze and solve problems were checked through the individualized examination(examinations as medical record analysis). Comprehensive score = standardized examination (60%) + general specimen examination results(10%) + slicing examination results (10%) +Record of medical record examination (20%)

Data Statistical Analysis:

The data were statistically analyzed by SPSS19.0 statistical analysis software and presented in $\bar{x} \pm s$, and the single factor analysis of variance was adopted in each group.

Result

Students had shown great enthusiasm and interest in the "flipping classroom" teaching reform activities and the groups discussed orderly. Before the discussion, more than 80% of the students had made full preparation and reviewed the relevant basic subjects of 《Anatomy》, 《Histology and Embryology》, 《Biochemistry》,《Physiology》, 《Medical Microbiology》, 《Medical Immunity》,etc. They had also studied the related subjects of 《Diagnostic》 and 《Internal Medicine》and consulted a large number of literature and network resources, showing the unprecedented learning initiative. The atmosphere of the discussion was intense, showing the strong communication ability. The students put forward a large number of problems, solved 80% by group discussion, 10% under the teacher's hint, and10% under whole class discussion. The results of the students' questionnaire survey showed that (Table 1): by applying the "flipping classroom" teaching model, the students could grasp the knowledge more thoroughly and thoroughly, in addition, it not only strengthened students' ability of self-study and communication, but also improved their learning efficiency and study effect. 83.92% students were willing to continue the flipping classroom. only 3.58% of the students were reluctant to continue, the main reason was the heavy task of learning medical courses, and the flipping classroom aggravated the burden of learning, resulting in lack of time and energy.

Table 1   Compared with traditional teaching, the effect of flipped classroom(%, n=56)

Whether the mastery of knowledge is more comprehensive and deeper	quite comprehensive and deep	comprehensive and deep	general	poor
	23.22	57.14	12.5	7.14
Whether it is more conducive to the cultivation and improvement of self-study ability	quite beneficial	beneficial	general	poor
	26.79	58.93	12.50	1.78
Whether it is more conducive to the cultivation and improvement of communication ability	44.64	48.21	1.78	5.36
Learning effect	quite good	good	general	poor
	37.50	42.86	12.50	7.14
Learning efficiency	quite high	high	general	poor
	35.71	41.07	14.29	8.93
Whether the school is willing to continue the flipping classroom	Very willing	willing	general	poor
	39.28	44.64	12.50	3.58

Comparison and Analysis of the Comprehensive Scores of the Two Groups (n=56)

In the test group, the students in the standardized test and the comprehensive ability test were obviously superior to the control group. It showed that the overturned class can not only strengthen the learning of the basic knowledge, but also improve the comprehensive ability of the students.

Table 2 score comparative analysis table   (n=56)

	Standardized test results	general Specimen examination results	Slicing test results	Record of medical record examination	comprehensive score
control group	63 ± 19.6	68 ± 18.7	69 ± 17.6	62 ± 20.4	67 ± 18.9
test group	$71 \pm 15.7*$	$77 \pm 17.1*$	$78 \pm 14.8*$	$78 \pm 18.1*$	$75 \pm 17.7*$

Note: * compared with the control group, $P < 0.05$.

Discussion

The flipping classroom subverts the traditional teaching mode that teachers explain in class and students do homework after class, replans the class time and realizes the innovation of the traditional teaching mode, which is a new independent learning mode and a perfect combination of MOOCs outside school and classroom . The students in the experimental group were significantly better than those in the control group in standardized tests and comprehensive ability tests, and flipping classroom were accepted by most students,it indicates that teaching mode can not only stimulate students' interest and initiative in learning, give full play to students' imagination and creativity, cultivate students' ability to discover, analyze and solve problems and their comprehensive application ability, but also fully arouse teachers' enthusiasm so as to achieve satisfactory teaching effect,which can be further promoted. However, for the clinical medical students with heavy workload, it is still necessary to explore how to combine the flipped classroom with traditional teaching. In addition, under the influence of the traditional teaching mode and the

students' inherent learning habits, the flipping classroom needs to be further improved and developed in the 《Pathology》 teaching .

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