

The Practice and Exploration of College Physics Flipped Classroom Teaching Method

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Abstract—This paper introduces the implementation process of college physics flipped classroom teaching method, elaborates the teaching effect of teaching practice in recent years, and puts forward some suggestions for implementing this method in college physics teaching.

Keywords—College Physics, Flipped Classroom, Teaching method

I. INTRODUCTION

The flipped classroom teaching method is emerging in recent years, make full use of the new teaching model of online teaching platform, pre-class teacher recorded a good video, together with other forms of course information uploaded to the network teaching platform, so that students in extracurricular video Learning so that students who are absent from class or who do not listen attentively to the class can keep up with the class process, which is the interaction time between the student and the teacher, the student completing the homework in class, and discussing homework with the teacher As well as points of knowledge that are not understood in the video, and teachers are used during class time to actively engage students in the learning process and provide personalized guidance [1].

In college physics teaching practice in recent years, the author adopted the flipped classroom teaching method, gained some experience and experience, and deeply understood the advantages and disadvantages of this teaching method.

II. THE REALIZATION PROCESS OF COLLEGE PHYSICS FLIPPED CLASSROOM TEACHING METHOD

In the actual teaching, the students have already finished the basic knowledge studying through reading the teaching videos and viewing materials before the class, completed the group discussion and online interactive questions with teachers, including the pre-class small test online. By this teachers can master the students' learning situation before class. According to the students' online questions and test results, teachers can solve the existing common problems in class. Students' personality problems are solved in a one-to-one way. Before class, teachers will also set some thinking and design topics for students to solve, discuss and display in class. Simple summary is: learning tasks → pre-class online test → summary of knowledge points in class (to solve common problems) → discussion of problems in class → practical application discussion → pre-class layout of topics to discuss.

III. THE TEACHING EFFECT OF COLLEGE PHYSICS FLIPPED CLASSROOM TEACHING METHOD

The author adopted the flipped classroom teaching method in actual teaching of the university physics in the whole process, by comparing with the teaching effect of parallel teaching class with traditional teaching method, found the flipped classroom teaching method has the following teaching effects:

Firstly, the flipped classroom teaching method can active classroom atmosphere and improve student participation rate. The atmosphere of traditional teaching classroom is somewhat boring, which limits the students' activities and creations, thus the students' dozing phenomenon occurs from time to time. Conversely, the flipped classroom teaching method will active the classroom atmosphere, stimulate students' learning interest and improve students' enthusiasm for classroom participation effectively, especially there is no chance of student drowsiness during the discussion session. Through the discussion of questions, students are no longer passive recipients, but active thinker in class. Most importantly, students like to learn physics from passive learning to active exploration.

Second, flipped classroom teaching method fully arouse students' learning enthusiasm and initiative. At the beginning of the course, students who were accustomed to traditional teaching methods were confused and uncomfortable with the new teaching mode of overturning classroom. Some contradictions were even encountered. In particular, the kinematics part of the opening of university physics course was relatively simple. Learning knowledge repetition rate higher, some students more or less ignored, neglected the part of the study and discussion, leading to this part of the content is not thorough understanding, learning is not solid. After a period of familiarization with the teaching process of the flip classroom and the break-up of teachers and students, most of the students have been able to adapt to the teaching mode of overturning the classroom and actively cooperate in the follow-up study. Through the questionnaire and usually through the exchange of feedback with students, most students fully affirmed the flip classroom teaching method. The students themselves said: Flip classroom is to change "I want to learn" to "I want to learn", so that students really get into the textbooks, through knowledge, and this teaching mode gives students the opportunity to discuss the exchange of freedom, after intense discussion, Students are often impressed on such issues.

At the beginning of the course, have become accustomed to traditional teaching style of teaching students to flip feel confused about the new teaching mode and discomfort, and even some resistance, especially university physics kinematics opening part, the content is relatively simple, and high school students learned knowledge repetition rate is high, some students have more or less to belittle, neglect that part of the study and discussion, in this part of understanding is not thorough, learning is not solid. After a period of time to flip familiarity of the classroom teaching process and the running-in between teachers and students, most students have been able to adapt to flip the classroom teaching mode, and actively cooperate with, active participation in the follow-up study. Through questionnaires and communication with students, most students give full affirmation to flipped classroom teaching. Students themselves reflect said: turn the classroom is to "want me to learn" into "I want to learn", make the students really boring textbooks, understand knowledge, and at the same time this kind of teaching mode to students free to discuss the opportunity to communicate, after heated discussion, students tend to leave deep impression on this issue.

Thirdly, the flipped classroom teaching method can improve students' ability of autonomous discovery and autonomous inquiry, and cultivate students' intuitive thinking on college physics. Such as the classification of ferromagnetic materials according to the characteristics of hysteresis loop in ferromagnetic parts studying, the students will produce an illusion that the coercive forces of rectangle magnetic materials is larger than the hard magnetic materials' after see the hysteresis loop graphics of this two materials given by the textbook, therefore the rectangle magnetic materials belong to the class of hard magnetic materials. In flipped classroom, students found this problem and raised some questions, while it did not seem to make clear about this in most college physics textbooks.

Fourthly, the flipped classroom teaching method has a certain effect on improving students' achievement. In the past two years teaching practice, compared with the parallel classes in the traditional classroom, the results of the students with flipped classroom teaching method were not lower than those of the traditional teaching mode in the four mid-term exams and the four final exams, but slightly higher. While from the perspective of student development in the long run, the flipped classroom teaching method takes an advantage significantly.

IV. SUGGESTIONS ON THE IMPLEMENTATION OF FLIPPED CLASSROOM TEACHING METHOD

Carrying out flip classroom teaching in college physics teaching, teachers must pay a lot of time and energy to prepare pre-course resources (especially video resources) for students, to carefully prepare the classroom discussion questions and class exercises. The questions used in the classroom are best served as a step type. In order to motivate students to participate in class and classroom learning, classroom learning should be quantified and included in the total score.

In recent years' flipped classroom practice, we know that teaching does not begin with the teacher's lesson preparation, but from the students' pre-class preparation. In the actual teaching process, we should emphasize the high intensity preparation of students' before class, which is the prerequisite for efficient classroom teaching. For this reason, the teachers can assign classroom speech, group discussion, report presentation, pre-class test and other teaching links before class, so as to give students pressure, so that they dare not neglect or perfunctory.

Teacher's classroom instruction should be instructive. The main role of instructor is to stimulate students' interest and thinking, to arouse discussion and debate, to provide guidance and to guide students in the right direction. To this end, teachers should be carefully prepared the discussion questions, typical examples and practical applications, the language should be concise, instructive, and contagious, can effectively stimulate students' intelligence, attract students' interests, and realize deep participation and positive contribution to the teaching process. Teachers should emphasize the physical thinking and scientific methods in lectures and discussions, and introduce demonstration experiments, video presentations and computer simulation techniques in teaching timely so as to guide them in conducting research studies. In addition, teachers should not teach too much, and try to control within 30 minutes, while the following class discussions and group discussions not less than 30 minutes or more.

Focus on group discussion. From a psychological point of view, the average student can remember 70% of what they discussed with others and 95% of what they teach to others. This shows the importance of studying and discussing the learning process. The advantages of small-class teaching and group discussion are obvious at this point. The advantages are mainly

reflected in the fact that small classes and subgroups ensure that teachers give sufficient attendance, inspection and supervision to all participants in each class, which is suitable for teachers control classroom discussions effectively. Under the military school network environment and teaching conditions, the group research and discussion occur in the classroom, and effectively carry out the discussion depends largely on the teacher's topic design and step by step in-depth inspiration and guidance.

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