

Study on the Micro Lesson and Flipped Lesson on College Physics Experiment

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Abstract. With the rapid development of network technology, micro and flipped Lesson lesson has been gradually applied to the teaching of physics, college physics experiment course for the problems, this paper presents micro lesson teaching mode and flipped Lesson experiment lessons integrated application in students at the same time the basic experimental abilities, but also to exercise the students ability to innovate, achieve better teaching results in the limited classroom time experiment.

Introduction

With the rapid development of network technology, micro-lessons and gradually applied to the flipped Lesson teaching in various subjects. "Micro-Course" (microlecture) concept was first due to the New Mexico David Penrose (david penrose) pioneered in 2008, is now gradually being introduced domestic and most teachers are familiar with. Micro lesson is a new teaching model, which is in accordance with curriculum standards and teaching practice requirements in order to support instructional videos, instructional design around a certain point or knowledge to carry out teaching and learning activities [1]. Flipped Lesson (Inverted Classroom) is the original form of the Colorado Teacher • Jonathan Berman (Jon Bergmann) and Aaron • Sams (Aaron Sams) involved in a teaching mode first. Flipped Lesson teaching mode refers to the complete knowledge of students learning at home, and became a classroom between teachers and students and between students and students interact with places, including answering questions, the use of knowledge, so as to achieve better educational results [2]. At present, more and more teachers to apply to micro-lessons and flipped Lesson teaching in various disciplines, and received a significant effect of teaching, the paper slightly and flipped Lesson lesson as a starting point to explore a new set of teaching college physics experiment the method, which teach students knowledge, but also cultivate their analysis of the problem, test the ability to solve problems, and ultimately improve the overall quality of students.

Physics is an important part of the natural sciences, is an important basic science, and biology, medicine, aerospace, etc. fields have a cross, an irreplaceable important role. Physics essence is an experimental science, physics experiment is the foundation of physics, left physics experiment, physics can not be developed. University physics experiment is a systematic and comprehensive experimental courses after students enter college earlier encounter, the students basic experimental skills, improve the ability of students to learn physics plays an important role. Experimental method also allows students to learn science system, so that students get a good skills training, to enhance students' ability to observe things, ask questions, analyze and solve problems.

The traditional mode of teaching, the teacher is to impart more knowledge, for a limited time to complete the task of teaching, as student learning, teachers are not well mastered. This non-interactive cramming method of teaching, which kill the enthusiasm of teaching, but also allow students to feel boring classes, the result is that students can not lead to more effective learning. Meanwhile, the students' lack of motivation to learn, but also to the class teacher as headache, over time, a vicious cycle. How to improve the quality of teaching, so that teachers and students teaching

and learning is done in a relaxed atmosphere, it has become a hot issue of university education.

A Physics Experiment Teaching in College Problems

To complete the experimental course to achieve a good effect in the classroom teaching a limited time, students in the experimental class before you must do the preview, to fully grasp the purpose of the experiment, the experimental principle, experimental procedure and related experimental results. Only good test prep content to targeted lectures focused on shorter teachers on the process, in order to better and safer complete the experiment. However, the current college physics experiment course, there is little unprepared student, the student's understanding of the whole experiment are pinned in a half an hour to explain the teacher can not teach a deep understanding of the content and can not be innovative. Many students are turned over the textbook while doing experiments, experimental course leading to a multiplier.

Each student is independent of the individual, the knowledge and ability are not the same, the quality of students parameters times uneven teaching effect is not the same result. Physical Experiment of College Classroom generally two hours, including 20-30 minutes a teacher to explain the process, including the use purpose of the experiment, the experimental principle, experimental equipment, experimental procedures, precautions, and so on, time is very tight, the teacher can not occupy most of the time to explain, it will shorten the student's time, explain in this limited time, some students will be able to listen to it again a deep understanding of, and some students have not mastered, will definitely affect the effectiveness of teaching.

The purpose of the experiment course, is to train students to identify problems, solve problems and practical ability, in addition to an important objective is to develop the students' ability to innovate. In the current experiment teaching, teachers are usually in a short time to explain the experimental contents and precautions after the students to complete the required courses in the course of the experiment, since time is short, the task of teaching students in a hurry in the evening, and no extra time to think about and discuss new experimental method is not conducive to the cultivation of students' innovative ability.

Any teaching is to learn new things, it is necessary to review the link for learning. For theory, notes and textbooks by students in the class record, review after class system, but does not have after-school review experimental course conditions. Although the experimental class teacher to explain the contents of the notes can be part of, but a lot of the experiment to be recalled by the instrument, most laboratories will be arranged on a plurality of classes experimental course, less spare time, but usually inconvenient for non Laboratory students in the class did not do the experiment, which hinder to experiment course review provided [3].

Micro and Flipped Lesson Advantages

Invention and development of micro-teaching lesson providing a new model will be applied to the micro-class university physics experiment will also be able to produce good results. First, the micro class has convenience. Through the micro class, physics experiments demonstrate directly to students, physical processes and phenomena previously available only within the physical classroom and laboratory can see, through the micro-lesson can be achieved at any time through computers, mobile phones and other devices directly watch makes learning More convenient. Second, micro lesson has repeated. Experimental teaching content can always repeated demonstration, before the experimental operation for experimental details, such as the experimental results, the steps are even entire experimental teaching process and so did not hear or understand when, before the experiment can be viewed again by micro lesson to learn, repeated studies in order to ensure the smooth progress of the students experimental operation, but also take into account the students review after class. Third, micro lesson has immediacy. In the absence of micro-lesson before, teachers in the students before the operation, usually a presentation, or the number of students due to space and other reasons, resulting in some students can not easily see the entire presentation process of teachers, through the micro class, to ensure the operation so that each a

student can be observed. In addition, the experimental class, a teacher usually with a number of students, due to the different learning abilities of students, lectures effect will not be the same, through the micro-lessons, one to one teaching can be achieved [4].

Traditional physical experiments are teachers on classroom-based presentation, students will understand the purpose of the experiment, the experimental procedure in accordance with the results you can do it, behind a teaching mode, hindered the students' thinking and innovation. Flipped Lesson is student-centered, teacher-directed discussion teaching method, first, students use modern educational technology ability to access information. In the flipped Lesson teaching, students need before the class content of teaching learning, which requires students to learn to use the network teaching platform access to learning information, in addition to the university's network platform to be learning platform outside school related resources can be better integrated resources, inspire innovative thinking and learning. Second, the ability to cultivate independent learning. Flipped Lesson teaching mode requires students before class on video a thorough study, a thorough understanding of the purpose of the experiment, the experimental principle, experimental procedures, test results and data handling and the like, where is difficult to understand their own knowledge, where is the key, where is the difficulty students need to sort out their own analysis in the classroom can be a purposeful, focused questions and learning, greatly improve the effectiveness and efficiency of the experimental teaching, better able to shape the independence of the students to understand the ability to acquire new knowledge. Third, give students more time to ponder the experimental innovation. Experimental course not only to train students to observe and solve problems and hands-on ability, but also to cultivate students' creative ability. In the traditional classroom experiments, students need to complete the whole process of the experiment in the limited classroom time due to the tight schedule, many students are basically in accordance with established procedures to complete the experimental task, and in the flipped Lesson teaching mode, can give students before class provide more time to think, especially in the comprehensive experiment and designing experiment, so that students have more time to think about how to improve and innovate, to experiment and to fully organize the content of doubt, improve classroom efficiency, to make the curriculum to achieve more good teaching effect, while training students to solve new problems and innovation.

The Micro Lesson and Flipped Lesson Application Specific Integrated Part of the Design in College Physics Experiment Teaching

In this paper, "Using Double Prism Light Wavelength" for example [5], the specific presentation of micro lessons and flipped Lesson in college physics experiment teaching in. The experiment was the main problem is how to use the double prism interferometric wavelength of light, in the theoretical course of study, students already have some understanding of the interference, and be able to understand and derive $\lambda =$ significance. Where λ is the wavelength of light, d is the distance double sutural, D is the double-slit to the distance between the receiving screen, an interference fringe spacing. Schematic in Figure 1.

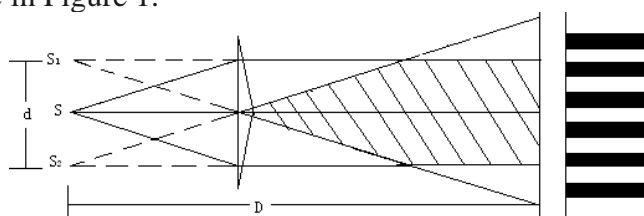


Fig.1 The Schematic graph of Light Interference

The first aspect of a well-designed teacher recording time of 20 minutes or so experimental micro-lesson video, micro lesson with blackboard and laboratory equipment operation, clear teaching objectives, knowledge prominent courses, such as experimental purposes, the use of double prism metering principle wavelength, the experimental procedure, the results of experimental phenomena to be obtained and the entire apparatus of the introduction, use and precautions, teachers should study the important and difficult experiments in micro-lesson and gave

expression. Teachers in the micro-lesson to reflect the guidance and to avoid telling a tale of teaching. Teachers can send video directly or through a paper-way test questions, give students space to think, for example, how faster and better regulation of the optical path, micrometer eyepiece drum reverse rotation on the data and the like. Teachers will be sent to the micro-lesson video interactive platform, students log on independent study.

The second part, the first class of students in teaching learning platform for video on the full understanding of the course content, to substantially complete the experimental procedure. In the form of experimental group's pre-class discussions experimental details, expected results, finishing the experiment in question and do not understand the part, and through other ways of learning, such as finding books, network and outside the school micro-lessons, etc. discuss experiments improvement and innovation.

The third aspect of the organization of classroom activities. Students in the class have had systematic study and discussion, before the start of the experiment, the students raised questions before class, the teacher can give a positive explanation or discussion guide all students to complete that lesson helped students experiment was successful complete, but also give the students themselves to solve problems provide an opportunity to ask questions. Students can also bring innovative part of the experiment brought up for discussion with teachers, increase the students' thinking, teacher-student interaction, so that teaching is no longer rigid. Teachers should use a shorter time on the experimental considerations given to emphasize again.

The last part of the operation of the student experiment. With these preparations, the operation will be successful students and teachers in the classroom quizzes tour for incorrect experimental phenomena raised by the students to give help solve.

Micro lessons and flipped Lesson, this new teaching model proposed, the biggest advantage is to enhance students' dominant role of teachers who teach from the content into learning coaches, teachers and students through interactive, more teachers more time to answer students' questions, students will be better exercise autonomy and innovation. Through micro and flipped Lesson lessons integrated application in college physics experiment, change the traditional teaching-learning, gradually turned to science to teach students to promote knowledge into passive learning to active scientific research. Bound to this or that specific deficiencies in the implementation of the teaching, but in essence, is very suitable for application in college physics experiment teaching, they can not only improve classroom efficiency, but also can improve students' ability to innovate. New problems brought about new things, hope that the majority of educators to explore the long-term efforts to improve.

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