

Research on the Application of Flipped Classroom Supported by Micro Class in the Teaching of Ordinary Differential Equations

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Abstract: With the development of quality education, Ordinary Differential Equation, as a basic course of mathematics major in colleges and universities, has been reformed, innovated and developed. Especially under the support of education informatization, micro class and flipped classroom are widely used in the teaching of Ordinary Differential Equation, which has a positive impact on improving its teaching quality and efficiency. This paper starts with the necessity of the application of flipped classroom teaching mode supported by micro course in the teaching of Ordinary Differential Equation, and explores the specific application strategy research in the course practice, aiming to provide reference for other professional courses teaching reform.

Keywords: Micro Class; Flipped Classroom; Ordinary Differential Equation; Teaching Application

The course of Ordinary Differential Equation is closely related to many subjects. It is urgent to improve the teaching quality of the course and make it adapt to the development of modern disciplines. In the traditional teaching of Ordinary Differential Equation, we pay attention to the theoretical logic analysis and equation solving process, desalinate the teaching status quo of the practical application of the course, and seriously deviate from the teaching objectives and tasks of this subject. Therefore, how to strengthen the application of Ordinary Differential Equation in practice to improve the teaching quality of this course has become the key point of research for mathematics teaching in colleges and universities.

1. Application characteristics of flipped classroom mode supported by micro class

1.1 Characteristics of micro class teaching

With the development of computer technology, learning channels for students have been more and more abundant. Micro class is to realize the application of "fragmented time", integrate knowledge points, so that students can carry out learning activities anytime and anywhere. There are more teaching advantages to adopt micro class mode of professional course teaching^[1].

First, teaching time of micro class is short with relative simple the teaching content. In fact, In the textbook compilation of Ordinary Differential Equation, the text content is tedious and boring, which is difficult for students to learn. However, the short micro video, micro material courseware or post-school exercises that are updated at any time simplify the learning difficulty of Ordinary Differential Equations to a greater extent, and cater to the current' learning habits of students.

Second, the micro course teaching content is more targeted. In the context of quality education, no matter what kind of course teaching, we should be able to seek truth from facts and formulate teaching plans according to the specific learning

situation of students. Micro class is a way to integrate knowledge points in a short time, sort out the problems faced by students in self-study and put forward corresponding opinions, so as to support students to find and solve problems in time. Therefore, the application of micro lecture in the teaching of ordinary differential equations is feasible and inevitable.

1.2 Characteristics of flipped classroom teaching

Flipped classroom mainly refers to readjusting the time inside and outside the classroom, transferring the learning initiative to students. In this teaching mode, students can focus more on deep-seated problem research. In the current teaching practice, micro class is an important module of flipped classroom teaching mode. In the traditional classroom teaching, the teacher has always occupied the dominant position, what to teach and learn in Ordinary Differential Equation course depends on the teacher's guidance, with always same teaching plan in the course teaching. For a long time, students' practical application ability of calculus course is weak, do does their professional innovation ability. In this regard, flipped classroom teaching has brought about a series of changes in course mode and management mode with positive significance

First, the flipped classroom teaching mode highlights the teaching information. In flipped classroom teaching, students learn the basic knowledge of the course in their spare time, while in the classroom, they complete the application and inquiry activities of professional knowledge and practical problems. In this classroom mode, the after-school teaching videos and courseware produced by teachers will be focused on efficiency, with more prominent teaching information, so that efficiency of students' knowledge acquisition and the learning effect will be improved^[2].

Second, flipped classroom teaching can stimulate students' subjectivity and innovation. To realize the flipped classroom teaching mode, all kinds of after-school theoretical teaching videos and courseware will be saved, so that students can watch and study repeatedly anytime and anywhere until they master the knowledge points. In classroom teaching, teachers will create a more relaxed and democratic classroom environment for students, and adopt more tolerant and scientific evaluation methods for students, so as to encourage students to play their own initiative and innovation to explore the practical application of professional courses, strengthen the connection between theoretical knowledge and practical application for the purpose of used and practical learning.

2. Strategies of flipped classroom supported by micro class in the teaching of Ordinary Differential Equations

Based on the above analysis, flipped classroom supported by micro class has higher value for teaching, and also meets the teaching task of Ordinary Differential Equation in the new era. In the course of Ordinary Differential Equation in colleges and universities, the application of flipped classroom supported by micro lecture needs to follow the following process.

2.1 Prepare software and hardware equipment for micro class and flipped classroom

Ordinary Differential Equation course teaching activities have a high degree of abstraction and logic, the production of micro class video needs to be re formulated according to the students' situation, meanwhile, it is also required to ensure that there is a stable and mature network learning system in colleges and universities for teachers to upload the carefully designed micro lesson video to the network learning platform, so that students can be online network platform for learning, interaction, communication. Therefore, colleges and universities must be able to provide the necessary hardware facilities for the flipped classroom teaching mode, update the existing network learning platform, so that the Ordinary Differential Equation course teaching video data can be stably saved. For example, we should be able to provide demonstration tools and graphic tools on the network platform. When solving the derivative equation of high-order unknown functions, students can think and solve problems on the platform. In addition, it is also required to optimize and upgrade the textbook system of Ordinary Differential Equations. In the new era, higher mathematics as a basic course for many majors in colleges and universities, and its practical application is more and more important. However, the existing Ordinary Differential Equations textbook is backward, and the paper materials are updated slowly. In some test setting, more theoretical knowledge is explained, such as "the image of the general solution of first-order differential equation is a family of curves in several dimensional space". By updating the network teaching materials, some practical ordinary differential cases are added in time, so that students can improve the practical application ability of ordinary differential. Question: what is the relationship between higher order linear differential

equations and linear equations? At this point, students can be guided to use the solution of ordinary differential equation to find the relationship between them, finally get the answer of “initial value problem of n-order linear differential equation”^[3].

2.2 Making clear the teaching objectives of the course under the new teaching mode

In the new era, the teaching focus of Ordinary Differential Equation course is to enable students to apply the definite integral element method to solve other professional problems. Therefore, in the design of flipped classroom, teachers need to fully consider this teaching goal, according to the students' learning ability, the important and difficult points in the learning of ordinary differential equations, to achieve the design of micro class content. On the one hand, teachers can develop the micro class content of the class through the network resources; on the other hand, teachers can develop the corresponding answer micro class video according to the students' discussion and analysis in the classroom and the problems faced by students in self study.

2.3 Formulating teaching evaluation system suitable for flipped classroom teaching mode

Making good preparation and completing teaching activities, it is also required to develop a flipped classroom teaching evaluation system supported by micro class. In the existing teaching evaluation activities, students' classroom learning situation is often evaluated by means of examination, which is lack of comprehensiveness and can not accurately reflect the practical application ability of students for ordinary differential equation course. Therefore, a new teaching evaluation system should be established. For example, in the construction process of evaluation system, the questions of this class are formulated for each micro class video and answered by the students. The system forms the evaluation results for the students' answers. Finally, the evaluation after class of a semester is summarized and calculated according to the proportion of teacher evaluation 5, the proportion of student mutual evaluation 3, and the proportion of student self-evaluation 2, at last, the learning effect of students for ordinary differential equation course is obtained.

3. Conclusion

To sum up, it is the general trend to realize the innovation and reform of teaching mode in the course of Ordinary Differential Equation. The flipped classroom teaching mode supported by micro class has the characteristics of short teaching time, simplify teaching content with more targeted, which is more in line with the teaching task requirements of Ordinary Differential Equation course, and is also more conducive to stimulate students' enthusiasm for advanced mathematics learning and carry out practical exploration of basic theoretical knowledge such as calculus. In the current teaching of Ordinary Differential Equations in colleges and universities, the application of flipped classroom mode is not going smoothly. Through the preliminary planning and preparation work, as well as the construction of a new teaching material system, new teaching tools, etc., the content of the new teaching materials will be carried out in the way of micro class, so that students can complete in-depth learning in their spare time on the basis of mastering the existing theoretical knowledge.

References

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