

Practice and Application of Flipped Classroom Teaching Based on Micro Course in the Course of Motor and Drive Foundation

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Abstract. With the advent of the "Internet +" era, the network resources of intelligent terminal learning equipment and various online top-quality courses have been widely applied, bringing revolutionary innovation to the new teaching mode and promoting the formation of the new normal "Internet + Teaching". In this new situation, traditional motor teaching cannot fully meet the needs of learners for knowledge. Combined with the characteristics of the course, this paper discusses the teaching reform methods, designs the flipped classroom teaching mode of "motor and drag" course, and applies the micro course teaching design to teaching practice, which greatly improves students' interest in learning, promotes students' active learning, urges students to think deeply about the knowledge they have learned, and produces good practical teaching effect.

1. Introduction

The course of motor and drive foundation has strong theoretical nature, many basic concepts and abstract professional characteristics. When analyzing various quantitative relations of various motor characteristics, it is necessary to combine the relevant laws of electricity, magnetism, heat and mechanics [1,2]. Students generally reflect that the course is boring and difficult to learn. The main reason is that the course integrates multi-disciplinary knowledge such as electricity, machinery and magnetism, which is interdisciplinary and has the characteristics of a specific object and abstract theory. The difficulty of teaching and learning is large [3,4]. Before the implementation of "flipped classroom", how to design and perfect the connection of activities before, during and after class The key is to form a new teaching method with the basic characteristics of "integration of activities before, during and after class", so as to improve the quality of teaching. Based on many years of classroom teaching experience, this paper explores the problem in teaching practice and selects the "flipped classroom" teaching mode based on Micro class. The basic course of motor and drive foundation focuses on the most widely used motor drive in the electric drive system. It analyzes and explains the principle and characteristics of motor and its basic application in production practice. It mainly describes the basic structure, working principle and operation analysis of DC motor, asynchronous motor and synchronous motor to help students master solid basic knowledge and theory for innovation Laying a solid foundation is an important course for undergraduate students majoring in electrical automation [5-7], so it is of great significance to teach this course well.

2. Micro Course Teaching Design

The reconstruction of teaching content aims at breaking up the knowledge points without scattering, breaking without disorder and breaking without being small. The selection of the Micro course content of motor and drag relies on the professional personnel training program, integrates the ideological and political elements of the course, refines the teaching content, makes the course courseware according to the actual teaching, records the teaching video and collects various related teaching resources. The members of the research group analyzed the motor in the teaching content of the course in the way of animated explanation, as shown in Figure 1, so that the context of the teaching content is clear and visible, and the knowledge points can be intangibly inserted into the

video animation, giving the students visual impact and aesthetic feeling [1, 4, 6-9]. Students can also choose the modules they want to learn by themselves, and deeply learn the corresponding motor structure, composition principle, application and use precautions, etc., so as to make the complex theory The explanation and difficulty are resolved into three-dimensional video animation which is easy to understand and visualized, which greatly stimulates the enthusiasm of students' independent learning.

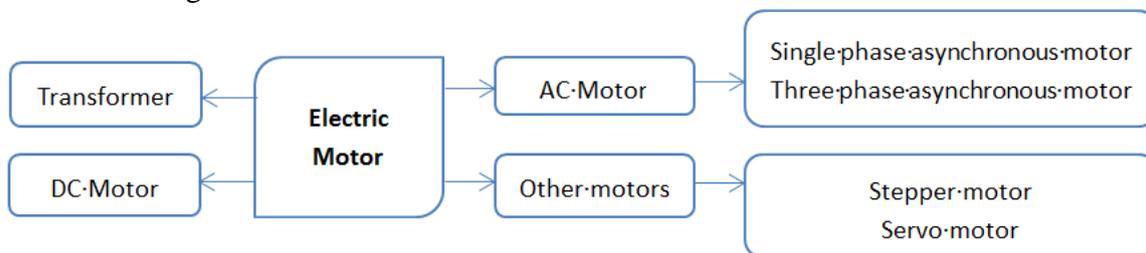


Figure 1. Motor animation explanation guide

3. Flipped Classroom Teaching Practice Process

"Flipping" means to let students control their own learning and use the teaching video. Students arrange and control their own learning according to their own knowledge. Students can master the speed of watching the video by themselves. If they understand fast forward skipping, they can watch it backward and again. At the same time, they can stop to think or take notes carefully. They can even ask teachers and students for help through chat software. "Flipping" increases the interaction in learning, especially between teachers and students as well as between students and students, because the role of teachers has changed from content presenter to learning promoter. In the flipped classroom, we should pay attention to the selection of comparative teaching to carry out the course content, such as the structure of DC motor and AC motor, the conversion of transformer and asynchronous motor, the speed regulation of DC motor and asynchronous motor, the magnetic field of three-phase asynchronous motor and single-phase asynchronous motor, carry out independent learning and teaching, link the old and new knowledge, and compare them The mechanical characteristic curve emphasizes the similarities and differences between AC and DC motors and transformers, so that teachers have time to communicate with students and solve problems, and truly integrate into students' learning. The specific implementation process is shown in Figure 2.

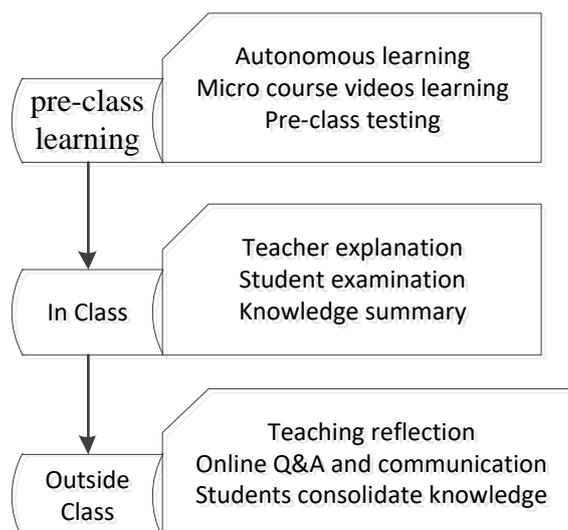


Figure 2. Schematic diagram of the flipped teaching implementation process

Pre-class learning. In this study, the teacher uploads the micro class video of the motor, the task list and other auxiliary learning materials to the class resources through the blue ink cloud class mobile app in advance, and arranges the corresponding thinking exercise test and task activity.

Classroom internalization. In the flipped classroom, which is directed by teachers and started by students, students carry out teaching activities together with multimedia courseware made by teachers. Students combine the contents of teaching materials and bibliography, form their own understanding of knowledge points through preview and comparison, and at the same time, explain, discuss, summarize and summarize the learned contents. The brainstorming activities are organized by teachers to test students' classroom learning effect and group cooperation ability and to summarize and evaluate curriculum content, teaching process, activity design and some common problems encountered by students.

Reflection after class. After class, teachers reflect on the final teaching effect and answer questions online for students; students reflect on their understanding and mastery of the teaching content, actively explore, exchange experience with teachers and students, and consolidate the knowledge learned.

4. Curriculum Assessment Based on Flipped Classroom Teaching Mode

In view of the serious shortage of theoretical teaching hours, when making the assessment of this course, we should not only consider the assessment of students' ability to understand the basic knowledge of motor and drag, but also consider the assessment of their application ability, design ability, hands-on ability, innovation ability, summary and analysis ability, oral expression and word processing ability and other comprehensive qualities, so as to make students learn in limited class hours as much as possible to learn more about the basics of motor and drive. In the aspect of the experiment, we should pay attention to the increase of computer simulation experiment on the basis of real hardware experiment, so that students can understand the difference between engineering practice and idealized state, strengthen students' understanding and memory stimulation, and connect engineering practice to think about problems. Moreover, students' interest and enthusiasm in learning the course will be greatly improved, which can achieve excellent results. Therefore, based on the flipped classroom teaching mode, the course assessment combines online and offline learning attitude, enthusiasm and learning consciousness, and pays more attention to the evaluation of students' learning process, including the evaluation of learning attitude, classroom performance, practical operation skills, team cooperation consciousness and communication ability, which is divided into four parts: usual performance, experimental performance, online learning part and final examination See Table 1 below for details.

Table 1 Course assessment method and scoring table

Evaluation items		Evaluation method	Proportion	Subtotal	
Process evaluation	Usual performance	Learning attitude	according to the completion of homework, classroom questions, on-site operation demonstration, communication with teachers and students, learning feedback, etc., the teacher will make a comprehensive assessment	10%	50%
		Organizational discipline	comprehensive assessment by teachers and student leaders according to attendance in class	5%	
	Experiment results		according to the students' hands-on operation level, classroom learning attitude, the quality and quantity of experiment reports submitted by each experiment class, the comprehensive evaluation shall be made by the teachers	20%	
	Learning performance of online course		according to the quality and quantity of online course assignments submitted by students and the test results of online course platform, the comprehensive assessment shall be made by teachers	15%	
Phased assessment	Final exam		written exam, closed book exam, assessed by the teacher	50%	50%
Total			100%	100%	

5. Implementation Effect of the Flipped Classroom

Through the questionnaire survey and data collection, this paper analyzes the influence of flipped classroom teaching mode based on micro class on students' learning process and effect as follows: (1) mobile learning, personalized learning improves students' interest in learning, and students realize learning at any time. (2) data analysis, diagnosis, optimization of teaching, students achieve accurate learning. (3) data evaluation and effective teaching methods improve the teaching quality. Compared with class 1 of electrical engineering in 2017 and class 1 of electrical engineering in 2016, the enthusiasm of students in the course of "Fundamentals of electrical machinery and driving" has been significantly enhanced, and the attendance rate has increased from 95% to 99%. (4) Students' performance has been improved. After the implementation of the flipped classroom, the curriculum has increased by 3.8 points on average, and the passing rate has declined, which is mainly due to individual differences. The success of flipped classroom implementation largely depends on the degree of students' self-learning before class, while the learning of professional basic courses, many students will rely more on the teacher's classroom explanation, and some students do not seriously study micro class videos and other learning Resources affect their final overall evaluation results.

6. Conclusion

The flipped classroom teaching mode based on micro class can truly be "student-centered". Motor and drag has been recognized and loved by students, and the rate of knowledge transfer has been improved. Moreover, learners have more time and energy to create and reprocess. Students can learn new knowledge, find resources, interact and communicate independently before, during and after class All of them improved. At the same time, teachers in the cloud class platform to create their own, through teaching reform and innovation to promote their own professional development.

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