The Application of Hybrid Teaching Model in Electrotechnics Course

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Abstract. In view of the existing problems in the teaching of electrotechnics, from the perspective of cultivating innovative talents, this paper proposes a hybrid teaching model based on internet, introducing blended learning method into theory teaching and practice teaching so as to make the teaching process "offline" Teaching) and "on-line" (online teaching). The students on the line can learn independently and the teachers and students in the line deepen their interaction so that they can complement each other's strengths so as to cultivate students' interest in learning and autonomous learning and improve the teaching effect of electrotechnics.

Keywords: Electrical engineering · Teaching reform · Mixed type

1 Introduction

Electrotechnical engineering is a technical basic course required for the non-electrical engineering major in colleges and universities. It involves a wide range of contents and a large amount of information, and is of strong theoretical and practical nature [1, 2]. It will lay a solid foundation for follow - Fundamentals, the professional thinking ability of students, engineering application ability plays an important role [3–5].

2 Problems Existing in the Traditional Teaching Mode of Electrotechnics

As a teacher of electrical engineering, I deeply understand that there are many problems in the traditional teaching mode of electrotechnics, as follows:

2.1 More Content, Less Time

However, with the reform of higher education in China, the hours of basic courses in colleges and universities are generally reduced. Taking Inner Mongolia University for Nationalities as an example, a total of 40 h of electrotechnics courses, including Theoretical teaching 34 h, experimental teaching 6 h, this is the primary challenge

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facing electrotechnics courses, how to improve the quality and effectiveness of teaching within a limited time, only to change our traditional teaching mode, looking for a new teaching model that can adapt to the new situation.

2.2 Conceptual Abstraction, Difficult for Students to Understand, Lack of Interactivity

Electrotechnics contains multidisciplinary knowledge, but also involves some physical phenomena, laws of nature and methods of mathematical analysis. The content of the theory is abstracted so that students are less interested in practical content. The traditional electrotechnical teaching emphasizes on the "inculcating" teaching mode, the teacher's "teaching" and the students "learning" all focus on the contents of the textbook. The tedious theoretical knowledge is taught by teachers. Students can only be passively accepted. Students' interest and enthusiasm in learning are limited. Teachers and students have little interaction with each other. Teachers find it hard to teach and students have difficulty in learning.

2.3 Teaching Content and Life, Engineering Practice Out of Touch

The traditional teaching mode pays attention to the teaching of theoretical knowledge, the weakening of practice and applied teaching. The students will do the questions, will take the exams, master the theoretical knowledge, but do not know how to apply them to life and engineering practice. They can not understand the profoundness and accomplishment brought by practice, Can not understand the advanced and practical electrical engineering courses.

In view of the above problems, we introduce the network mixed teaching model into the teaching of electrotechnics [6, 7], highlighting the main value of students in learning activities, and strive to build a multi-teaching method is conducive to students to improve their own learning Ability teaching mode to improve the teaching effect of electrotechnics course [8, 9].

3 Web-Based Hybrid Teaching Model

Based on the network of hybrid teaching is the teacher in the curriculum design and knowledge transfer, the classroom teaching and information technology integration, the teaching process of "offline" (classroom teaching) and "online" (online teaching) organic Combination of online students to learn independently, offline teachers and students in-depth interaction, so as to achieve efficient classroom. The specific process of hybrid teaching mode is shown in Fig. 1.

Through online learning platform, the online and offline teaching can be effectively combined. Students can learn by themselves through the "online" self-study before class and through the teacher's guidance. Develop students' ability to think and learn independently. Exploratory learning with active awareness maximizes human potential and acquires knowledge. The hybrid teaching model can improve students' interest in learning and learning, improve the difficulty of the course, and thus help to improve teaching quality and achieve better teaching results.

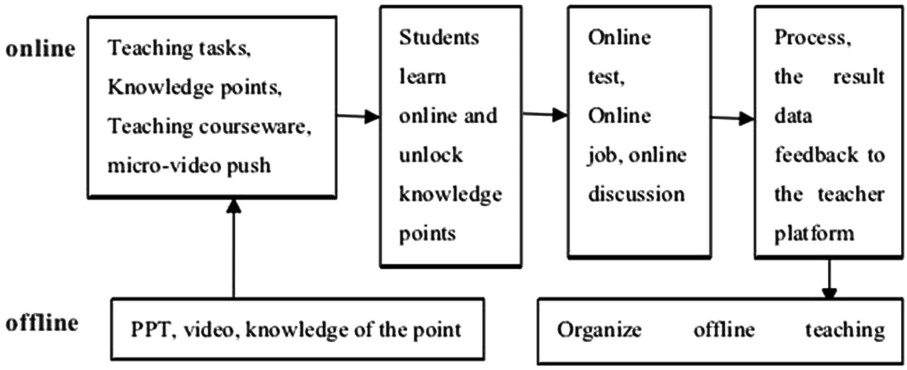

Fig. 1. Electrotechnical mixed teaching mode

3.1 Electrotechnics Mixed Teaching Process

The specific electrotechnics mixed teaching process shown in Fig. 2.

Before Class: Teachers in the online teaching platform to publish teaching tasks, teaching courseware, micro-video and other guidance resources and content resources, students access to the platform through the smart phone or computer course resources, especially through the study of multimedia courseware, micro-video for autonomous learning, Organize the content that is difficult to understand, record the doubts, feedback to the teachers through the online interactive communication platform, obtain the relevant information from the teachers, and focus on the common problems of the students in the classroom.

During Class: Groups-teaching is a common teaching and learning organization in the hybrid teaching of electrotechnics. The class students are divided into several learning groups of 4–5 people each. The group-based learning activities are carried out to achieve mutual aid among students. In the classroom teaching, students should first report the contents of the preview according to the teaching task book first, and the teachers should make overall comments according to the report situation, and discuss the difficult problems in the group or the discussion among the groups. During the discussion and exchange, teachers learned about the students' learning situation in real time, pointed out the commonly questioned content and combined the pre-test questions published on the platform to consolidate the heavy and difficult content.

After Class: Teachers conduct comprehensive assessment, discuss the extension and effect follow-up; students access to multimedia courseware, micro-video and other resources for review and consolidation; online exchange platform as a medium for students, teachers and students to interact. Through the online exam bank, students can complete the usual homework, testing and other assessment tasks, and use the knowledge learned to expand exercises.

Different types of students can make progress according to their own learning habits. Teachers are more responsible for teaching them how to learn and build knowledge so as to make classroom education more inspiring and pioneering. The hybrid teaching

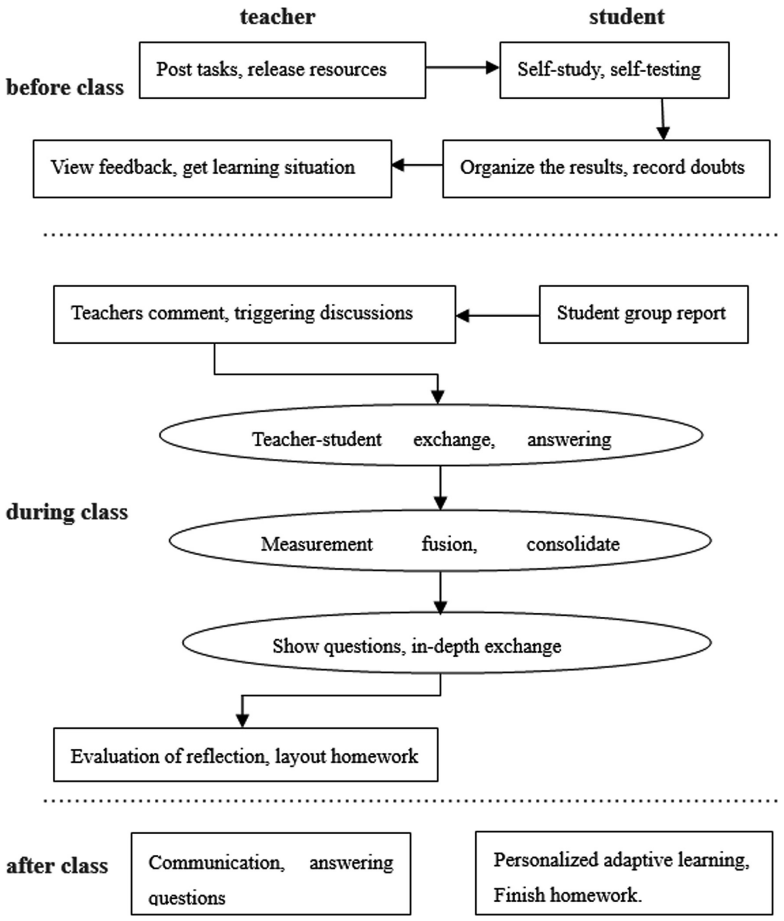

Fig. 2. Electrotechnics mixed teaching process

formed by using information technology adds an extra time for "online" self-preparation in traditional classrooms. For students who have slow understanding, there is a "time difference" that can make up for and absorb digestion knowledge through the Internet.

Practice teaching is an important part of the course of electrotechnics. We also carry out the hybrid teaching reform of practice teaching, redesign the course of electrotechnics experiment, and take the network teaching platform as the carrier, the traditional experiment teaching is divided into online learning and experiment. The actual operation of the two modules, the specific process can be seen in Fig. 3, that is, in the experimental class, the teacher released the contents of the experiment and classroom learning related resources, including teaching micro-video, teaching courseware and related knowledge links to expand the website, Intelligent mobile terminals at any time, any place to obtain learning materials, which greatly improved the efficiency of student learning.

3.2 Assessment of the Reform

Electrotechnics course hybrid teaching model reform also attaches great importance to the curriculum assessment reform. Evaluation of student achievement is a comprehensive assessment of various assessment results, including weekday results, process scores and final grade. Usually the results of the main visit students daily attendance, homework, notes and other content; process scores accounted for a high proportion, including the online platform for each class before the task book, all kinds of tests, homework, answering questions, discuss the completion of the situation, that each Teaching projects should have an assessment, the average score of all teaching projects as a process score; closed book exam results as the final grade. To strengthen the process of student assessment, and urge students to participate in the usual peacetime learning to avoid the students one or two weeks before the final exam surprise examination can pass the examination of the phenomenon, so that students pay attention to normal learning, pay more attention to the cultivation of learning ability and quality, Forming a good style of study and test.

4 Evaluation

In the first semester of the 2017–2018 academic year, a hybrid teaching was conducted on the electrotechnics course. The research group selected 23 students of the Mechanical Engineering Institute 16 (experimental class) as the experimental subjects and conducted a mixed teaching mode. In addition, 58 students as a control class, the implementation of the traditional teaching model. After a semester of study, the average grade of the blended teaching mode class reached 77.78 points, while that of the control group with the traditional teaching mode was 69.54 points, as shown in Fig. 2.

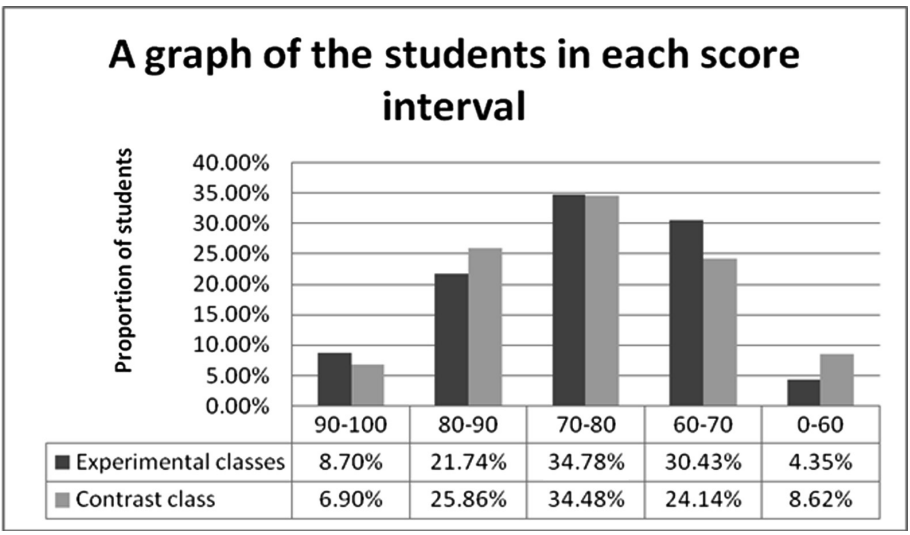

Fig. 3. Student score comparison chart

A questionnaire survey was conducted on 23 students from 14 mechanisms (experimental class), of whom 3 were very interested in the teaching method, 7 were more interested, 9 were generally interested, and 4 were not interested. The result shows that the teaching effect of mixed teaching mode is better than the traditional teaching mode. Students in the experimental class generally believe that the high degree of freedom for blended learning can be freely arranged online learning time, be free to develop their own learning plans, and in the classroom can not solve the problem, you can use the platform rich learning resources independent thinking and Solve the problem.

5 Conclusion

Practice shows that the hybrid teaching mode applied to the theory and experiment teaching of electrotechnics can solve the problems existing in the teaching of electrotechnics to a certain extent and has good adaptability and promotion to the teaching reform of electrotechnics. In the future teaching practice, it is necessary to continue to carry out continuous reform and exploration. From time to students as the main body, the modern educational technology into the teaching of electrical engineering, hoping to achieve better teaching effectiveness and cultivate students' engineering practice ability and innovation ability.

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