

Research on Discrete Mathematics Teaching Method Taking Intelligent Classroom

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Abstract—Discrete mathematics is not only a formal description language and logical reasoning tool of computer science and technology, but also an important professional foundation of computer science and technology. The traditional course teaching mostly adopts the mode of concentration, which can't mobilize the students' thinking to move forward. With the development of intelligent classroom, mobile learning with communication terminal is widely used in the classroom. In view of the actual situation of discrete mathematics teaching, combined with the mobile Internet environment in the teaching design, the intelligent classroom is constructed by using the flipped learning mode and the case teaching form which serves the successive courses. The construction of intelligent classroom can improve students' ability of autonomous learning, perceptual theory and applied theory.

Keywords—intelligent classroom; discrete mathematics course teaching; practical case; teaching method

I. INTRODUCTION

The goal of the major of computer science and technology is to train senior professionals who can be competent in subject research, computer system design and application system development. As a professional basic course, discrete mathematics needs to be taught to enable students to apply theoretical ideas freely to engineering applications.

The traditional course teaching mostly adopts the mode of concentration, which cannot mobilize the students' thinking to move forward. First, the teaching mode of flipping classroom is modularized in the form of knowledge points, which allows students to learn knowledge independently in advance in the form of tasks, and to cultivate students' comprehensive ability of expression by sharing the understood knowledge points in class. Promote students' initiative in learning. Second, with the emergence of cloud mobile learning platform information technology, mobile learning using communication terminals has become a high-quality way of information learning. Making rational use of the mobile interconnection function of mobile phone in teaching can provide a good hardware environment for mobile learning in teaching, and publish the course knowledge points in the form of special topics on the cloud mobile learning platform. And then gradually realize the teaching goal of "learn at any time" in professional education. Third, students often do not see the specific application of the theory in the course of learning. It is easy to lose interest in learning for students. In order to serve the goal of talent

training and the need for students to understand the theory, starting from the actual cases, students can feel the value of theoretical application and practice through the form of online discussion.

We make use of the mobile Internet environment in the teaching design of this course, adopting the flip learning mode and the form of case teaching serving for the follow-up course, and constructing the intelligent classroom. Students' ability of autonomous perceptual theory and applied theory will be improved.

II. RESEARCH STATUS OF DISCRETE MATHEMATICS TEACHING METHODS

School of information science and technology of Peking University has conducted an investigation on the orientation and teaching of discrete mathematics courses in the professional curriculum system, and the research group has proposed a hierarchical and modular knowledge framework [1]. On the basis of "Research report and professional standard on the development strategy of computer science and technology specialty in colleges and universities (trial)" and "Public core knowledge system and curriculum of computer science and technology specialty in colleges and universities", It carries on the student training and curriculum construction according to the different training objectives of scientific type, engineering type and application type[2,3]. How to highlight the cultivation of students' computational thinking ability and learning ability of sustainable development in the teaching process of discrete mathematics, and put forward the introduction of reverse case teaching method in the teaching of discrete mathematics. The teaching case is designed from the point of view of the professional curriculum system and the cultivation of computational thinking ability, and scientific research is fed back to the teaching [4]. In view of the new engineering education, the literature puts forward the teaching reform of discrete mathematics oriented to the cultivation of practical ability [5, 6]. This paper explores the teaching method of discrete mathematics from the design of teaching content and teaching mode, and expounds the concrete implementation process and teaching effect. Literature studies the teaching model of micro curriculum in colleges and universities, discusses how to construct the teaching model and design template of discrete mathematics in MOOC environment, and puts forward the theoretical framework and practical guidance for the related research of micro curriculum in MOOC

Subject of Educational Science Planning in Jilin Province (Research on Internet + Experimental Teaching Innovation Mode Based on Artificial Intelligence)

environment [7]. Under the background of big data and artificial intelligence, the literature re-examines the curriculum orientation of discrete mathematics. It analyzes the relationship between the content of discrete mathematics course and big data and artificial intelligence, and puts forward some teaching reform measures. With the help of column chart, it analyzes the course achievements of discrete mathematics in recent years, and summarizes the experience in the process of teaching [8]. In the era of big data and artificial intelligence, more attention should be paid to discrete mathematics.

III. PRE-TEACHING ANALYSIS OF DISCRETE MATHEMATICS COURSE FOR INTELLIGENT CLASSROOM

A. Analysis of teaching objectives

Discrete mathematics mainly uses mathematical language to describe the state, relationship and change process of discrete systems. It is a formal description language and logical reasoning tool for computer science and technology. Taking propositional logic as an example, it belongs to a part of mathematical logic, and it is the mathematical theoretical basis of digital electronic technology and computer language programming. It is mainly to cultivate students' logical thinking ability in the aspect of scientific theory literacy. The main purpose of teaching is to cultivate students' scientific literacy and engineering consciousness in the aspect of engineering practice, so that students have the ability to comprehensively use the knowledge, methods and techniques of logical operation to solve practical problems.

Students may get the ability to acquire and apply knowledge through discrete mathematics, and cultivate the ability of abstract discrete thinking and logical thinking. In the teaching design of the course, we use the mobile Internet environment, flip the learning mode and serve the case teaching form of the subsequent courses, which play an important role in the cultivation of innovative thinking.

B. Learning sentiment analysis

In the process of learning discrete mathematics, there are two problems in students' learning:

1) Students' understanding of the knowledge points of the course is always accompanied by these problems: "where can I use these contents?" Students often do not see the specific application of discrete mathematics in computer science, and it is easy to lose interest in learning, which is not conducive to the explanation of follow-up knowledge, but also difficult to cultivate students' ability.

2) In the actual teaching situation at this stage, students' dependence on mobile phones has always been the main competitive object of teaching. In the previous teaching process, in order to ensure the effect of students' listening, teachers made great efforts to attract students' attention, which also consumed a lot of teachers' energy, and there had been a situation in which students were asked to submit their mobile phones actively in the teaching process. However, banning the use of mobile phones does not prevent students from relying on them habitually. On the contrary, it is counterproductive.

IV. RESEARCH AND EXPLORATION OF SPECIFIC TEACHING METHODS

A. The key points of case Teaching content

The case selects the core content of propositional logic. The content is to realize the learning of the paradigm and its solving method. It is necessary to understand the concept and solution of conjunctive paradigm and disjunctive paradigm. It mainly includes the steps of dissecting (conjunctive) paradigm, mastering the concept, coding and nature of small items, and the concept and coding and properties of large items. The key point is to set up the solution method of mastering conjunctive paradigm, disjunctive paradigm, principal conjunctive paradigm and principal disjunctive paradigm. The difficulty of students' understanding is the solution method of understanding paradigm, that is, the concept and solution method of principal disjunctive paradigm and the concept and solution method of principal conjunction paradigm.

This part mainly trains the students to master the mathematical knowledge needed to engage in the related work of computer major, and to cultivate the students' ability to apply the basic principles of mathematics.

B. Teaching method design

The teaching design of this course combined with the mobile Internet environment, the flipped learning model and the case teaching form serving the subsequent courses is adopted to improve the students' ability of autonomous learning, perceptual theory and applied theory. We discuss the application of teaching ideas from three aspects.

1) The concept of mixed learning is mainly the organic combination of face-to-face classroom learning and online learning. In order to achieve the optimal learning effect, different information technology and teaching methods are applied in the form of technology. This design uses the mobile Internet real-time feedback teaching interaction tools (Blue Moyun class APP, Learning APP) as the auxiliary teaching platform, using real-time interactive feedback to achieve the optimal teaching effect.

2) The concept of collaborative learning is a strategy of organizing students to promote each other in the form of groups or teams. The pre-class learning and classroom participation in the flipped classroom can't be separated from the interaction between the students and their peers to achieve the internalization of knowledge. The collaborative learning model is realized in the form of the flipping task completed by the learning group, and the teacher looks for the problem in the way of auxiliary analysis in the classroom. In order to evaluate the effect of the task, the teacher evaluates the task and each group evaluates each other to complete the assessment of student cooperation.

3) The concept of case teaching is mainly in the form of practical application of cases to assist the teaching methods of theoretical understanding. With the construction of mobile Internet environment based on teaching needs, the implementation of the original teaching methods has opened

up a new way. Based on the troubles of the students, after the students study online, the concrete practical cases are released as their discussion questions. Starting from the actual cases, the students can feel the value of theoretical application and practice in the form of practical thinking.

C. Teaching process design

The teaching process is student-centered, mainly assisted by the network teaching platform of Jilin Institute of Chemical Technology, combined with mixed learning concept, collaborative learning concept and case teaching concept to realize the course teaching process. The specific teaching process, as shown in Fig. 1, is divided into the following five parts:

1) Based on the network teaching platform of Jilin Institute of Chemical Technology, the curriculum construction framework is set up, and the curriculum portal is formed according to the requirements of curriculum construction. According to the progress of different classes, the curriculum tasks are distributed according to the progress of different classes. Taking the paradigm section of propositional logic in Chapter 1 as an example, the specific tasks are three task points. The concept and solution of conjunctive normal form and disjunctive normal form, the steps of small-term and large term, and the main disjunctive (conjunctive) paradigm of propositional formula.

2) After learning the content through the platform, students can use the platform to learn about the "topic discussion" in the APP application, and mobilize students to interact with each other. They can discuss questions online or privately (teachers answer them separately).

3) The design uses the "grouping task" in the mobile platform, and the teacher designs the teaching reversal task, and the students freely combine the learning group. The collaborative learning model is realized in the form of joint learning groups to complete flip tasks (common learning, mutual problem solving, collaborative division of labor to complete PPT), and teachers find problems in the way of auxiliary analysis in the classroom. In order to evaluate the effect of the task, the teacher evaluation and the mutual evaluation of each group complete the assessment of students' cooperation.

4) Method sets up online "topic discussion" problems, organize offline practical application case analysis based on knowledge points, and let students feel the value of theoretical application and practice by thinking about practical problems.

5) The test involves five topics related to the knowledge points of this chapter using the "test" in APP. The test will enable students to quickly review the knowledge points of this section at the end of this course, so as to consolidate the effectiveness of this course. The use of mobile means to mobilize the enthusiasm of students to participate in the course of learning.

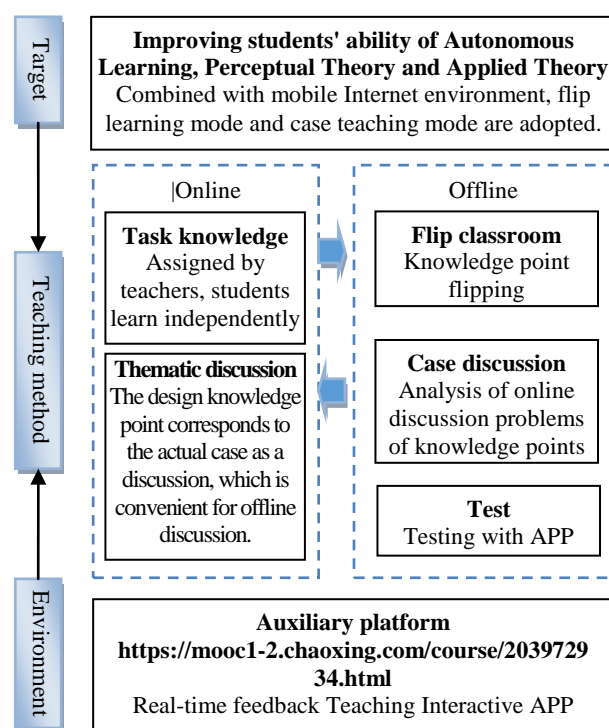


Fig. 1. Structure diagram of teaching process design

V. TEACHING INNOVATION

The traditional course teaching can't mobilize the students' thinking to move forward. The teaching process design based on the teaching concept of intelligent classroom reflects the following three innovations.

1) Discrete mathematics has the characteristics of large number of concepts, scattered content, very theoretical and so on, teachers abandon the original teaching unit and let students learn the core knowledge of teaching independently in advance in the form of task. The flipped learning mode is adopted to make the students explain the knowledge points and carry on the knowledge understanding in the form of special topic discussion, so as to cultivate the students' comprehensive ability to express their views. The teaching situation in the flipped classroom is shown in Fig.2. flipping the cooperative learning in the classroom will eliminate the loneliness of students' web-based learning, experience different roles in the discussion, accept different points of view, and achieve collaborative knowledge construction.

2) Because of the strong theory of discrete mathematics curriculum, students often have trouble with the knowledge points they have learned and do not know where to apply them. In order to enable students to understand the specific application of discrete mathematics in continuous courses, this paper puts forward a case teaching form to serve the continuous courses, so as to improve the students' ability of perception theory and application theory. This chapter is mainly about propositional logic. In addition to cultivating the mode of logical thinking, it plays a very important role in the

subsequent data circuit design. Therefore, the design and selection of logic paradigm derivation is used to solve the problem of circuit design. So that students in the theoretical study at the same time have the practical theory of the application of soil, so that students to find the application of theory and the field of operation.



Fig. 2. Teaching situation of "flipping classroom"

3) The teaching design combines the real-time feedback teaching interaction tools (Bluemoyun Class APP, Learning APP) as the auxiliary teaching platform to make rational use of the mobile interconnection function of mobile phone, so as to provide a good hardware environment for mobile learning in teaching. And then gradually realize the teaching goal of "learning at any time, learning anywhere, learning with you" in professional education.

VI. CONCLUSION

Not all teaching theories are perfect and highly sustainable, and they change with the development of technology and the state of learning. Teaching practice is the source of teaching theory, and practical activity itself is the precursor of theory, which contains rich possibility theory, and is the only way to test the rationality of teaching theory. Through the theoretical reflection obtained from practice, the teacher's personal experience and the experience system formed on this basis should be explained and constructed from the theoretical level, and through the continuous reflection and connection between the teaching practice teaching theories. The teacher's personal experience and the experience system formed on the basis of

the teacher's personal experience should be explained and constructed from the theoretical level. It can't only complete the theoretical promotion of practice, but also have the opportunity to examine and revise the existing theory.

The practice of this teaching curriculum design, from the point of view of application, makes the students effectively connect the knowledge. They have learned with the practice, understand the theory online, put forward the solutions to the practical problems offline, and discuss the perfect methods in the classroom. It highlights the dominant position of students in learning, and the degree of acceptance of students is significantly increased.

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