

# Practical Teaching Reform of Discrete Mathematics

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**Abstract** : In order to highlight the application of discrete mathematics and strengthen the practice of students, we combine online and offline, enrich online teaching resources, strengthen experimental teaching, introduce online evaluation mode and research-based teaching mode, combine various ways to strengthen the cultivation of students' theory with practice, practical ability and innovative spirit.

**Keywords** : Discrete Mathematics; Practice; Reform in Education

Discrete mathematics is one of the basic compulsory courses for computer majors. It is a comprehensive mathematical subject, which fully describes the discrete characteristics of computer science. It is a powerful mathematical tool of computer science. Its leading courses include advanced mathematics, linear algebra and so on. This course prepares the required mathematical foundation for subsequent professional courses such as data structure, database principle, digital logic, operating system, compilation principle, system structure, algorithm analysis and artificial intelligence.

## 1. Curriculum objectives of discrete mathematics

(1) By introducing the basic knowledge of discrete mathematics, including mathematical logic, preliminary set theory, binary relationship and graph theory, students can master the basic methods of mathematical model abstraction and analysis of objective things.

(2) Through the study of this course, students will be trained in abstract thinking, careful reasoning and generalization. This course can improve their professional theoretical level, and provide necessary modern mathematical tools for subsequent professional theoretical courses.

(3) It can lay a solid mathematical foundation for students to adapt to a wide range of fields of computer application engineering. At the same time, use relevant knowledge points to understand the diversity of things in dialectics, guide college students to integrate the diversity of knowledge, ideas, methods and motivation into the cultivation of innovation ability, and stimulate and improve innovation consciousness.

## 2. Current situation of discrete mathematics teaching

### 2.1 Many concepts are abstract and difficult to be understood

Discrete mathematics has many concepts, strong theory and high abstraction. It is a professional basic course of computer science and is widely used in many subsequent professional courses. However, when learning this course, most professional courses have not yet started. Students have no intuitive feeling about the application of discrete mathematics, which affects their interest in learning. This makes students feel that the content is divorced from application, abstract and difficult to understand, and affects their enthusiasm for learning.

### 2.2 The curriculum emphasizes theory and lacks practical teaching process

The teaching process of discrete mathematics ignores the practical teaching segment. Students can not realize the important role

of discrete mathematics in the learning process, can not fully reflect the practicability of professional basic courses, and is difficult to mobilize students' learning initiative and enthusiasm, which affects the cultivation of innovative consciousness and innovative ability.

### **2.3 Students lack the ability to use computer science knowledge and skills to solve practical problems**

With the development of computer science and technology, being able to correctly understand the basic concepts of computer science and flexibly use various ideas, methods and technologies to solve practical problems will become a necessary skill for computer professionals in the future. These skills are the goal of cultivating computational thinking. However, the current curriculum materials lack the system construction of cultivating students' computing thinking ability, and there are deficiencies in students' computer science problem-solving ability. As the most basic and theoretical course in the core computer courses, the teaching problems of discrete mathematics will affect students' learning and training, and the reform is imperative. Therefore, in the teaching of discrete mathematics, we should introduce the "teaching mode of combining research and experiment", strengthen the cultivation of students' ability to study, analyze and solve problems, and strengthen the cultivation of students' practical ability and professional skills, so that students at all levels can obtain more knowledge and exercise. It has become an important and urgent task in curriculum teaching.

## **3. Practical teaching reform of discrete mathematics**

Discrete mathematics itself discusses the study of discrete structure, which can train students' ability of abstract thinking and logical thinking. However, this should be an advantage, which also makes the course of discrete mathematics pay too much attention to the construction of theory, thus ignoring its application teaching in practice. Because its abstract aspects are difficult to be understood, many students rarely understand and remember by themselves after class, but focus on the conclusions that will be used in the exam, which is contrary to the significance of discrete mathematics itself.

Discrete mathematics attaches great importance to theory and application, but because of its important role in the follow-up course, the experimental operation of this course itself should also be paid attention to. When there is no practical support but only theoretical learning, the abstraction of discrete mathematics will increase the difficulty of students' understanding of it, so practice is a necessary link of discrete mathematics.

Based on these aspects, we consider trying to add some practical teaching after the study of discrete mathematics theory, so that students can deepen their understanding of abstract discrete structure in the process of practice.

### **3.1 Integration of online teaching resources**

Discrete mathematics is a very important professional basic course for computer related majors. There are rich and vivid teaching resources on the network. In order to make full use of these resources, teaching resources are collected and sorted according to chapters in the form of online courses. Online courses are an important supplement to classroom teaching. Students can study online in their spare time. This can not only promote students' understanding of the course content, but also enhance their interest in course learning.

### **3.2 Strengthening experimental teaching**

The experimental topics are designed according to the contents of the chapters. The experimental design should consider the students' programming ability and prerequisite courses. Generally, it is mainly based on basic experiments, as well as a small number of comprehensive experiments and innovative experiments. Due to the limited class hours, the experimental topics are generally completed by students voluntarily after class, which can be completed independently or in groups. It is required to specify the purpose, content, programming idea, important code segments and their analysis, experimental results, etc., in the report. The last chapter of the online course is set as experiment, and all experimental topics will be uploaded here. Teachers can choose the excellent ones from the experimental reports submitted by students and upload them to the back of the corresponding topics for other students' reference. Through the training of experimental topics, students' practical ability and problem-solving ability can be improved, and students can have a deeper understanding of the knowledge points of discrete mathematics course.

### **3.3 Introduce online evaluation mode**

Because of many contents, strong theory, abstraction and rigorous problem-solving ideas, the traditional discrete mathematics teaching cannot improve students' interest in learning, and the teaching effect is not ideal. It is very necessary to apply the online evaluation mode to the teaching process of discrete mathematics and improve the traditional teaching methods by using modern teaching technology.

The experimental topic is uploaded to the online evaluation platform. Students can test the code of the experimental topic

online and support multiple submission of evaluation. Collect questions from students. Each topic includes, background description, input and output requirements, time and space constraints, and the author should also provide evaluation data. The monthly competition is conducted on the online evaluation platform, and the winner can get a small reward. This way, stimulating and interesting, can inspire students to constantly challenge and greatly improve their programming practice ability.

### **3.4 Introduction of research-based teaching mode**

Divide the students into groups and choose a topic related to the course content. Students are required to explore the items they are interested in or the contents they have questions, cultivate their ability to find and explore problems, strengthen their autonomous learning ability and independent research ability, and improve their learning interest and motivation. Guide students to understand the background knowledge, cutting-edge knowledge and application examples related to the selected topic by consulting materials. Guide students to try to solve practical problems with the learned theories and methods. After discussion and research, students divide their work and cooperate, establish a mathematical model, calculate the results through programming, and reasonably analyze the results. Ask each group to complete the research report, explain and answer the questions of other students in the form of PPT.

## **4. Conclusion**

On the basis of traditional teaching forms, strengthen the research-based teaching and experimental teaching of discrete mathematics, highlight the application of discrete mathematics, and strengthen the practice of students, in order to improve their computational thinking ability marked by problem analysis ability, program design ability, basic innovation and engineering practice ability, so that students can improve the cultivation of practical ability through course learning and exercise. Inspire and guide students, take students as the main body, encourage students to actively think about problems, explore unknown knowledge and study the application of knowledge. Strengthen the cultivation of students' ability to integrate theory with practice, practice and innovative spirit.

## **References**

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