

Research on Mathematical Modeling Strategy Based on Innovation Ability Training

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Abstract: Mathematical modeling is an effective mode of cultivating mathematical thinking, which is of great significance to the cultivation of students' logical thinking ability. The strong practicality of mathematical modeling cultivates students' innovative consciousness, the diversity of problems cultivates students' innovative ability, and the interdisciplinary nature enhances students' innovative knowledge reserve. This paper first analyses the role of mathematics education in cultivating innovative thinking, and then puts forward effective strategies for developing mathematical modeling activities. It is hoped that the idea of mathematical modeling can be better integrated into the mathematics teaching in colleges and universities.

1. Introduction

Mathematics is one of the oldest disciplines in human society. As a cognitive system of human society, it is closely related to all levels of human social development. Mathematical modeling is an important tool to study and solve these practical problems. Mathematical model is a mathematical structure obtained by using appropriate mathematical tools and making necessary simplified assumptions for the necessary simplified assumptions on the inherent laws of a particular object and goal in the real world. Simply speaking, a mathematical model is an abstraction of practical problems. It is a mathematical structure based on mathematical theory and method to describe the essential attributes and internal relations of objective things. Mathematical model is a bridge between theory and practice. It is an important combination point and way to apply the results of students'theoretical learning to practice. In 2007, the Ministry of Education issued "Some Opinions of the Ministry of Education on Further Deepening Undergraduate Teaching Reform and Improving Teaching Quality in an All-round Way", which regards training innovative talents as the main theme of educational development. Mathematical modeling course is the best combination of theory and practice, innovation and other abilities. It can improve students'innovative consciousness, teamwork consciousness, computer usage ability and writing ability of scientific and technological papers. This is incomparable with other traditional courses, so more and more colleges and universities pay attention to it.

2. The Role of mathematics modeling education in cultivating innovative thinking

2.1 Strengthen the basic knowledge and skills of mathematics.

The basic concepts, principles and rules of mathematics are the frame, the origin and the foothold of mathematics innovative thinking. As we all know, the problem of "trisection" is called one of the three major mapping problems in ancient Greece. It is an impossible problem with a conclusive conclusion. However, up to now, many people are still entangled with this problem. Generally speaking, people who are purely interested in mathematical problems have great potential. If we can guide them meaningfully, we will cultivate purer talents. The basic knowledge and skills of mathematics are just like the building foundation. Its solidity will directly affect the quality and stability of the building. Unsolid foundation can not support the existence of buildings. The so-called innovative thinking based on unsound basic mathematical knowledge and basic skills is just a temporary fantasy. As the starting point of innovative thinking in mathematics, the accumulation of basic knowledge and skills is very important.

2.2 Strengthen the thinking and method of mathematics

There are many ways to form innovative thinking in mathematics. Different ways are applicable to different mathematical conditions, assumptions and thinking subjects. Among these methods, mathematical thinking plays an important role. Human thinking is directional, and there are positive and negative thinking, which is divided into positive thinking and reverse thinking. Reverse thinking refers to a thinking way that is contrary to people's normal thinking way. In some cases, according to the normal way of human beings' thinking, we can not get satisfactory results, but through reverse thinking we will get unexpected results. In mathematics, reverse thinking plays an important role in promoting the formation of innovative thinking. If we can analyze it from the normal direction of human thinking, we will often encounter obstacles in the process of derivation. If we can make full use of the reverse thinking method and start from the conclusion to assume and restore the conditions, we may open up our thinking and solve the problem.

3. Research on the status quo of mathematics modeling education

3.1 Questionnaire sample analysis

This survey is distributed through the network platform. A total of 1000 questionnaires were distributed. Among them, 934 valid questionnaires were recovered, accounting for 93.4% of the total valid questionnaires.

3.2 The simple operation mode of mathematics modeling

Homework is a very important part of teaching. Through homework, students can review and consolidate their knowledge, and also train their computational ability. Mathematical modeling textbook has many exercises for students to practice, but students can search through the network to find a lot of reference about homework content. So many students copy from each other. This situation can not achieve the training of thinking and the expected effect of homework. The results of this survey show that traditional exercise after class is still the most important way of teaching, accounting for 45.70%. The operation mode of mathematics modeling education is shown as the figure 1.

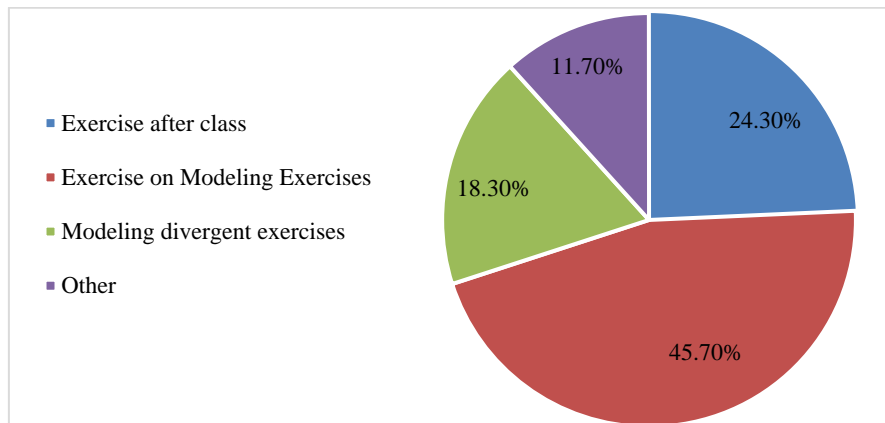


Figure 1: The operation mode of mathematics modeling education

3.3 The low learning effect of mathematics modeling

At the same time, the results of this survey show that the best learning effect is the exercise on Modeling Exercises, accounting for 31.50%. The learning effect of traditional mathematics modeling education mode is shown as the figure 2.

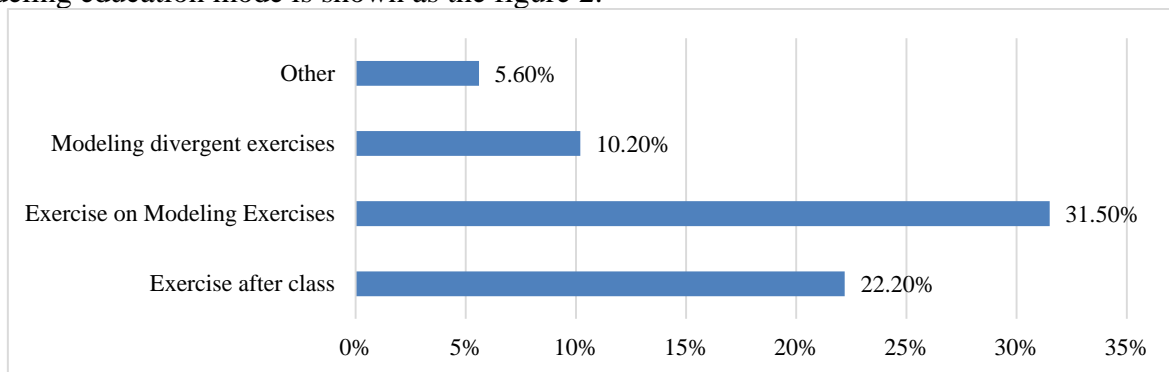


Figure 2: The learning effect of traditional mathematics modeling education mode

4. Countermeasures of mathematics modeling education

4.1 The Way of knowledge presentation in mathematical modeling

The learning materials chosen in the mathematical modeling course should be linked with students' life reality, mathematics reality and other disciplines reality as far as possible, which should be conducive to deepening students' mathematical understanding of the learning content. The presentation of the textbook content should embody the process of its generation, development and application. At the same time, we need to guide students to explore independently, cooperate and exchange, and pay attention to the students' humanistic spirit cultivation. The structure of the mathematical modeling chapter presents as shown in Figure 3.

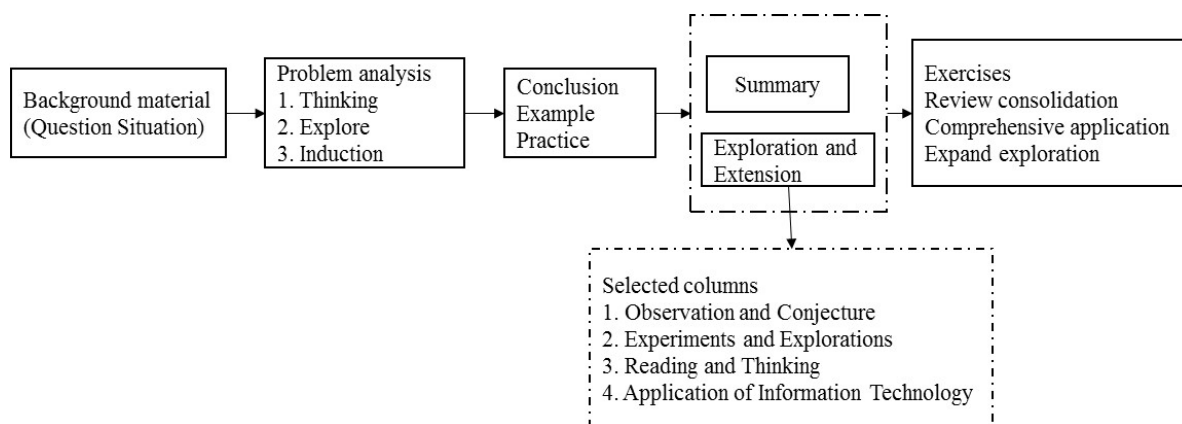


Figure 3: The structure of the mathematical modeling chapter presents

4.2 Strengthening students' ability of experimental modeling

At present, some university majors offer mathematics experiment courses, and only use MATLAB to do simple validation experiments of higher mathematics knowledge. Students do not make full use of software tools, such as matlab, MATHEMATICA, MAPLE, LINDO, SPSS and so on. However, the specific problems that students encounter in mathematical modeling competitions often need to be programmed or simulated by computer. With the help of computer and mathematical software, students need to calculate, analyze, guess, explore and test the modeling problem. Therefore, it is necessary to set up an open computer room laboratory for students interested in mathematical modeling. At the same time, the instructors are those who have outstanding experimental ability in the teaching team of mathematical modeling. Students are trained in many ways, such as micro lessons, live broadcasting and so on. Through these ways, we can stimulate students' curiosity and cultivate students' practical ability, and then strengthen students' ability of calculation and modeling.

5. Conclusions

Students should not only learn the basic theories and methods of mathematics, but also learn to use them flexibly. Mathematical application consciousness and practical ability have become one of the basic qualities that college students should possess. Mathematical modeling course is an important way to achieve this goal. Therefore, we should actively study good teaching methods in teaching and absorb new teaching contents and ideas in time, which is more conducive to the mathematics modeling development. With the advent of the information age, the replacement of knowledge is faster, and many new methods and technologies will emerge, so the mathematical modeling course will also change. Therefore, the reform of mathematical modeling course still has a long way to go, and we need to continue to work together.

References

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