



Practical Exploration of Higher mathematics teaching based on mathematical modeling thought

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Abstract: Higher mathematics is a vital part of higher education, especially for science and engineering students. The quality of higher mathematics learning is directly related to subsequent professional knowledge learning. Its importance is self-evident. Mathematical modeling ideas are beneficial to concretize and visualize the abstract and obscure mathematics knowledge, reduce the difficulty of understanding, mobilize the initiative and enthusiasm of students in learning, and achieve remarkable results. This article focuses on the application of mathematical modeling ideas in higher mathematics teaching.

Keywords: Mathematical Modeling Ideas; Advanced Mathematics Teaching; Practical Exploration

With the in-depth reform of the higher education system, the teaching mode under the traditional exam-oriented education system can no longer meet the teaching needs. There are many problems in higher mathematics teaching, which triggers student resistance and fear of difficulties, and fails to cultivate students' various thinking abilities and practical problems solving abilities, which in turn affects the quality of talent training. Therefore, innovative teaching models are essential. A large number of teaching practices have proved that mathematical modeling ideas are conducive to reducing the difficulty of knowledge, making it easier for students to understand, and can greatly improve teaching efficiency. Then, the following article will talk about some thoughts on the application of mathematical modeling ideas in advanced mathematics teaching.

1. Infiltrate mathematical modeling ideas in advanced mathematics classroom teaching

1.1 Infiltrate mathematical modeling ideas in the teaching of mathematical concepts

As we all know, the course Advanced Mathematics involves a large number of definitions of mathematical concepts. These concept definitions are all described in abstract and obscure language. If they are completely understood from the literal meaning, it will be difficult for students to understand, not mention follow-up learning. However, these concept definitions are actually supported by rich background cases, and teachers should give full play to the role of these backgrounds. Therefore, when carrying out concept teaching, they should not ask students to memorize in order to pass the exam. Teachers should vividly display the formation and evolution of these concept definitions in front of students, truly visualizing abstract and obscure theoretical knowledge. They need to keep the content specific to facilitate students' understanding. For example, before explaining new knowledge, students should be assigned to preview. During the preview process, they can find real cases closely related to these concepts through the Internet and related documents, and use cases to understand the background and practical application of this concept. It can deepen students' impression of these concepts and cultivate students' ability to use concepts to solve practical problems. For example, when explaining the concept of "definite integral", the textbook has already listed actual cases of variable-

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speed linear motion, curved-edge trapezoidal area calculation and other practical cases about this concept. Since students are unfamiliar with the knowledge, so in the preparatory stage, teachers can ask students to use various ways to find real cases such as geometrical volume and physical quality, and guide students to use the idea of "segmentation—approximate summation—taking the limit" to build a model, then solve these practical problems step by step. This is the determination integral mathematical model. Students will master the concept of definite integral and its formation process in the process of their own exploration, understand the approximation from invariance to change, and then to precise mathematical methods, so that they can better memorize and master the concept of definite integral. After the class, homework is arranged, and students are required to work in groups to complete various tasks related to the concept of definite integral, thereby greatly improving the quality and level of advanced mathematics learning.

1.2 Infiltrate mathematical modeling ideas in theorem-proof teaching

As we all know, theorem-proof is an important and difficult knowledge in advanced mathematics teaching. In mathematics teaching, cultivating students' proof ability has a greater impact on subsequent professional studies and careers, because when facing a certain problem, we need to ask each other to use their ability to solve problems. Theorem proof teaching is an important channel for cultivating students' exploration ability, creative thinking ability, and problem-solving ability. Most students think that proof is difficult because they do not master the essence of proof thinking, they know it but they do not really understand it. Therefore, another important task of mathematics teachers is to teach students the thinking methods and cultivate students' thinking ability, analysis and problem-solving ability. Based on this, the idea of mathematical modeling is permeated in the theorem teaching, guiding students to regard the theorem as a specific model, and the theorem conditions as the hypothetical conditions of the model, combined with the specific situations created in advance, to guide students to prove the theorems in real situations. In this way, they can deeply understand the essence of mathematics theorem, so as to effectively improve the effect of teaching and promote the overall development of students.

1.3 The role of multimedia teaching technology

The application range of mathematical modeling ideas is very wide, and there are no special requirements and modes. It can be used in different mathematical concepts and different mathematical backgrounds, but different applications will also produce different effects. In order to continuously improve the effectiveness of mathematical modeling ideas, teachers should use advanced modern teaching techniques to innovate teaching methods, such as case analysis, heuristic teaching, problem-oriented teaching, and task-driven teaching methods. Teachers should use different infiltration methods, focusing on training students' thinking abilities, fully respecting students' main teaching status, stimulating students' interest and enthusiasm for learning in the process of using modeling ideas, and cultivating students' ability to analyze and solve problems. It is worth mentioning that mathematics classroom teaching time is very limited, and to infiltrate mathematical modeling thoughts in teaching, it is necessary to enrich classroom content and improve lecture efficiency. Based on this, it is necessary to give full play to the role of modern teaching technology to realize traditional teaching. The in-depth integration of content and modern teaching technology can not only improve the quality and level of teaching, but also promote the overall development of students.

2. Pay attention to infiltrating mathematical modeling ideas in after-school training and practice

As we all know, advanced mathematics teaching is not only to impart mathematical knowledge and mathematical ability, but more importantly, to cultivate students' thinking abilities such as logical reasoning and calculation. After-class exercises are a crucial link to improve the quality and level of higher mathematics teaching. When doing after-class exercises, students must make full use of the knowledge learned in class to solve practical problems and achieve the purpose of reviewing the past and learning the new. Mathematics teachers must give full play to the role of the exercises after class. Every time a new knowledge point is explained, some application-oriented, open, and exploratory mathematics questions should be assigned, and some mathematics that needs to be completed independently and cooperatively by students. Students need to use mathematical modeling ideas to solve these problems. When it is worth

mentioning, teachers can add discussion links in the after-class exercises based on the actual situation, which can be carried out after class to avoid wasting classroom teaching time. Students can organize group discussions by themselves focusing on homework in the chapter. Some students will explain and others will listen. Students can ask questions at any time during the listening process, and the teacher must participate in the whole process. From a practical point of view, because students do not fully grasp the new knowledge in the classroom, there will be problems that cannot be solved in the discussion process. At this time, the teacher should conduct correct guidance based on the actual situation, encourage and affirm the correct viewpoints, as well as correct deficiencies.

3. Organize and carry out extracurricular mathematical modeling activities

Mathematics classroom explanation time is very limited. Through classroom teaching, students cannot fully understand modeling ideas, and there is not enough time for students to learn modeling gradually. Therefore, teachers should make full use of the off-class time to actively organize and carry out extracurricular modeling activities, taking the mathematical problems that students pay attention to as the main body, and let students cooperate in modeling in groups. Secondly, teachers can also give full play to the role of summer practice, hold mathematical modeling competitions in the school, and organize students to participate in provincial and national college students mathematical modeling competitions to cultivate students' modeling ability while continuously improving the quality and level of mathematical learning. As we all know, many problems encountered in various industries can be solved by using modeling ideas to simplify abstract and obscure content into mathematical formulas and transform them into geometric problems. Therefore, whether in class or outside class, teachers should pay attention to infiltrating mathematical modeling ideas to cultivate students' logical reasoning ability, association ability and creative thinking ability. Secondly, in the process of cooperating to solve problems, students can also feel the charm of advanced mathematics, so they can actively participate in it, and cultivate students' sense of teamwork and ability. The process of modeling is actually the process of students using mathematical knowledge to solve practical problems. In this case, students will realize the importance of learning advanced mathematics, realize that they can change from passive to active learning, and continuously improve the quality and level of advanced mathematics teaching.

4. Conclusion

In summary, the main goal of higher mathematics teaching is to teach students to master mathematical knowledge and skills, and to cultivate students' ability to use mathematical knowledge to solve practical problems. A lot of teaching practice has proved that the use of mathematical modeling ideas is conducive to strengthening students' understanding and mastery of knowledge and stimulating students' interest and enthusiasm in learning. Mathematics teachers should actively change teaching concepts, innovate teaching methods, give full play to the role of mathematical modeling ideas, and ultimately improve the quality of teaching.

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