

The role of the idea of mathematical modeling in advanced mathematics teaching in technical colleges

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Abstract: Increasingly fierce competition in the society leads to higher demand for talents. Technical colleges shoulder the responsibility of training professional and skilled talents, during which process advanced mathematics teaching serves as an important course. Talent training should be based on the training purpose and characteristics of the college. The idea of mathematical modeling pays full attention to innovation and thinking differences, making it helpful in promoting students' learning initiative and advanced mathematics teaching. It also helps to give full play to the role and value of advanced mathematics in daily life, and to promote students' abilities and comprehensive development. However, certain problems exist in advanced mathematics teaching nowadays, for example, inflexible teaching methods, outdated teaching concepts, monotonous teaching methods and insufficient learning interest. Therefore, the mathematical modeling idea should be introduced into the teaching of advanced mathematics, so as to fully stimulate students' interest in and efficiency of learning. This paper aims to explore the role of the idea of mathematical modeling in advanced mathematics teaching in technical colleges and the specific ways of application. It is hoped that the advantages of modeling ideas can be leveraged to enhance its application value in advanced mathematics teaching.

1. Introduction

Advanced mathematics is a relatively basic and difficult course with much content to cover. Although it can deepen students' understanding of mathematics and improve thinking ability and mathematics skills, it is not often used in daily life. Therefore, students tend to be unwilling to learn it, which affects the teaching effect. Mathematical modeling can help to solve problems in life and at work by applying suitable mathematical theories according to the actual situation. As for the advanced mathematics teaching in technical colleges, mathematical modeling can stimulate students' interest in learning and encourage them to use advanced mathematics in daily life. It can also improve students' practical and innovative abilities, which is crucial to students' comprehensive development.^[1]

2. Overview of the idea of mathematical modeling

The idea of mathematical modeling can help to make abstract and complex knowledge simpler. It is a scientific systematic learning method, which can help students to understand related knowledge in an easier manner and be better at mathematical learning. However, many students nowadays hold a pessimistic view towards advanced mathematics teaching and even regard it unnecessary since it has little to do with daily life. Moreover, advanced mathematics is abstract and theoretical, which might frustrate many students in the learning process. Against this backdrop, mathematical modeling theory can be used to introducing models into the examination, verification, solution, and expression of problems, which can make the knowledge of advanced mathematics more structured and practical, thus attracting more students and accelerating the active learning process. To a certain extent, mathematical modeling is more than a mathematical technique, but a mathematical thinking method as well, with which we can discover the internal laws of any situation in the objective world by simplifying problems and setting variables and parameters for mathematical solutions. The application of mathematical modeling theory is also helpful for students to deepen their understanding, during which process multiple ideas and methods can be applied to one problem by

using different mathematical models without any fixed standard.

3. Problems in current advanced mathematics teaching

3.1 Stiff teaching methods

Flexible and scientific teaching methods can help students better understand the theoretical knowledge of advanced mathematics and improve learning efficiency. However, the current teaching methods are generally monotonous, which leads to a dull and inactive learning environment. Teaching based on textbooks is difficult to attract or motivate students, which tends to affect the teaching effect. In addition, stiff teaching methods are harmful for the development of independent thinking, innovation, and mathematical thinking. In this way, students can not apply the knowledge learned in the classroom to real life for problem solving. Therefore, it is necessary to optimize the teaching methods and content and to improve students' participation through various activities, based on the current characteristics of advanced mathematics teaching and the classroom environment, so that students can apply advanced mathematics knowledge to daily life and work and have a more comprehensive logical thinking and mathematics ability.^[2]

3.2 Outdated teaching concept

Continuous development of science, technology, and society poses new requirements for education and teaching activities. Traditional educational methods can no longer meet the needs of talent cultivation nowadays. Traditional advanced mathematics teaching aims to enhance students' computing ability and logical thinking, so that they can be better at solving mathematical problems. However, little interaction between students and teachers makes the classroom dull and boring. Some teachers pay too much attention to problem solving and test scores, while neglecting the importance of logical thinking. They blindly copy the teaching ideas and methods of predecessors without any adjustment based on the students and specific requirements, resulting in low teaching efficiency. Outdated teaching method makes it difficult for students to combine theory with practice. In this way, the course cannot attract students.

3.3 Insufficient faculty

The teachers in technical colleges are weaker in comprehensive ability, teaching methods and teaching concepts compared to teachers in universities. Many teachers in technical colleges fail to adapt to the changing times by adjusting the teaching content, activities, methods, and plans that have been used for the past few years or even decades, thus influencing the future personal development and career planning of many students. In this way, the demand for mathematical talents cannot be satisfied in the society. Some teachers who teach advanced mathematics have a higher age, making them slower in accepting new things and skills, learning to master multimedia teaching technologies and applying new modern teaching concepts in the Internet age, which may discourage the students and lower teaching quality.^[3]

4. The role of the idea of mathematical modeling in teaching application

4.1 Facilitating independent learning

The idea of mathematical modeling, providing a new way for advanced mathematics teaching, can fundamentally enhance students' interest in learning by making teaching methods more flexible and interesting. It focuses mainly on the ability to solve daily problems using classroom knowledge by making the course more relevant to real life. In technical colleges, teachers are supposed to guide the students to apply mathematical modeling ideas in after-school practice, so as to further facilitate their understanding of using the mathematical modeling theory for problem solving, and to enhance their creative and thinking abilities.

4.2 Deepening the understanding of advanced mathematical theories

The appropriate application of modeling ideas can effectively improve the teaching environment and methods of advanced mathematics, enable students to master relevant knowledge more quickly and accurately, and improve their logical thinking, innovation, and mathematical ability. As an important curriculum in technical colleges, advanced mathematics takes a large proportion is also directly related to students' comprehensive ability. Therefore, we must emphasize advanced mathematics teaching in technical colleges and spot problems in teaching.

5. Application of the idea of mathematical modeling in advanced mathematics teaching in technical colleges

5.1 Cultivating higher-quality faculty

The application of mathematical modeling in the advanced mathematics teaching of technical colleges poses higher requirements for the teachers. To some extent, mathematical modeling is an innovation in the educational philosophy and teaching methods. As we advocate quality education nowadays, teachers serve as the organizer and implementer of idea of mathematical modeling. Therefore, their teaching ability and comprehensive quality directly link to the effect of the application. Technical colleges should bring in more high-caliber faculty members so as to enhance the overall level of advanced mathematics teaching. At the same time, it is necessary to improve the quality of existing teachers by providing them with professional training, through which they can master the specific ways and methods of applying mathematical modeling theory to teaching. Advanced mathematics teachers need to strengthen the consciousness of innovation, learn the frontier knowledge, understand the role of mathematical modeling in advanced mathematics teaching, and develop various teaching practices based on new teaching theories, so as to arouse students' interest in learning and promote their comprehensive development.^[4]

5.2 Introducing mathematical software in advanced mathematics teaching activities

There are two kinds of basic mathematics software advanced mathematics teaching, namely, Mathematica and Matlab, which are both powerful and effective tools in modeling. Using the software in teaching as a kind of assistance can not only enable students to learn modern mathematical calculation tools, but also enhance their computing capability. With the computer software, complicated calculation problems can be solved quickly and correctly, and the values of derivative integral, limit differential equation, and extremum of multivariate function can be effectively obtained. In this way, students can develop their practical ability and spend more time on mathematical thinking and concept digesting.

5.3 Improving curriculum design

The teaching method of the idea of mathematical modeling features flexibility. However, when it comes to the formulas and theories of advanced mathematics, students usually memorize them mechanically, which is not effective at all. In addition, the practicality of related mathematical theoretical knowledge is not fully exerted.

6. Importance of mathematical modeling in advanced mathematics teaching

6.1 Improving practical problem solving

In traditional theory-based advanced mathematics teaching, students learn only for exams without applying knowledge in daily life. Fortunately, the idea of mathematical modeling can help students to relate related knowledge to daily life. Mathematical models are mainly constructed based on objective laws in daily life, so students can relate the solutions to the daily problems. Apart from that, mathematical modeling can also make advanced mathematics teaching more active and interesting. Students tend to get frustrated by complex advanced mathematics learning. But with mathematical modeling, students can be more motivated, mathematical problems can be simplified,

and learning can be easier, which is conducive to the efficiency of advanced mathematics teaching.

6.2 Enhancing learning confidence

As learning proceeds, the content for learning gets increasingly difficult. Compared with high-school mathematics, advanced mathematics is more sophisticated in theory and more abstract, which is a huge challenge to the students' logical thinking and abstract thinking [1]. In the process of learning advanced mathematics, many students who have shown great interest in high-school mathematics are frustrated and tired, thus losing interest over time. Mathematical modeling ideas can make advanced mathematics teaching more diverse and attractive by using various teaching methods. Teachers can create an active learning environment to enhance students' interest as well as their confidence in learning.^[5]

6.3 Enhancing comprehensive ability

The idea of mathematical modeling is to use rigorous mathematical conclusions and ideas, appropriate assumptions, and reasonable analysis in problem solving. In the process of using mathematics language, students can effectively enhance their language and expression skills. In the process of simplifying and analyzing abstract content, students can enhance their logical thinking and the ability of information capture. In addition, students can enhance their thinking innovation and logics by relating different mathematical knowledge during modeling. At the same time, the idea of mathematical modeling encourages independent learning and thinking, thus laying a good foundation for future study and life.

7. Conclusion

In conclusion, effective application of modeling ideas in advanced mathematics teaching can effectively solve such problems as boring teaching content, monotonous teaching methods, and outdated teaching concepts, simplify complex mathematical problems, and improve students' abilities of mathematical idea application, problem solving, and innovation. This paper explores the role of the idea of mathematical modeling in advanced mathematics teaching in technical colleges and the specific ways of application. It is hoped that modeling ideas can be fully leveraged in higher education, so as to improve the teaching quality of advanced mathematics in technical colleges and promote the comprehensive development of students.

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