Research and Application of Mathematical Modeling in the Cultivation of College Students' Mathematical Core Literacy

Fangbo Hou

College of Ats and Sciences, Jilin Agricultural Science and Technology University, Jilin, Jilin, 132101

Keywords: mathematical modeling, mathematical core literacy, cultivation method

Abstract: Mathematical modeling is one of the core literacy of the six major mathematics. Mathematical modeling can develop students' mathematical thinking and mathematics application skills. Teachers should strengthen students' awareness of mathematical modeling and guide students to model through independent inquiry. Teachers should also set up classroom activities related to mathematical modeling, develop students' modeling skills, and enhance students' core literacy.

1. Introduction

Starting from the definition of teaching, the modeling idea comes from constructivism, and its connotation is the abstract mathematical inquiry mode that mathematicians can summarize after a lot of research. Through this model, most data can be effectively quantified and this quantification builds a precise and efficient mathematical problem model. Therefore, teachers' effective teaching of this thought in the teaching process can help students improve their mathematics ability, and this ability is the key to the core literacy of mathematics. With the gradual development of the new curriculum reform, mathematics teaching has become an inevitable way for students to carry out efficient and accurate core literacy teaching. This requires teachers to educate students in the process of modeling, and use this idea as a starting point to cultivate Students' knowledge of mathematics inquiry ability, math problem solving ability and mathematical logic thinking. From this point of view, the teaching of mathematical modeling ideas for students can not only promote the development of junior high school mathematics teaching, but also help students to effectively lay out and plan their own mathematics career.

2. Core Literacy-related Talent and Mathematics

Since the beginning of the 21st century, a variety of innovative careers and working models have emerged, and new technologies have enabled humanity to enter the era of globalization of information dissemination. Researchers have put forward new requirements for education in the information age from different perspectives. Among them, Thomas L. Friedman's views have received wide attention. From the educational point of view, he gives the five skills and attitudes needed to train children into a middle class that will not be eliminated in a flat world: one is to cultivate the ability to learn how to learn; the other is to master the skills of surfing the Internet. Identify the noise, garbage and lies on the network, discover the source of wisdom and knowledge on the network; third, learn self-motivation, maintain learning passion and strong curiosity; fourth, learn lateral thinking and find connections in different fields. Develop comprehensive ability; fifth, cultivate artistic talents, learn to empathize, coordinate arrangements, solve new challenges, and pursue excellence.

As a front-line teacher of school education practitioners, they also start from their own fresh educational practice, and propose to cultivate students' originality, profoundness and flexibility in thinking in mathematics teaching, and develop habits of independent thinking. [5] When Einstein talked about the goal of school talent training, he also pointed out: “Students leave school is a harmonious person, not an expert... The primary position should always be the synthesis of independent thinking and judgment. The cultivation of abilities, rather than the acquisition of specific knowledge. If a person masters the basic principles of his subject and learns how to think

and work independently, he will definitely find his way. The above-mentioned talent training goals for us Delineating the blueprint for responsibility that education should assume. Mathematics as a core subject of the school should naturally play a role in educating people around these macro goals and provide direction for the construction of mathematical literacy. For example, mathematics education can promote the development of students' originality and flexibility. This will help to find solutions in crisis and conflict so that individuals can enjoy life more.

3. Composition Model of Mathematical Core Literacy

“Core literacy is a kind of concept that defines the future talent image from ‘learning results.”[10] Although the expression of core literacy is very rich, they should focus on the concept of talent, curriculum, and discipline. For example, the International Student Assessment Program (PISA) initiated by the Organisation for Economic Co-operation and Development (OECD) proposed the concept of mathematical literacy earlier, and portrayed the image of future citizens from the perspective of mathematics education. It defines mathematical literacy as “a personal ability, including the ability to recognize and understand the role of mathematics in the world, to make informed mathematical judgments, as a positive, enthusiastic, reflective citizen who uses mathematics and participates in it, To meet the needs of personal life." The Oxford Learning Center has published what is mathematical literacy, when will have mathematical literacy, and what challenges are faced by mathematical literacy development. The Center proposes that mathematical literacy includes the ability to solve real-world problems, reason and analyze information; it is an ability to understand mathematical "language." Math literacy is the second key literacy in addition to language literacy. It is especially important for students to understand problems by understanding technical terms.

Domestic scholars have put forward their own views on the study of the connotation of mathematical literacy. Some studies have proposed that the core literacy of mathematics is a comprehensive and specific ability for students to learn mathematics. It is based on mathematical knowledge and skills, and is higher than specific mathematical knowledge and skills. It reflects the essence of mathematics and mathematics. It is in the process of mathematics learning. Forming. Some studies also believe that the core literacy of mathematics is a comprehensive manifestation of mathematical emotional attitude values, mathematical knowledge, and mathematical ability. Some studies emphasize that the core literacy of the discipline refers to the quality of thinking and key competence of the discipline. The mathematics discipline mainly cultivates the logical thinking of deduction and induction, and cultivates the corresponding reasoning ability of deduction and induction. Some foreign studies focus on the specific components of mathematical literacy, and propose that the core literacy of mathematics is situational, including mathematical thinking ability, representation ability, symbol and formal ability, communication ability, modeling ability, problem solving and problem solving (Math problem processing) ability and so on. [16] Other international scholars have paid more attention to the study of specific mathematical literacy components, among which the higher frequency appears for mathematical problems, mathematical problem solving and mathematical communication.

4. The Cultivation and Strengthening of Mathematical Modeling Ability

Before the new lecture, the teacher designed the pre-learning study guide to remove the barriers of knowledge and direction for the students. Through the guidance program, students are guided to explore the key to the problem, and there is a preliminary self-learning process for the construction of the model. Through self-learning and inquiry, students can fully expose problems and improve the pertinence of model teaching. Inspired and guided by the design of the pre-learning study guide, the students will gradually learn, research and apply mathematical models, form new methods to solve problems, and strengthen the awareness of modeling and participation in practice. For example, when a teacher guides a student to construct a measurement-based model, the design guide should remind the student to abstract the measurement object and master the basic common

sense. Teachers should encourage students to analyze and optimize the data using a variety of different measurement methods. By guiding students to explore independently, students can explore and summarize the methods of model establishment under different conditions, and cultivate students' modeling ability.

Teachers can integrate mathematical model teaching in all aspects of teaching. For example, teachers should pay attention to the infiltration of mathematical modeling ideas in the new class teaching, so that students can link the mathematics knowledge points in the new lectures with the actual life, introduce the cases related to mathematics in real life into the classroom teaching, and guide the students to the case. Internalization is a mathematical application model to stimulate students' interest in mathematics learning. In different teaching sessions, teachers can vividly display the contents of the textbooks to students by contacting familiar examples in real life, thus strengthening students' ability to use mathematical models to solve practical problems. The teacher develops the new lectures by describing the background of the mathematical problems and guiding the problem background. In the review section of the review class, teachers focus on refining and summarizing problem-solving models, cultivating students' ability to transform, and allowing students to recognize and apply mathematical models in multiple directions. Relatively speaking, the mathematics problem in the high school stage pays more attention to the comprehensive examination of knowledge, and requires more flexibility in thinking. The mathematics knowledge, problem solving methods and mathematical ideas examined in the high school stage are basically unchanged, and the set topic form is relatively stable. Therefore, teachers should properly guide, reasonably inspire, analyze the answering ideas, and gradually construct a problem-solving model of key questions.

Teachers should combine teaching experiments when conducting mathematical modeling activities. Conducting activity classes and practical classes can encourage students to collaborate and learn. Teachers should conduct mathematics experiment teaching in a timely manner. They can arrange a teaching experiment class every week to let students actively solve problems from the perspective of mathematical modeling. In the teaching experiment, students are allowed to write experimental reports in the form of group cooperation. The teacher asked the students to conduct group communication in the classroom and summarize the communication of each group. Teaching experiments can encourage students to enhance their mathematical modeling awareness and enhance their core literacy.

In the teaching of mathematical modeling, teachers should pay attention to the choice of interdisciplinary problems in mathematics combined with subjects such as chemistry, physics and biology. Teachers can select relevant application questions from these subjects to guide students through mathematical modeling and application of mathematical tools to solve problems in other disciplines. For example, some students think that learning a good creature is not related to mathematics, because the high school biology department is mainly based on descriptive language. These students lack scientific thinking and have not yet established a science awareness. For example, students can use mathematical addition and multiplication principles to solve the computational problems of some genetic diseases in biology. They can also mathematically rank and combine the genes of meiosis and gametes. Composition problem. As another example, when learning a sine function, the teacher can guide the student to use the model function to write mathematical expressions of the exchange images learned in the physics discipline. This requires teachers to guide students in mathematical modeling in classroom teaching. Therefore, teachers should pay attention to the connection with other disciplines in the teaching of mathematical modeling. Through mathematical modeling, students can understand other subject knowledge and strengthen students' learning ability. Paying attention to the connection between mathematics and other disciplines is an important way to cultivate students' awareness of modeling.

5. Conclusion

In the process of mathematics teaching, teachers should be student-oriented, carefully designing the guiding case, and encouraging students to explore and apply mathematical models

independently. Through modeling teaching, students are formed into a mathematical application consciousness and modeling consciousness that transforms mathematical problems and practical problems. By strengthening the awareness of mathematical modeling and allowing students to master the methods of applying mathematical models, teachers can lay a solid foundation in mathematics and enhance the core literacy of mathematics.

Acknowledgements

Project Fund: Research and Practice of Mathematical Modeling in the Cultivation of College Students' Mathematical Core Literacy in the 13th Five-Year Plan of Jilin Province Education Science Approval Number: GH170515

Jilin Province Education Department's "Thirteenth Five-Year" Science and Technology Project "Study on Block Eigenvalue Containment Domain of Block Composite Matrix Partitioned by Part II" Contract No.: JJKH20180731KJ

References

[1] Zheng Lan, Xiao Wenping. Exploration and Time of Problem-Driven Mathematical Modeling Teaching Concept [J]. Journal of Wuhan Institute of Shipbuilding Technology, 2012(4).

[2] Wang Guojun. High School Mathematical Modeling Teaching [J]. Education Science (citation), 2016(8).

[3] Li Mingzhen, Qi Jianhua. Cultivation of Mathematical Modeling Ability of Middle School Mathematics Teachers [J]. Journal of Henan Institute of Education (Natural Science Edition), 2002 (2).

[4] Ren Youqun, Yan Fengwei, Li Feng. How is Digital Aboriginal Possible? Also on the Necessity and Possibility of Computational Thinking Entering Information Technology Education in Primary and Secondary Schools [J]. China Electro-education Education, 2016(1): 2 - 8.

[5] Liu Xinqiu, et al. Connotation analysis and rational positioning of "mathematical emotions" [J]. Journal of Taiyuan College of Education, 2005(9): 21 - 24.