Thought on Mathematical Thought Infiltration Method for Mathematics Teaching in Higher Vocational Colleges

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Abstract: Mathematics is an important foundation subject and also basic basis for scientific and technological development. Science, engineering and economic management subjects in higher vocational colleges are based on mathematics. Mathematics is an abstract subject. To learn mathematics well, students need to own good mathematical thinking. For the students in higher vocational colleges, their foundation is relatively poor, and the courses set in higher vocational colleges are just a few. Thus, teaching knowledge cannot meet students' needs. In order to improve teaching quality of higher vocational colleges, it is necessary to infiltrate mathematical thought in teaching, improve mathematical learning ability, make mathematical thinking become the essential quality in the future learning and exploration and lay a solid foundation of mathematics.

1. Introduction

Mathematical thought is an applied thinking. It can help us analyze and solve problems in actual work and learning through mathematical theory or logical reasoning. It is a very important basic ability and tool for our work and life. Educators express that much mathematical knowledge learned at school will be gradually forgotten in life and work, without essential action. However, mathematical thought will be imprinted in mind and becomes an important thinking mode. It can help us solve and handle various problems in work and life. It is required to infiltrate mathematical thought in mathematics teaching in hiver vocational colleges and cultivate students' mathematical thinking so as to exert its real functions.

2. Overview of mathematical thought

The views and methods used to solve mathematical problem in mathematical activity are mathematical thoughts. For mathematics, proposition, rule, skill and method of mathematics are the essentials of mathematics. They are the soul of mathematics. Generally speaking, mathematical method is the specific way, mean and strategy used to solve mathematical problems. In a generalized sense, mathematical method can be expressed as description of the state of a thing, relation among things and process with mathematical linguistics. Through analysis, derivation and calculation of the relationship, problem prediction, judgement and interpretation can form. Mathematical thought is not just the foundation of solving mathematical problems, but also the basic theory and spiritual essence of mathematics teaching. Mathematical thought is mainly reflected in the implementation means of mathematical method. Mathematical thought has been an important content for people to investigate mathematics and learn mathematics, and is also the essence of mathematics learning and application. For mathematics teaching in hiver vocational colleges, mathematical thought must be infiltrated in teaching in order to really achieve teaching significance.

3. To mine mathematical thought

Mathematic textbooks contain mathematical thought. The main teaching basis of teachers in higher vocational colleges is the textbook. Thus, in order to improve mathematics teaching quality

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and promote formation of mathematical thought, teachers of higher vocational colleges must deeply mine contents of textbooks, analyze textbooks, research teaching content and mine the thinking methods contained in textbooks through combining professional content and the knowledge.

3.1 Firstly, limit thought

The concept of limit is widely applied in real life, such as solving the extreme value of two-variable function, solving conditional extremum, and least square function. All these contents are widely applied. In the teaching process, it is required to start from the concept of limit value, rationally arrange teaching content and teach students through some practical cases. Or, mathematical model can be constructed as per the teaching content. Mathematical modeling method can be utilized to introduce the mathematical concepts of integral and derivative. In the teaching process, teachers should pay attention to students' ability to comprehend these concepts and solve practical problems with these concepts. For example, during teaching the courses of economics, qualitative or quantitative analysis of partial derivative is a common way, and it can solve many problems of economics. For example, marginal analysis and elastic analysis applied in economic analysis, output maximization under the fixed cost, and cost minimization under certain output can be solved through the theory of partial derivative.

3.2 Secondly, derivative thought

Derivative content is an important content in mathematics teaching of higher vocational colleges. The concept of derivative plays a great role for some limit value problems. For instance, first-order derivative and second-order derivative can be used to solve the limit value of a function. The curvature of function curve at one point can be solved with derivative. Hence, derivative has very important significance in real life. Derivative thought is not just very important in mathematics, but also plays an important role in other subjects, such as physics, economics and lemology. Thus, teachers can properly apply mathematical modeling thought to explain the content of this chapter, and solve mathematical problems through modeling of abstract derivative. For example, during teaching instantaneous speed of variable rectilinear motion and current intensity of AC, derivative modeling thought can be used. In lemology teaching, some lemology cases can be added, and the cases can be converted into functions. In this process, students can effectively understand and master the change rules of independent variables in the function so that students can gradually develop the habit of solving problems with mathematics.

3.3 Thirdly, integral thought

The thought which is widely applied in mathematical modeling is definite integral. Both calculus and definite integral are key contents in geometry and physics. In order to better promote students' learning efficiency, teachers should try their best to add mathematical modeling thought in the teaching process, and skillfully establish integral formula with infinitesimal method. When teaching integral, teachers can use the distance of variable rectilinear motion to extract the concept of integral from the problem. Solving infinitesimal is the key of problem solving based on definite integral thought. Definite integral model can be utilized to solve some practical problems such as the mass of uneven fine rod, acting of variable force, commodity storage cost optimization and time setting of traffic lights. Mathematical modeling method is a very effective learning method. Students experience researching and thinking process of mathematicians through modeling. In this way, they can more thoroughly understand mathematical concepts and formulas. Besides, this can help students comprehend the essential significance of mathematics, and students' cognition for mathematics can be changed thoroughly. On this basis, students can cognize the role of mathematics in life and then form the thought that mathematics stems from life and is applied in life.

4. Method of mathematical thought infiltration

4.1 To pay attention to the occurrence process of mathematical knowledge and grasp the opportunity of mathematical thought infiltration

The occurrence process of mathematical knowledge is actually the generation process of mathematical thought. Hence, it is required to attach importance to students' mathematics learning process, seize the opportunity, properly infiltrate mathematical thought into teaching, let students practically experience mathematical thought and achieve the teaching effect. For instance, solving the system of linear equations us the basic content of mathematics teaching of higher vocational colleges. In the teaching process, teachers can properly enlighten students for thought conversion and convert the problem of system of equations into familiar matrix problem. In matrix problem solving process, teaches can guide students to convert matrix into echelon matrix through elementary transformation, then judge the solution to the system of equations and figure out the solution. In this process, students can feel the significance of conversion thought and grasp the application of elementary transformation. In this process, students can experience teaching knowledge transfer. In other words, elementary transformation method can be used to simplify the solving method during figuring out the inverse matrix of matrix. In this teaching process, the teacher plays an important guiding role. Teacher's careful guidance can make students take active part in knowledge occurrence process. In this process, students are repeatedly edified by mathematical thinking and gradually develop the habit of consciously applying mathematical thought. In mathematical thought teaching, students must master research method and inference method which are the basic methods. With these methods, students can cognize the essence of mathematics and recognize the inherent law of mathematics so that they can grasp the fundamental strategy and procedure of mathematical problems in the problem solving process. After students experience this process, they can have a more comprehensive understanding of establishment, development and promotion of mathematical knowledge structure, understand the process of proposing mathematical concepts, formulas and theorems and more clearly cognize the process of concluding the problem solving thought. Such mode can let students form mathematics consciousness in thinking process and enhance the relation between consciousness and real life. Students gradually learn to start from practice, model to solve abstract mathematical problems, cultivate mathematical thinking quality and form the favorable self-learning ability. Once they form self-learning ability in mathematics learning, they can lay a solid foundation for absorbing more mathematical knowledge in the future learning and life to meet their learning needs and job needs.

4.2 To deepen mathematical thought with "problem solving"

The core of mathematics is problem. High-level mathematical problems usually need to be solved through profound mathematical thought. In addition, these problems will promote people to generate new views and mathematical theories and facilitate mathematics development in the solving process. Problem solving is an important expression of mathematical thought application. Meanwhile, mathematical problem solving needs mathematical thought as the guidance as well as innovation and application of mathematical thought. Therefore, in mathematics teaching process, teachers of higher vocational colleges must highlight the guiding role of mathematical thought and display the process of applying mathematical thought in problem solving in order to help students deepen mathematical thought. Mathematics teachers of higher vocational colleges should choose the typical cases which can highlight mathematical thought and are closely related to the teaching content. These cases should be able to introduce mathematical knowledge so as to let students form the ability to apply mathematical knowledge to solve practical problems. When students explore and solve problems, they can deeply experience the application value of mathematics. Mathematical modeling activity cam well play a good ideological guiding role and guide them to seek mathematical problems in real life, conclude and summarize the problems, create mathematical models and try to solve

mathematical problems with mathematical knowledge and method. Teachers should let students experience mathematics in life and realize mathematics stems from life through introducing the extensive applications of mathematics in the society and opening their mathematical view. When students successfully solve mathematical problems, they can enhance their confidence and motivate their enthusiasm for mathematics learning. Through the process of solving problems, they can enhance understanding of the essence of mathematics, enhance practical ability of mathematics and promote their innovation ability.

4.3 To enrich mathematical thought infiltration method with information technology

Abstraction has been an important feature of higher mathematics. Different schools and majors have diverse requirements for higher mathematics study. Higher mathematics in higher vocational education mainly requires students mastering the formation process of mathematical concepts and learning mathematical methods. It does not require students pursing perfection in terms of proving mathematical formula, theorem and nature, but requires them applying mathematical knowledge. But for some formulas and theorems, students should be able to profoundly experience them and deeply cognize their essence so as to better apply them. Teachers of higher vocational colleges need to simplify abstract and complicated concepts and mathematical theories in teaching process and let students cognize them clearly so that they can accept them. In current information technology development, the application of multimedia technology in teaching process achieves this idea. Multimedia technology can let teaching become vivid and visual and make boring teaching become interesting. Teachers can utilize multimedia teaching to create favorable classroom atmosphere. Multimedia video, animation and drawing functions are the tools which can be used to let intangible knowledge become visual. Multimedia teaching can stimulate students' learning interest, motivate their sense organs, give full play to their initiative and let boring higher mathematics study become easy and pleasant. For instance, mathematics teachers of higher vocational colleges can express "infinite approximation" through animation. Students can enhance perceptual cognition through watching animation. Teachers can design some animations with variable parameters and let students set parameters at will in learning process to enhance their participation and let them really become the master of classroom. When setting the parameters, students can deepen their understanding of relationship between "infinite" and "finite".

5. Summary

Infiltrating mathematical thought, enhancing integrality of mathematical knowledge and keeping integrity of mathematical knowledge in mathematics of higher vocational colleges contribute to helping students form complete mathematical idea and mathematical thinking and strengthening relations among each knowledge point so as to make them form big mathematical concept. Mathematics stems from life and is also widely applied life. Infiltrating mathematical thinking to students in teaching process and cultivating students' ability to solve problems in life with mathematical thinking and method can enhance students' analysis ability. These are also of great significance for cultivating students' creativity.

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