Practice and reflection on mathematics teaching reform in higher vocational colleges

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Abstract: Faced with the current situation of heavy tasks and relatively reduced class hours, students' learning interest is generally not high, the teaching reform is imperative. This paper explores and thinks about teaching contents, teaching methods and teaching evaluation.

1. Introduction

Higher mathematics is an important basic course in higher vocational education, which plays an important role in the study of students' professional courses and the cultivation of their thinking quality. Therefore, mathematics teaching in higher vocational colleges should focus on improving students' mathematical accomplishment, and teaching for students' application and practice. However, the teaching situation of mathematics in some higher vocational colleges is worrying. The main manifestations are as follows: A. Some students lose their interests in mathematics due to their poor mathematics foundation and lack of good learning methods. B. Some people think that mathematics is of little use except for exams, and that there is no initiative in learning. C. Most teaching materials of mathematics emphasize the systematicness and integrity of mathematics, and lack the introduction of basic ideas and methods. D. Teaching of teachers is mainly based on traditional teaching methods, and focuses on the teaching of theoretical knowledge in class, which has little connection with practical application, and does not meet the requirements of training application-oriented talents in higher vocational colleges. E. In recent years, with the promotion of employment-oriented and work-integrated learning talent training mode, the teaching hours of mathematics in higher vocational colleges are gradually reduced. As an important basic course, mathematics is faced with the task of how to improve students' mathematical application ability while reducing class hours. Facing the teaching of mathematics in higher vocational colleges with few class hours, heavy tasks and uneven quality of students, the reform is an essential and urgent task.

2. Several main aspects of mathematics teaching reform in higher vocational colleges

2.1 Reform of teaching content

The study of mathematics in higher vocational colleges should provide necessary basic knowledge for specialized courses and cultivate students' ability to analyze and solve practical problems with mathematical thoughts. In terms of teaching content, the principle of necessary and enough is adopted to cut, and the content is reorganized according to students' different majors.

The teaching content of higher mathematics must highlight the application of mathematics. It can introduce the actual background of mathematical concepts and principles, introduce some important conclusions without proof, and highlight the application of conclusions through practical examples. The practical examples of teaching should be taken from students' daily life or their major to make the knowledge specific and vivid. The textbook compilation should desalt the Abstractness and rigor of theorems, rules and formulas, and strengthen the content of practical application, which is what higher vocational students need most.

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Mathematical modeling is a comprehensive application of mathematics, computer and other disciplines. Mathematics teaching in higher vocational colleges should add some mathematical modeling knowledge which could strengthen students' mathematical application ability. If conditions permit, colleges could also introduce the use of computer application software, such as excel, matlab, lingo, etc., increase the content of mathematical experiments, and improve the data processing and programming ability of students.

2.2 Reform of teaching methods

2.2.1 Change of teachers' teaching ideas

At present, the teaching method of mathematics teachers in higher vocational colleges in our country is mainly explanation method, that is, teachers give priority to teaching and students give priority to listening. This kind of teaching method is easy to evolve into injection. In addition, teachers pay attention to systematicness and logicality, and do not fully consider students' characteristics and professional requirements, so the teaching effect is not very well. Higher vocational education requires the cultivation of high-level and sustainable development of practical and technical talents, so that they can skillfully use the theoretical knowledge to solve various problems encountered in practical production. According to the characteristics of higher vocational education, the mathematics course should pay attention to the application of mathematics knowledge and take cultivating students' ability to solve practical problems as an important goal.

First, for students, the interest can arouse them to study the enthusiasm, the interest is the best teacher, therefore in the higher vocational mathematics teaching must let the student realize the mathematics application and the interest, causes them to have the interest to study and grasps the essential knowledge. For example, the concept of limit can be explained with professional examples, such as the compound interest problem in the professional investment and financial management, and the calculation formula of the value of the stock are all limit problems. Another example, when talking about the basic formula of calculus, in order to improve students' interest in learning, teachers could talk to students about the issue of the invention of calculus, that is, whether the invention belongs to Newton or Leibniz. As a mathematics teacher of higher vocational college, we must extract the mathematical breakthrough point in life, through specific examples of life, so that students understand the close connection between mathematics and real life, to have a strong interest in mathematics learning.

Second, it should attach importance to the cultivation of students' mathematical application ability. From the perspective of application in higher vocational mathematics to deal with mathematics, elucidate mathematics, and present the mathematics, take cultivating students’ ability to solve practical problems as the focus of teaching content, use problem situation, setting up model, interpretation and application teaching mode, arrange multi-angle and multi-level content of mathematics application, stimulate students' interest in learning effectively. Problems such as water conservancy and transportation are transformed into algebraic equations, while problems such as population, output, profit, tax and growth rate are transformed into exponential equations. Problems such as the input and output of the material cost are transformed into the problem of the maximum value of the function, which can be solved by solving mathematical problems. In daily teaching, teachers can adopt heuristic teaching method and discussion teaching method which are helpful to cultivate students' mathematical application ability. Students are the subject and teachers are the leader. Teachers can set up problems carefully and guide students to actively explore ways to solve problems around the problem solving. Through concrete examples, the real problems in life are in front of students, so as to stimulate students' desire to learn.

How to guide students to study and reflect in problem solving? We can arrange some materials so that students can solve problems by self-directed activities and know what knowledge they have learned is useful in solving problems. At the same time, in the teaching of mathematical modeling course, we should start from the practical problems of our life to discuss, first easy and then difficult. Teachers should ask students to explain some practical results with existing mathematical knowledge, and then propose some practical problems step by step, and solve them with

mathematical modeling method.

2.2.2 The thought method of higher mathematics should be emphasized in teaching

An important part of college learning is to understand the thinking method of the subject, not just to prepare for exams. The thought method of higher mathematics is beyond the reach of elementary mathematics, which is a great leap of human understanding of the objective world. Therefore, teachers should give special prominence to the thought method of higher mathematics in teaching, instead of just explaining the problem-solving skills. For example, the idea of limits is extremely important in higher mathematics, throughout the whole of higher mathematics. we can deal with the problem of change, the problem of curve, the problem of infinity with using the limit tool. As a tool for studying many problems, we should focus our teaching on students' understanding of the idea of limits.

2.2.3 Using modern educational technology Rationally

Introducing modern educational technology into mathematics teaching is an ineviTable trend of teaching reform. In the process of higher mathematics teaching, multimedia courseware has large amount of information, rich and colorful contents, and strong ability of computer processing information, which can well simulate mathematics teaching and even complete part of teachers' work. In addition, the Abstract concepts and theorems in mathematics can be vividly expressed through charts, images, animations and other multimedia, which is convenient for students to understand and master. However, modern educational technology can only be an auxiliary means in mathematics teaching in higher vocational colleges. The characteristics of mathematics determine that the use of multimedia teaching in many aspects of mathematics teaching is not good, but the teachers teach on the blackboard will be clearer and more concise, more conducive to the understanding of students. If teachers teach some content with using courseware, it is difficult to reflect the thinking process of mathematics, students cannot really understand.

In addition, for the technical application-oriented talents cultivated by higher vocational colleges, mathematics is a tool for them to engage in professional work. In teaching, we should introduce some mathematical software to students appropriately, or we can also open mathematical experimental courses. Using mathematics software can perform more complex calculation, drawing, to establish the mathematical model of calculation, analysis, and judgment, therefore teachers can introduce some commonly used mathematical software, such as mathematica, matlab, lingo, etc., especially the matlab not only has its powerful calculation function in mathematics, but also has the extremely widespread application in studying other engineering courses of.

2.3 Reform of teaching evaluation

At present, the evaluation of mathematics teaching in higher vocational colleges mostly focuses on the quantitative evaluation with specific scores as indicators, and it can't examine students' practical application ability of mathematical knowledge well. The assessment is mainly based on written test, which only evaluates students' learning situation through test scores, and does not pay attention to the evaluation of students' practical application ability, which is unfavorable to the development of students. The multi-evaluation system should be developed to evaluate students from the perspective of development and cultivate students' long-term interest in mathematics and application ability of mathematics. Assessment can include classroom learning status, homework, daily test, final test, etc., and students' scores can be comprehensively assessed in various forms such as examination papers, applied small projects, mathematical modeling applications, mathematical papers and defense. Teachers must evaluate students fairly and reasonably, design practical examination topic according to students’ different study administrative levels and different professional circumstance, and ask students finish inside formulary time. This will make students think, inquire, read materials initiatively in the learning process, which not only mobilize the enthusiasm of students to learn, but also improve the students' mathematical application ability imperceptibly.

3. Conclusion

The development of social economy requires more and more for builders. China's higher education has entered the mass stage, and more and more graduates have entered the labor market. The huge employment pressure and the inadaptability of college graduates force us to pay attention to the teaching in colleges and universities. Higher vocational education is the objective need of higher education to adapt to social development, and it is also the ineviTable product of China's higher education development. With the continuous development of science and technology, the importance of mathematics is more and more recognized by everyone. In the reform of mathematics teaching in higher vocational colleges, we should use modern teaching concepts to cultivate students' mathematical application ability and promote their comprehensive development.

References

[1] Gong Hua, Chen Daheng, The development of mathematical modeling education in higher vocational education reform, Vocational Education Research, vol. 2, 2006.

[2] Yang Honglin, Some ideas on teaching reform of higher mathematics course, Journal of Mathematics Education, vol. 2, 2004.