

Research on Strategies to Improve Mathematical Thinking Ability in Higher Vocational Colleges

Liyao Liu

Hunan Railway Professional Technology College, 412001. Zhuzhou City, Hunan Province, China

Abstract: Mathematics teaching in higher vocational colleges is also constantly pursuing higher education quality as the continuous deepening of education reform. However, the author found that the cultivation of students' mathematical thinking ability has become an urgent problem that needs to be solved in the actual teaching process. However, the current situation is restricted and influenced by many difficult factors. The paper conducts an in-depth analysis on the cultivation of mathematical thinking ability based on this, in order to effectively improve this situation.

Keywords: Higher vocational mathematics; Thinking ability cultivation; Improvement strategies

Introduction

Students in higher vocational colleges generally have problems such as weak mathematical foundation and lack of interest in mathematics, which restricts the improvement of students' mathematical thinking ability. The content of mathematics teaching lacks interest and the teaching methods are single, which cannot stimulate students' interest in learning and cannot effectively improve students' mathematical thinking ability.

1. The importance of cultivating students' mathematical thinking ability in higher vocational mathematics teaching

1.1 Mathematical thinking ability is an essential basic ability for higher vocational students

As a basic subject, mathematics' logic and abstraction provide students with unique thinking training opportunities. Students can exercise their thinking abilities such as logical reasoning, inductive classification, and spatial imagination, which is very important for students through the study of mathematics. It is important for them to better understand and apply mathematical knowledge, as well as solve problems in other subjects and in daily life.

1.2 Cultivating students' mathematical thinking abilities also helps improve teaching effectiveness from a teaching perspective

When students' mathematical thinking abilities are effectively cultivated, they are able to better understand and apply mathematical knowledge, reducing their over-reliance on teachers, thereby reducing teachers' teaching pressure. At the same time, students' active participation and proactive thinking can also make the classroom atmosphere more active and further improve teaching effectiveness.

2. Challenges faced by cultivating mathematical thinking ability in higher vocational colleges

It also has to face some obvious challenges in actual teaching^[1], although the cultivation of mathematical thinking ability plays such an important role in higher vocational mathematics teaching. On the one hand, the mathematical foundation of higher vocational students is uneven, which makes unified teaching difficult. On the other hand, traditional teaching methods often focus on the infusion of knowledge and neglect the cultivation of students' thinking ability, which also makes the cultivation of mathematical thinking ability an arduous task. In order to effectively cultivate students' mathematical thinking ability in higher vocational mathematics teaching, it is necessary to conduct in-depth analysis and response to relevant difficult factors.

3. Problems in improving and cultivating mathematical thinking ability in higher vocational colleges

3.1 Teachers do not pay attention to the cultivation of students' thinking ability

Influenced by the traditional concept of exam-oriented education, many teachers pay too much attention to students' mastery of theoretical knowledge in higher vocational mathematics teaching, while relatively neglecting the cultivation of students' abilities. Mathematics is a subject that requires high logical thinking. If we only emphasize the learning of theoretical knowledge and ignore the cultivation of students' abilities, it will lead to students who can master relevant knowledge but cannot apply it to solve practical problems. Internalize mathematical knowledge.

For example, in the process of teaching calculus, some teachers focus more on letting students master "technical" knowledge, but lack guidance and guidance for students on "Tao". As a result, although students have mastered a lot of mathematical knowledge, However, the ability in comprehensive application and innovative application is very weak, and the "unity of knowledge and action" is not enough, which restricts the gradual formation of students' innovative thinking ability, and also affects students' future career development and improvement of comprehensive quality ^[2].

3.2 Students generally lack motivation to learn

Students' learning enthusiasm is crucial for cultivating students' innovative thinking ability. However, judging from the reality, most higher vocational students have poor academic performance, failed the college entrance examination, and have certain deficiencies in learning confidence. In order to stimulate students' interest and enthusiasm in learning, teachers need to focus on innovation in the teaching process. For example, in teaching the concept of definite integrals, an "interesting" teaching method can be adopted, the design guidance and interest of PPT courseware can be enhanced, and the method of "problem introduction" can be added.

3.3 Teachers' teaching methods are too simple

In higher vocational mathematics teaching, teachers' teaching methods are too single, which is also one of the important reasons for students' lack of interest and enthusiasm in learning. At present, most teachers mainly use lecture-based and indoctrination-based teaching during teaching, and carry out various teaching activities from a theoretical level, lacking practicality.

In order to improve this problem, teachers need to continuously optimize and improve their teaching methods. For example, practical teaching links can be added, such as experimental teaching, case analysis, etc., to allow students to deepen their understanding and application of mathematical knowledge in actual operations ^[3]. At the same time, teachers can also use information technology to assist teaching, such as producing vivid multimedia courseware, using network resources, etc., to improve teaching effects and students' learning experience.

3.4 Lack of innovation in teaching ideas

In terms of cultivating students' innovative thinking ability, teachers' teaching ideas are crucial. However, some teachers still have the problem of lack of innovation in teaching ideas. This directly affects the cultivation of students' innovative thinking ability. Teachers need to constantly update teaching concepts and methods, and focus on cultivating students' innovative thinking and practical abilities in order to solve this problem.

Teachers need to pay attention to the individual differences and needs of students and carry out various mathematics teaching activities with students as the center. At the same time, teachers also need to focus on cultivating students' independent learning abilities and cooperative spirit, and stimulate students' learning interest and motivation by organizing group discussions, cooperative learning, etc.

4. Strategies to improve students' mathematical thinking ability in higher vocational mathematics teaching

4.1 Make timely changes in teaching concepts

In higher vocational mathematics teaching, the transformation of teaching concepts is the basis for cultivating students' mathematical thinking ability. Traditional teaching concepts often focus on imparting knowledge but ignore the cultivation of students' subjectivity and thinking ability. Therefore, mathematics teaching in higher vocational colleges needs to change its teaching philosophy to be student-centered and focus on cultivating students' mathematical thinking ability.

In actual teaching, higher vocational mathematics teaching should focus on student participation and experience, allowing students to actively participate in discussions, exchanges and thinking in class. Teachers should encourage students to put forward their own ideas and opinions, and guide students to discover and solve problems, thereby cultivating students' mathematical thinking abilities.

4.2 Construct a multi-dimensional interactive classroom teaching model

The construction of classroom teaching models is crucial to cultivating students' mathematical thinking abilities. The traditional classroom teaching model is often teacher-centered, and students are in a passive acceptance state, which is not conducive to cultivating students' mathematical thinking ability. Therefore, mathematics teaching in higher vocational colleges needs to build a multi-dimensional interactive classroom teaching model to allow students to develop mathematical thinking abilities in interactive communication.

In teaching practice, mathematics teaching in higher vocational colleges can adopt various forms such as group cooperation, case analysis, and classroom discussion to allow students to discover and solve problems through interactive communication. At the same time, teachers should also focus on guiding students to engage in independent learning and inquiry learning, so that students can develop mathematical thinking abilities through independent thinking and inquiry. In addition, the multi-dimensional interactive classroom teaching model also needs to pay attention to students' individual needs and provide differentiated teaching according to students' different characteristics and needs, so as to better cultivate students' mathematical thinking abilities.

4.3 Targeted cultivation of mathematical thinking with the help of mind maps

Mind map is an effective thinking tool that can help students better organize their thinking and deepen their understanding. In higher vocational mathematics teaching, teachers can use mind maps to carry out targeted cultivation of mathematical thinking.

First of all, teachers can help students form a systematic understanding of mathematical knowledge through the production and application of mind maps. For example, teachers can review the content with students and jointly create mind maps to clearly present the connections and logical relationships between knowledge points after learning a chapter of calculus. This can not only help students deepen their understanding of knowledge, but also cultivate students' logical thinking and structured thinking.

Secondly, teachers can use mind maps to conduct targeted thinking training. For example, when solving mathematical problems, teachers can guide students to use mind maps to analyze problems and sort out ideas, thereby helping students form a clear problem-solving framework and logical chain. This can not only improve students' problem-solving abilities, but also cultivate students' analytical and creative thinking.

4.4 Strengthen students' knowledge application ability from the perspective of life-oriented teaching

Mathematical knowledge comes from life and is also applied to life. In higher vocational mathematics teaching, teachers should focus on combining mathematical knowledge with practical applications and strengthening students' knowledge application abilities through a life-oriented teaching perspective.

Firstly, teachers can create mathematical problem situations related to life, so that students can feel the application value of mathematical knowledge in the process of solving practical problems. For example, when teaching knowledge related to mathematical modeling, teachers can introduce some practical cases and let students try to build mathematical models to solve practical problems. This can not only improve students' mathematical modeling abilities, but also cultivate students' application awareness and practical abilities.

Secondly, teachers can guide students to participate in daily mathematical practice activities. For example, students are organized to conduct social surveys, data analysis and other practical activities, so that students can use mathematical knowledge to solve practical problems in practice. This can not only improve students' practical abilities, but also cultivate students' innovative thinking and teamwork abilities.

Conclusion:

Improving the mathematical thinking ability of higher vocational students is a long-term and arduous task. In actual training, it is necessary to take comprehensive measures to improve students' mathematical thinking ability from various aspects such as teaching content and methods, students' own factors, teaching resources and environment to cultivate more high-quality talents with innovative spirit and practical ability.

References:

- [1] Wumei Yang. (2018). A brief analysis of the cultivation of innovative thinking ability in higher vocational mathematics teaching. *Science and Education Wenhui*,(12):98-99.
- [2] Huifang Shi.(2020). Exploration on integrating the spirit of mathematics into the ideological and political teaching of higher vocational mathematics courses. *Vocational Technology*, 19(12): 41-46.
- [3] Yajia Liu. (2020). Exploration and thinking on integrating mathematics culture into higher vocational mathematics teaching. *Science and Technology Vision*, (16): 148-149.

About the author:

Liyao Liu (1983.6-) Female, Master's Degree, Research direction: Mathematics Research in Higher Vocational Colleges