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Exploration of cultivating students' autonomous problem-solving ability in college mathematics teaching

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Abstract: With the continuous development of information technology and the arrival of globalization, the demand for talents in society is becoming increasingly urgent. At the same time, talents from all walks of life also need to continuously improve their ability to independently solve problems in order to adapt to the requirements of the rapidly developing era. College mathematics education also faces the challenge of cultivating students' ability to solve problems independently. This situation makes it difficult for the traditional teaching mode that focuses on "teaching" and "training" to meet the needs of cultivating high-quality talents. Therefore, this article explores the cultivation of students' autonomous problem-solving ability in college mathematics teaching.

Key words: college mathematics teaching; students' autonomous problem-solving ability; analysis of training

1 Introduction

With the rapid development of society and the explosive growth of knowledge, traditional teaching models are no longer able to meet the needs of students. Therefore, college mathematics education needs to focus on cultivating students' autonomous problem-solving ability, enabling them to have the ability to face complex problems and innovative thinking. However, traditional mathematics teaching often focuses on imparting theoretical knowledge and lacks the cultivation of students' practical problem-solving abilities. Students passively receive knowledge in the classroom, lacking initiative and creativity. Therefore, if teachers only focus on whether students' answers are correct and neglect their problem-solving process and thinking methods, it is even more detrimental to cultivating students' abilities.

2 The current status of cultivating students' ability to solve problems independently in college mathematics teaching

2.1 Teaching status

The current situation of cultivating students' ability to solve problems independently in college mathematics teaching is not optimistic. There are some problems in the current teaching situation. Firstly, traditional mathematics teaching still relies on "teaching" and "exercise" as the main methods. Teachers play the role of knowledge imparters, while students passively receive information. This teaching mode limits students' thinking development and the cultivation of their ability to solve problems independently. Secondly, under the exam-oriented evaluation system, students tend to focus more on exam taking skills and answering methods, while neglecting the cultivation of understanding the essence of problems and

problem-solving strategies. This makes students more inclined to mechanically memorize formulas and algorithms, rather than truly understand the essence and applications of mathematics. In addition, teaching in large classes is also a challenge.

2.2 Student status

In terms of the current situation of students, due to the long-term influence of traditional teaching models, many college mathematics students face some difficulties in their ability to solve problems independently. Firstly, some students lack the ability to think deeply and analyze problems. They may be more accustomed to using mechanical formulas and algorithms to solve problems, but lack an understanding and abstraction ability of the essence of the problem, which makes them feel at a loss when facing complex practical problems. Secondly, some students have low interest and motivation in mathematics, lacking initiative and creativity. They may view mathematics as a boring subject and only study with a mindset of dealing with exams. This negative learning attitude limits their enthusiasm and motivation to develop autonomous problem-solving abilities. In addition, some students lack effective learning strategies and methods, and do not know how to accurately analyze and handle problems. They may feel confused when facing complicated mathematical problems, unsure of where to start and unable to find a solution. This situation may cause them to easily give up or feel frustrated when encountering difficulties in mathematics learning. Some students also have differences in their learning abilities, and their understanding and mastery of mathematics may be relatively slow. In traditional large class teaching, teachers find it difficult to provide these students with sufficient personalized guidance and support, resulting in slow progress in problem-solving.

3 The significance of cultivating students' autonomous problem-solving ability in college mathematics teaching

Cultivating students' ability to solve problems independently in college mathematics teaching is of great significance. Firstly, cultivating students' ability to solve problems independently can help improve their innovative thinking and logical reasoning abilities. Mathematics is a discipline that requires abstract thinking and logical reasoning. By cultivating students' ability to solve problems independently, it can stimulate their thinking vitality and creativity, and improve their innovation and problem-solving abilities. Secondly, the cultivation of students' ability to solve problems independently helps to promote students' lifelong learning ability. In a rapidly changing society, knowledge updates rapidly, and students need to have the ability to actively learn and independently solve problems to cope with future challenges. By cultivating students' ability to solve problems independently, it can make students become more confident and flexible when facing new fields and problems. In addition, cultivating students' ability to solve problems independently can also improve their practical application abilities. Mathematics, as a widely applied discipline, enables students to better apply mathematical knowledge to practical problem-solving and improve their practical application abilities after mastering the ability to solve problems independently. Finally, cultivating students' ability to solve problems independently can help improve their professional competitiveness. In the current fierce job market, enterprises and institutions pay more attention to the comprehensive quality of talents, especially their innovation ability and problem-solving ability. By developing independent problem-solving abilities, students can have stronger competitiveness and better adapt to the development needs of society. Therefore, cultivating students' ability to solve problems independently in college mathematics teaching is of great significance. It can not only improve students' academic level, but also lay a solid foundation for their future development.

4 Strategies for cultivating students' autonomous problem-solving ability in college mathematics teaching

4.1 Enhancing students' confidence based on the student-centered approach

Gorky once said, "Only those who are full of confidence can immerse themselves in life and fulfill their will everywhere." From this sentence, we can see that confidence plays an important role for everyone that cannot be ignored, as the saying goes, "Confidence is the cornerstone of success." In college mathematics problem-solving, students' confidence is an indispensable tool [1]. Therefore, in college mathematics teaching, attention should be paid to cultivating and enhancing their confidence in problem-solving.

Teachers should encourage students to actively participate in classroom discussions and problem-solving processes, and stimulate students' interest and participation through questioning, interaction, and group activities, which can make students feel that their voices are heard and respected, thereby increasing their confidence in solving mathematical problems. Furthermore, teachers should pay attention to the individual differences of students and understand the learning characteristics and potential of each student. Through communication and observation with students, teachers can discover their potential and encourage them to showcase their ideas and methods during problem-solving. At the same time, teachers should also give students full praise and affirmation, encouraging them to persist in trying and exploring new problem-solving ideas. Teachers should promptly acknowledge students' efforts and achievements. Regardless of the students' achievements in problem-solving, appropriate praise and encouragement should be given, which can stimulate students' enthusiasm and motivation, and enhance their confidence in solving mathematical problems. Finally, teachers should give students enough time and space to solve problems. The problem-solving process may face difficulties and setbacks, but students need to have enough patience and perseverance to overcome difficulties. Teachers can guide students to analyze the difficulties and key points of problems, provide necessary guidance and support, but at the same time, they should also respect students' independent thinking and problem-solving abilities, so that students have confidence in their own abilities.

4.2 Creating problem scenarios to stimulate students' interest

Interest is the best teacher for students, and problems are the best guidance for students. In the teaching of college mathematics, creating problem situations can stimulate students' interest in solving problems independently. Creating problem situations is another important strategy for cultivating students' ability to solve problems independently. By combining abstract mathematical concepts with practical problems, teachers can stimulate students' interest and curiosity in mathematics, enabling them to actively participate in the problem-solving process [2].

Firstly, teachers can select mathematical problems with practical backgrounds and application scenarios and introduce them into the classroom. For example, when explaining the concept of functions, teachers can use real-life function problems as introductions to make students feel the importance of mathematics in solving practical problems. This problem scenario can help students establish a connection between mathematical knowledge and practical applications, inspiring their desire to actively think and solve problems. Secondly, teachers can design interesting and challenging questions to arouse students' interest and thirst for knowledge. These problems can go beyond the textbook content and require students to use their mathematical knowledge to reason and analyze, and find solutions. For example, it is possible to pose a difficult problem about sequences or probabilities, allowing students to brainstorm and try to solve it. Such problem situations can stimulate students' thinking ability and creativity, and cultivate their spirit of continuous exploration and challenge in problem-solving. In addition, teachers can also use technological means, such as mathematical modeling software or online interaction platforms, to create virtual scenarios and present mathematical problems. Through visualization and interaction, let students participate in the process of problem modeling and solving. This kind of problem scenario can increase students' intuitive perception and understanding of mathematical problems, and stimulate their initiative to solve problems [3].

5 Conclusion

The importance of cultivating students' ability to solve problems independently in college mathematics teaching is self-evident, and it plays an indispensable role in improving students' comprehensive literacy and future development. This article explores to some extent the cultivation of students' ability to solve problems independently in college mathematics teaching, and puts forward some suggestions. In summary, cultivating students' ability to solve problems independently requires the joint cooperation and efforts of teachers and students. Only through continuous practice and experience accumulation can students gradually improve their problem-solving ability and lay a solid foundation for future learning and work.

Conflicts of interest

The author declares no conflicts of interest regarding the publication of this paper.

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