

Research on Exercise Design Method Based on Cultivation of Students' Mathematical Thinking Ability

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Abstract: In the new curriculum standard, students are required to have the spirit of innovation. Good exercise training can not only stimulate students' spirit of innovation but also cultivate students' ability of mathematical thinking. In junior middle school mathematics teaching, we should not only pay attention to the improvement of students' mathematical literacy, but also pay attention to the improvement of students' learning quality. Exercise teaching and design is an important part of middle school mathematics classroom teaching. Exercise training can improve students' ability to solve mathematical problems, improve mathematical literacy and mathematical thinking ability. Therefore, in order to cultivate students' mathematical thinking ability as the purpose, this paper summarizes a better way of design, which is of great significance to improve the quality of mathematics classroom teaching.

Keywords: middle school mathematics, exercise design, mathematical thinking ability

1. Problem Raising

The quality and efficiency of teaching has always been a concern. The new curriculum reform puts forward requirements on students' mathematical ability. For example, students should understand the basic mathematical concepts, the nature of mathematical conclusions, and understand the background of their production through different forms. Through independent learning, students can conduct exploratory activities, experience the process of mathematical discovery and creation, and improve students' ability to analyze and solve problems. Cultivate interest in learning mathematics and help students establish confidence in learning mathematics.^[1]

Exercise training plays a key role in mathematics classroom teaching. As the only way to learn mathematics, it is convenient for teachers to obtain students' feedback information through exercises, and is an important tool to test their own teaching results and students' learning results. On the other hand, improve students' grasp and understanding of important mathematical knowledge and mathematical thinking and methods, so that students can learn how to use and transfer knowledge, from blindly accepting to actively exploring. In the middle school math exercises class, we should pay attention to students' mastery of knowledge and skills, realize that students are people with great development potential, and meet the needs of students in real life. As the focus of teaching work, we should train students' mathematical thinking ability from many aspects, and cultivate students' innovative consciousness and ability.

2. Analysis on the Present Situation of Exercise Design in Mathematics Teaching

By reading relevant literature, it summarizes some shortcomings of exercise design in the current mathematics teaching classroom:

Some teachers make students become passive receivers in classroom teaching, and unilaterally export knowledge in class without considering the absorption effect of students, so that students' creativity cannot be developed^[2]. This will make the classroom atmosphere become dull and low, the classroom effect and quality can not be guaranteed.

In the process of exercise teaching, teachers cannot summarize problems into the form of problem string, which is not perfect for the superposition of different types of skills, which is not conducive to

students' systematic absorption of knowledge.

Under the background of the new curriculum reform, it emphasizes the cultivation of students' logical thinking ability, independent operation ability and problem solving ability. However, some places still lack of attention to this aspect, and the teaching quality and efficiency cannot be effectively improved^[3].

In the teaching of mathematics, it is easy for teachers to lose sight of the potential functions of the examples and exercises in the textbook. In the process of helping students improve their problem-solving ability, it is necessary to carry out regular exercises for students. Teachers should pay more attention to the selection of exercises, which will affect students' mastery of knowledge. Teachers tend to neglect the selection of exercises in teaching and fail to make exercise design play a greater role^[4].

As mathematics is a relatively abstract subject, some difficult to understand will affect students' interest in learning mathematics. Sometimes the exercises involved in math class are out of the context of life, which will cause students to be unable to form correct cognition, unable to apply what they learn, and unable to achieve the preset learning effect. Teachers should be good at mobilizing a positive classroom atmosphere, let students contact more real life situation exercises, let students have a new understanding of mathematics in the mind.

3. The Role of Mathematical Thinking Ability in Mathematics Learning

In the teaching of mathematics, students will apply many qualities of mathematical thinking. In the process of learning mathematical knowledge, students must also have the following mathematical abilities: observation and experiment, comparison, classification, deduction, induction and mathematical induction, analysis and synthesis, abstraction and generalization, generalization and specialization, modeling and concretization, analogy and mapping, association and conjecture, etc. They are the most basic means of mathematical thinking operation, and there is a close relationship between the content, form and quality of thought. Therefore, the quality of mathematical thinking is very important to the quality of students' mathematical learning.

4. The Significance of Exercise Design in Mathematics Teaching

The problem design in mathematics teaching should meet the educational requirement of cultivating talents and improve the overall quality of the students. To design exercises well in a mathematics class, teachers need to know the basic knowledge and ability of students in the class, develop a set of effective teaching methods, formulate scientific teaching strategies, and implement them into teaching work according to teaching requirements^[5]. The main purpose of mathematics teaching is to improve the core quality of mathematics, teachers should do a good job in mathematics teaching exercise design, better achieve the teaching objectives.

5. Cultivate Students' Mathematical Thinking Ability Through Exercise Training

Exercise design, as an important link in the mathematics classroom, requires teachers to conduct scientific design and training, so that students can understand and think about the learned knowledge from new aspects, improve their knowledge structure, and improve their mathematical thinking ability to a certain extent. The following is an analysis of the ways of students' mathematical thinking ability through exercise training.

5.1 Conduct Exercises Training for Students Differently to Enhance Their Thinking Agility

The agility of students' thinking is reflected in the speed of doing the problem when doing the problem correctly. In the teaching of mathematics classroom, teachers should emphasize the concept and application of mathematics, have a deeper understanding of the abstractness of mathematics, and improve the speed of students to solve problems. Different understanding of mathematical knowledge and different ways of thinking will lead to different problem-solving speeds. In the process of teaching, attention should be paid to improving the problem-solving speed of students in exercise training. In practice and training, some similar knowledge points are put together for comparative analysis to find the similarities in solving problems. They are interrelated and different^[6]. By comparing and analyzing

similar questions, students can improve their speed in the process, which is conducive to students' mastering of knowledge and skills.

5.2 Strengthen the Exercise Training of Students' Categorization and Enhance Their Flexibility of Thinking

In the process of mathematics teaching, teachers should enhance the variability, let students have more imagination space, train students to consider problems from multiple aspects, explore their own ideas, and enhance the flexibility of students' thinking. In mathematics classroom teaching, more attention should be paid to the use of variable teaching. As a typical representative of categorization exercises, students can have a clearer and deeper understanding of mathematical concepts through careful observation and analysis, which is conducive to improving the efficiency of teaching [5]. In the classroom teaching of mathematical formula, for example, students are required to master different deformation of the same formula or flexible transfer of question types, which can enhance the flexibility of students' mathematical thinking.

5.3 Strengthen the Exercise Training of Students' Judgment and Enhance the Accuracy of Students' Thinking

In the teaching of mathematics class, students should be centered, and the accuracy and depth of thinking should be cultivated according to the different mathematical ability of each student, which is actually to cultivate students' mathematical ability. Let the students think about the problem comprehensively, understand the problem thoroughly, can see the essence of the problem through the phenomenon of the problem. Judgment exercise training refers to putting mistakes and correct forms together for students to judge. This exercise training is conducive to the cultivation of students' thinking accuracy.

5.4 Exercise Training to Enhance Students' Reciprocity and Broaden Students' Thinking

The broadness of thinking is a kind of difference from the conventional existence, thinking from all aspects, can not make the students' thinking in a closed state. In the process of mathematics classroom teaching, students should realize the reciprocal relationship between problem solving, so that they can not only solve problems in a positive way with mathematical knowledge, but also solve problems in a reverse way. In the face of problems, they can think both ways, which is conducive to cultivating students' flexibility of thinking.

For example: a middle school has 100 students to participate in table tennis competition, every loss will be eliminated, adhere to the last is the winner, every game will have to win or lose, when a few games, can select the champion.

In this case, it would be complicated and time-consuming to solve the problem directly from the heads. If we start from the tails and calculate the number of games played by 99 eliminated players, we will have 99 eliminated players and need 99 games in total.

5.5 Strengthen the Exercise Training of Students with Multiple Solutions to One Problem and Enhance the Creativity of Students' Thinking

In the classroom teaching of math exercises, teachers should be good at guiding students to think about problems from different levels and perspectives, and draw different conclusions from the same problem condition, so that students' mathematical thinking can be divergent, which is also the core of cultivating students' innovative thinking. Be good at guiding students to analyze and think about the same problem from different directions and interrelationships of events, and broaden students' horizons. The students' flexibility and creativity of thinking can be developed through the training of multiple solutions to one problem.

5.6 Strengthen the Exercise Training of Students' Question Types and Variations, and Enhance the Leap of Students' Thinking

In general, the order of thinking is: concept, judgment, reasoning, conclusion. The leapfrogging of thinking is reflected in ignoring some links and making the leapfrogging of thinking bigger. In the thinking training of students' variable teaching, they can transform the known and unknown more

quickly, ignore the secondary things, see the essence of the problem, and better play the role of intuitive inspiration in dealing with problems. Change the form and position of expression in the same background, so that students can skip some links to see the essence of the problem.

6. Conclusion

At the same time, exercise teaching can adopt the mode of "basic exercise, personalized exercise and innovative exercise", which can enable students of different levels to break through the existing thinking level and be reflected in the cognitive process of analysis, evaluation and creation.

The ongoing new curriculum reform has brought about some changes in both teaching content and teaching concepts, which is a challenge for students in learning and a test for teachers in teaching. Now the mathematics textbook retains the key content of the traditional textbook, but also adds some advanced and relatively novel content, including the mathematics frontier problems. At the same time, "link", "reading" and other text materials are added to the textbooks, which can expand the scope of students' knowledge. There are more questions that require students to think and do things, and more open questions appear in textbooks.

Because of these dramatic changes, it is not only more demanding for students, but also more challenging for teachers. Exercise training in middle school mathematics teaching is a very important teaching form in mathematics classroom, which will affect the level of cultivating students' mathematics core literacy and the quality and efficiency of teaching. Teachers should pay attention to the combination of teaching requirements and students' knowledge level to complete the exercise design scientifically, for knowledge can not only "warm Gu" do not "know the new", the exercise design can not be a single repeat, refuse to question sea tactics. Let students experience more real life math problems, enrich the teaching content, help students build a knowledge system, stimulate students' thirst for knowledge.

Mathematics teachers should think more about how to creatively cultivate students' mathematical thinking in the exercise teaching of mathematics. In the classroom, teachers should give students more time and space to think, guide students to find problems, analyze problems and summarize different question types to familiarize unfamiliar problems to solve problems, and cultivate students' mathematical thinking ability in this process. Let the students become the main body of learning, promote the development of all aspects of the quality of the students.

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